Fire Apparatus and Custom Fabricators

# SPECIFICATIONS

## FOR THE

# CITY OF WORTHINGTON DIVISION OF FIRE & EMERGENCY SERVICES

## ON A

# RESCUE-PUMPER

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Phone (859) 331 – 0360 Fax (859) 331 - 0399

**BID BOND**

Bids must be accompanied by a bid guarantee of not less than (10%) ten percent of the total amount of the bid. The guarantee may be in the form of a cashier's check, certified check, bank draft, or an irrevocable letter of credit, or a bid bond issued by a surety company licensed to issue such bonds in this state. Bond shall be issued by the manufacturer, bid bonds by salesperson or agents are not acceptable. NO EXCEPTIONS.

**PERFORMANCE BOND**

A 100% Performance bond shall be provided within 10 days after receipt of the awarded contract. The performance bond shall be furnished by the bidder of the apparatus proposed. Performance bonds by salesman or agents of manufacturer are not acceptable. NO EXCEPTIONS.

**APPROVAL DRAWINGS**

There shall be a complete set of drawings that are designed from the specifications and/or any change orders signed by the purchaser before construction begins. These drawings shall indicate the chassis make and model, location of lights, siren, horns, compartments and all major components of the unit. The signed drawings will become part of the contract documents. NO EXCEPTIONS.

**INSPECTION TRIPS**

City of Worthington will pay for Fire Division personnel to inspect this apparatus during construction; there shall be three (3) factory trips, which include the following:
One (1) pre-construction conference for the bid apparatus.
One (1) communications installation inspection.
One (1) final inspection and road test before delivery of the apparatus.

Bidder shall notify the Division of Fire at least two (2) weeks prior to each of these benchmarks.

The inspections shall be conducted during normal working hours Monday to Friday, the length of the inspection shall be determined by the Fire Chief. The apparatus shall be in finished condition and ready for delivery when the final inspection is scheduled.

A road performance test and pump test must be performed during the final inspection. Certificate of a third party testing of the pump must also be available for inspection.

**DELIVERY**

The completed unit shall be delivered to the Fire Department at a destination determined by the fire department.

After delivery, an appointment shall be made to have a factory representative present to familiarize those persons designated by the Fire Chief with the basic operation of the apparatus and its components.

The training shall be held for three (3) consecutive days, in order to instruct the members on all three shifts.

A draft course outline shall be provided by the Fire Chief or his representative, prior to delivery to ensure that the training procedures do not conflict with the Fire Divisions S.O.Ps.

The Fire Department may at their discretion videotape the instructional presentation for future reference and training.

## PRE-DELIVERY SERVICE

Immediately prior to delivery the apparatus shall receive a pre-delivery service consisting of: Engine oil and filter change, chassis lubrication, adjustment of engine to manufacturers specifications, complete inspection including all electrical and mechanical devices for proper operation, correction of leaks or obvious problems and complete cleaning and detailing.

## CHASSIS

## CAB AND CHASSIS

The cab and chassis shall be a Spartan Chassis, Inc. Flat Floor Gladiator, model GA42H, extended long four door, 20" raised roof over crew and driver-officer area, aluminum tilt cab, built specifically for the fire service by a publicly held U.S. parent company, specializing in chassis design for all fire service applications. The cab and chassis shall meet the requirements of the National Fire Protection Association Standard 1901, (2003 edition or latest edition).

## CAB CRASH TEST ECE-29

Spartan Chassis, Inc. has successfully submitted their extruded flat floor cab to the International crash test ECE-29, Addendum 28, revision 1. As part of the ECE regulation 29 tests, the frontal area of the cab is struck by a 3,700-pound pendulum weight. The weight is brought back to a sixty-degree angle and then the weight is released and allowed to swing forward, imparting some 32,600 lbs. of force to the cab front face. The cab must be so constructed that after the test, there will be minimal intrusion of cab structure into the passenger area. Note: After the test the Spartan cab doors remained usable for both entry and exit. Also, as part of the test the cab roof must withstand a static load bearing test. The Spartan cab withstood a weight of over 60,000 pounds without permanent damage or collapse. The above tests were witnessed by and attested to by an independent third party. The test results were recorded on/by cameras, high-speed imagers, accelerometers and strain gauges. Notarized copies of the letters verifying the test results and videos of said test are available upon request.

## ONE-YEAR CHASSIS WARRANTY

The chassis manufacturer shall warrant to the original purchaser the custom fire truck chassis for a period of twelve (12) months with the exception of the actual fire apparatus chassis frame, which carries a lifetime warranty. The warranty period shall begin on the date the vehicle is delivered to the original purchaser. The warranty may include conditional items, which shall be listed in the detailed warranty document that shall be provided upon request.

## CAB WARRANTY

The cab shall be warranted for a period of ten (10) years. Warranty conditions may apply and shall be listed in the detailed warranty document that shall be provided upon request.

## FRAME

The frame side rails shall be black powder coated "C' channel type 10.25" x 3.5" x .38" with an inner channel 9.44" x 3.13" x .38" of 110,000 psi minimum yield high strength steel, a RBM of 3,315,214 inch pounds and a section modulus of 30.14 cubic inches.

A minimum of seven (7) fully gusseted bolted assembly cross members shall be installed using grade 8 flanged head bolts and flanged lock nuts.

The area between the axle suspension hangers shall be free of any holes or fasteners in the flanges. No welding shall be incorporated in attachment of components. All frame dimensional cutting shall be by a plasma cutter. All relief areas shall be cut in with a minimum 2" radius at intersection points with ground smooth edges to prevent a stress focal point.

The frame and cross members shall carry a lifetime warranty to the original purchaser.

## PAINT FRAME AND CHASSIS UNDER CARRIAGE

The chassis under carriage consisting of frame, axles, driveline running gear, battery boxes, air tanks and other assorted chassis mounted components shall be painted with standard black paint. Paint shall be applied before airlines and electrical wiring is installed.

## CHASSIS WHEELBASE

The chassis wheelbase shall be over 199" and water tank shall be more than 1000 gallons.

## OVERALL HEIGHT

The height of the vehicle shall not exceed 132" from the ground.

## FUEL TANK

The fuel tank shall have a minimum capacity of sixty-eight (68) gallons. The baffled tank shall be made of 14-gauge phosphate coated steel with chromate epoxy exterior finish.

The fuel tank shall be mounted under the frame, behind the rear axle on straphangers with a "U" strap bolted front and rear so the tank can be easily dropped and removed. Tank shall have vent port to facilitate rapid filling without "blow-back". A roll over ball check vent shall be installed.

Dual drawtubes and dual sender ports shall be installed. A 2" NPT fill ports shall be available for right or left hand fill. A 1/2" NPT drain plug shall be centered in the bottom of the tank.

The standard fuel line for ISC and ISL engines will be nylon material rated for diesel fuel. All other engines will be steel wire braid reinforced rubber.

## FRONT BUMPER

A one piece, 10 gauge 304 polished stainless steel front bumpers shall be provided. The bumper shall be 101" wide and 12" high, two- (2) rib wrap-around type.

The bumper shall be extended 24" ahead of the cab.

**FRONT BUMPER APRON**

The front bumper apron if required shall be installed by the apparatus manufacturer.

**CHROME PLATED TOW EYES**

Two (2) chrome plated tow eyes shall be installed through the bumper. The eyes shall be fabricated from 3/4" thick #1020 ASMT-A36 hot rolled steel. The inside diameter of the eye shall be 2.00" and have a chamfered edge.

**AIR HORNS**

The air horns shall be provided and installed by the body manufacturer.

**AIR HORN ACTUATION**

The apparatus manufacturer shall install the air horn actuation.

**FRONT AXLE**

The front axle shall be an ArvinMeritor MFS-18 with a 3.74" drop and a 71.00" KPI. It shall have a capacity of 20,000 pounds GAWR.

The springs shall be taper type, four (4) leaf, 54" long and 4" wide with a military double wrapped front eye. Both spring eyes shall have a case hardened threaded bushing installed with lubrication counter bore and lubrication land off cross bore with grease fitting. The spring capacity shall meet or exceed the capacity of the front axle.

The hydraulic power assist steering gear shall be a TRW TAS-85. A Vickers hydraulic power steering pump shall be gear driven from the engine. The steering ratio shall be 23.3:1 and have 6.2 turns stop to stop.

**CHASSIS ALIGNMENT**

The chassis frame rails shall be crosschecked for length and squareness. Front and rear axles shall be laser aligned. Tires and wheels shall be aligned and toe-in set on the front tires at the chassis manufacturer's facility.

The completed apparatus should be rechecked for proper alignment after the chassis has been fully loaded.

**BRAKE DUST SHIELDS**

The front axle shall be equipped with brake dust shields.

**FRONT AXLE CRAMP ANGLE**

The hub piloted, MFS-18 model front axle cramp angle shall be a minimum of 50 degrees when using the 315/80R 22.5 front tires.

**FRONT TIRES**

The front tires shall be Michelin 315/80R 22.5 20PR "L" tubeless radial XZA1 highway tread with 22.5 x 9.00, ten (10) stud disc wheels. The tires and wheels shall be rated at 20,000 pounds.

**FRONT WHEELS ALUMINUM**

The front wheels shall be Accuride hub piloted, 9.00" x 22.5" polished aluminum wheels.

**FRONT WHEEL BEARINGS OIL LUBRICATED**

The front axle wheel bearings shall be oil lubricated and come equipped with an oil level visual inspection window.

**FRONT SHOCK ABSORBERS**

Two (2) Bilstein monotubular design, nitrogen gas charged shock absorbers shall be part of the front axle suspension. Bilstein shall warranty the shock for a period of five (5) years.

**STEERING COLUMN AND WHEEL**

The Douglas Autotech steering column shall be a seven (7)-position tilt and 2.25" telescopic type with an 18" steering wheel. The steering wheel shall be covered with black absorbite padding.

The steering column shall contain a horn button, self-canceling turn signal switch, four-way hazard switch and headlamp dimmer switch.

**DISC BRAKES**

The front axel shall have ArvinMeritor (Rockwell) ADB-1560 disc type brakes with 15” vented rotors providing a total of 120 sq. inches of braking area and automatic slack adjusters.

**REAR AXLE**

The rear axle shall be an ArvinMeritor model RS-26-185 with single reduction gearing and shall have a fire service rated capacity of 27,000 pounds GAWR.

**TOP SPEED**

The top speed of the vehicle shall be approximately 70 MPH +/-2 MPH at governed engine RPM.

**BRAKE DUST SHIELDS**

Only available on “S: cam brakes, not disc brakes.

**REAR BRAKES**

The rear brakes shall be Meritor 17” disc brakes with Meritor automatic slack adjusters.

**ABS BRAKE SYSTEM**

A Meritor Wabco four sensor four modulator anti-lock braking system shall be installed on the front and rear ArvinMeritor axles for safer vehicle control during braking and reduced stopping distance in skid conditions.

The electronic monitoring system shall incorporate diagonal circuitry to monitor wheel speed during braking through a sensor and tone ring on each wheel.

A dash mounted vacuum formed ABS composite lamp shall be provided to notify the driver of a system malfunction. A momentary test switch shall be installed to test the system for diagnostic codes.

The vacuum formed ABS composite system shall automatically disengage the auxiliary braking system device when required.

The Meritor Wabco vacuum formed ABS composite system shall have a three (3) year or 300,000 mile warranty provided by Meritor Wabco Vehicle Control Systems.

**REAR TIRES**

The rear tires shall be Michelin 12R 22.5 16PR "H" tubeless radial XDN2 highway tread with 22.5 x 8.25, ten (10) stud disc wheels. Tires and wheels shall be rated at 27,120 pounds.

**REAR WHEELS ALUMINUM**

The single rear axle wheels shall be Accuride hub piloted, 8.25" x 22.5" polished aluminum wheels.

**OIL LUBRICATED REAR WHEEL BEARINGS**

The rear axle shall have oil lubricated wheel bearings.

**REAR SUSPENSION**

The single rear axle suspension shall be a New Way air suspension with a single air bag on a pivoting torque arm assembly with nylon track pads on frame side and shock absorbers.

Dual air height control valves shall be installed to insure equal frame height on both sides of the vehicle regardless of load.

The rear air suspension shall have a maximum rated capacity of 27,000 pounds GAWR.

**AXLE COVER KIT STAINLESS STEEL (ALL WHEELS)**

The front and rear wheels shall have stainless steel lug nut covers. The front axles shall be covered with stainless steel baby moons with hole to view oil seal window. The rear axles shall be covered with foam mounted stainless steel high hats.

The lug nut covers, baby moons and high hats shall be American made Real Wheels brand mirror finish, 304L grade, and non-corrosive stainless steel meeting D.O.T. certification standards. All stainless steel baby moons and high hats shall carry a lifetime warranty.

**VOGEL LUBRICATION SYSTEM**

A Vogel Lubrication system shall be installed on the chassis. The system shall be capable of lubricating 24 grease points on the chassis. A park brake interlock is incorporated into the ignition system to keep the system from operating while parked.

**SINGLE REAR AXLE AIR BRAKE SYSTEM**

A FMVSS 121 and NFPA rapid build-up, compliant air brake system shall be provided. It shall include three (3) air reservoirs with a total of 4136 cubic inch of air capacity.

A Bendix E6 floor mounted tread valve shall be mounted in the cab for service brake control.

A Bendix PP1 control valve shall operate the parking brake system.

Emergency braking shall be controlled through the Bendix treadle valve and modulated through a Meritor Wabco inversion valve.

The rear axle spring brakes are to automatically apply in case of air pressure loss below 60 psi with a mechanical means for releasing the spring brake chambers.

## CENTER MOUNTED PARKING BRAKE ACTUATION VALVE

The parking brake actuation valve (PP-1) shall be moved to the center of the dash within reach of both the driver and officer.

## AIR DRYER

A Meritor Wabco system saver 1200 spin-on desiccant air dryer with a 12-volt, 100-watt automatic heated moisture ejector shall be installed in the air brake system.

The air dryer incorporates an internal turbo cutoff valve that closes the path between the air compressor and air dryer purge valve during the compressor "unload" cycle. The turbo cutoff valve allows purging of moisture and contaminants without the loss of turbo boost pressure.

The Meritor Wabco air dryer shall come with a three (3) year or 300,000-mile warranty provided by Meritor Wabco Vehicle Control Systems.

## MANUAL DRAINS ON AIR TANKS

Manual drains shall be installed on all reservoirs of the air brake system.

## AUTOMATIC MOISTURE EJECTORS ON AIR TANKS

Automatic moisture ejectors shall be installed in addition to the manual drain valves.

## NYLON AIR LINE TUBING

A dual air system plumbed with color-coded reinforced nylon tubing air lines shall be installed. The primary (rear) brake line shall be green; the secondary (front) brake line red, the parking brake line orange and the auxiliary (outlet) will be blue.

Brass compression type fittings shall be used on the nylon tubing. All drop hoses shall be fiber reinforced neoprene covered hoses.

## AIR COMPRESSOR

The air compressor on the engine shall be a Bendix BA-921 rated as being capable of producing a minimum of 15.8 cfm. It shall be gear driven, engine oil pressure lubricated and cooled by the engine cooling system.

## ENGINE

A Caterpillar C13 430HP turbocharged, air to air after cooled engine shall be provided.

TYPE:
In-Line six (6) cylinder, 4 cycle

HORSEPOWER:
430 @ 2100 rpm

TORQUE:
1550 lbs. @ 1200 rpm

DISPLACEMENT:
763 cu.in.

GOVERNOR:
Electronic

A wiring harness shall be provided with a drop out at the back of the cab. The harness shall include a connector to allow an optional harness for the pump panel to be plugged into it. Circuits shall be provided for multiplexed gauges (tachometer, oil pressure and engine temperature). Hand throttle, high idle and PSG system. A circuit for J1939 data link shall also be provided at the drop out.

A spin on engine coolant filter with shut-off valve shall be provided.

An engine mounted combination full flow/by-pass oil filter with replaceable spin on cartridge shall be part of the engine's lubrication system.

## ENGINE WARRANTY

The Caterpillar engine shall be warranted for a period of five (5) years or 200,000 miles, whichever occurs first.

## ENGINE OIL LEVEL CHECK

A low engine oil level switch shall be provided that will indicate when the engine oil is approximately four (4) quarts or more low. The switch shall light a red "LOW OIL LEVEL" indicator light in the dash. The indicator shall only function while the ignition switch is on and the engine is not running.

## FUEL WATER SEPARATOR WITH LIGHT AND ALARM

A Caterpillar combination primary filter/fuel water separator shall be installed with an instrument panel lamp and audible alarm to indicate when water is present in the fuel. The secondary filter shall also be provided and mounted on the engine in a convenient serviceable location.

## CAT ENGINE BRAKE

A Cat engine compression brake, for the six (6)-cylinder engines, with brake light actuation and cutout relay when in pump mode shall be installed. The engine brake will activate upon release of accelerator when in operation mode. A dash mounted switch with "On/Off" and High/Med/Low functions shall be installed.

## EXHAUST SYSTEM VERTICAL EXHAUST CONVERSION

An aluminized muffler with the inlet and outlet located on the same end of the muffler shall be supplied by the chassis manufacturer, to allow easy conversion to a vertical exhaust by the apparatus builder.

Exhaust tubing shall be .065 thick aluminized steel supported by bolted on frame brackets.

Stainless steel flex tubing is to be installed between the exhaust pipe and muffler. All exhaust system joints shall be connected with lapping band clamps.

## AIR CLEANER

The air cleaner shall be Farr #62891-001 dry type with a replaceable element, it shall have an outside air intake with an ember separator filter and an indicator light in the warning light cluster to show when the air cleaner element requires replacement.

## COOLING SYSTEM

The cooling system shall have sufficient capacity 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 and EPA requirements. 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 into the adjoining cores.

### 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.

### Surge Tank

The cooling system shall be equipped with a surge tank that is capable of being filled and removing entrained air from the system. The surge tank shall be equipped with a low coolant probe and sight glass to monitor the level of the coolant. The surge tank shall have a cap that meets the engine manufactures pressure requirements as well as the system design requirements.

### Coolant

The cooling package shall have Extended Life Coolant (ELC) installed. The use of supplemental coolant additives (SCA's) will not be allowed, as this is part of the extended life coolant makeup. The use of ELC provides longer life and change intervals providing improved performance. The coolant shall contain ethylene glycol and deionized water to keep the coolant from freezing to a temperature of -34 degrees F.

### Coolant Filters

Engines equipped with coolant filters will be supplied with standard non-chemical type filters.

### Hoses/Clamps

All radiator tubes shall be formed from aluminized steel tubing and installed with silicone hoses with stainless steel constant torque clamps.

Recirculation Shields
Recirculation shields shall be installed where required to prevent heated air from reentering the cooling package and affecting the performance. When a center hose well is installed an additional shield may be required to redirect the airflow into the coolers.

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

Hoses/Clamps
All charge air cooler tubes shall be formed from aluminized steel tubing and installed with silicone hump hoses and stainless steel "T" style clamps meeting the engine manufactures requirements.

## COOLING SYSTEM FAN

The engine cooling system shall incorporate a heavy-duty composite fan, belt driven on the engine. A shroud and Recirculation shield system shall be used to ensure air that has passed through the radiator is not drawn through it again.

## TRANSMISSION COOLING SYSTEM

Transmission Cooler
The transmission cooler shall be a cross flow air to oil design constructed completely of aluminum with welded side tanks. The transmission cooler shall be bolted to the bottom of the radiator to allow a single depth core, allowing a more efficient and serviceable cooling system. The transmission cooler shall be mounted in such a manner as not to extend below the chassis frame by more than 1", allowing greater approach angles and ground clearance.

Transmission Heat Exchanger
The transmission oil to water heat exchanger shall be installed to aid in cold climate conditions maintaining the transmission temperature at the operational level.

## STOP, TAIL, TURN AND BACK-UP LIGHT WIRING

Individual wires shall be run to the rear of the chassis for the stoplight, turn signal, taillight and back-up lights.

## SYNTHETIC TRANSMISSION FLUID

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

## TRANSMISSION

The transmission shall be an Allison 4000 EVS automatic with electronic controls. The transmission will have two (2) 10-bolt PTO pads.

The transmission shall be equipped with an air to oil transmission cooler located below the radiator allowing a single depth core and efficient cooling package. The transmission cooler shall be mounted in a manner to allow maximum approach angle by not protruding below the frame more than an inch. The transmission cooler shall be constructed completely of aluminum with welded side tanks. The transmission shall have two (2) internal oil filters.

Fourth gear hold-in range may be accomplished through wiring for a pumping application.

The transmission gear ratios shall be:
1st 3.51:1
2nd 1.91:1
3rd 1.43:1
4th 1.00:1
5th 0.74:1
6th 0.64:1 (if applicable)
Rev 4.80

**TRANSMISSION TOUCH PAD**

An Allison pressure sensitive range selector touch pad shall be provided and located to the right of the driver within clear view and reach.

**TRANSMISSION MODE**

The transmission, upon start-up, will select four- (4) speed operation. By pressing the "mode" switch on the shift pad (mode on) provides five- (5) speed overdrive.

**DRIVELINES**

All drivelines shall be 1810 heavy-duty series with "glide coat" splines on all slip shafts.

**TRANSMISSION WARRANTY**

The Allison 4000 EVS series transmission shall be warranted for a period of five (5) years with unlimited mileage. Parts and labor shall be included in the warranty.

The transmission must be filled with Transynd synthetic fluid or approved equal.

**MULTIPLEX ELECTRICAL SYSTEM WITH COLOR DISPLAY**

A Weldon multiplex electrical system shall be supplied. The system shall be a single starting type, installed per NFPA 1901. The electrical system shall be 12 volt, suppressed per SAE J551 with six (6) HarrisBCI-31 950 CCA batteries with 210 minute reserve capacity and 3/0 welding type dual path starter cables per SAE J541.

The Multiplexed wiring system shall include the following:
* Provisions for a driver's dash mounted information center with approximately 4"H (92mm) x approximately 6"W (159mm) color LCD screen.
* Systems Diagnostic Menu and controls.
* Solid state switching.
* Complete Peer to Peer network architecture.
* Weatherproof Nodes and sealed Deutsch connectors.
* Sequences and sheds electrical loads.

The Vista III Display Node shall include the following features:
* Automatic climate control when an air conditioning system is ordered.
* Outside temperature display.
* A real time clock with display.
* Three (3) programmable video inputs.
* A useable temperature range from -40 degrees to 185 degrees F.
* Unlimited virtual switches.
* Selectable font sizes, types and colors for optimum user efficiency.
* Selectable color buttons and screen backgrounds.

All wiring to be appropriate gauge cross link with 311 degree F. insulation. All wires in the chassis shall be circuit numbered and function coded, in addition the SAE wiring will be color coded. The wiring shall be protected by 275 degree F. minimum high temperature flame retardant loom as required.

The starting system shall be supplied with the following:
One (1) Cole-Hersee #2484 master battery switch.
One (1) Cole-Hersee #EX26654A ignition switch.
One (1) starter button.
One (1) green LED indicator for battery "on".
One (1) green LED indicator for ignition "on"

Features included with the Multiplex system include:
Back-up Alarm Disable
The fuction will allow the driver to turn the back-up alarm off. The back-up alarm shall automatically reset to sound the next time the transmission is placed in reverse.

Incandescent Ground Lighting Below Each Door
The cab shall be equipped with Trucklite model #40003 sealed bulb, incandescent lighting under each cab door. The lights will be activated by either a single switch on the dash or each respective door switch.

Alternating Headlights
An alternating high beam headlamp flashing system shall be installed into the high beam headlamp system that will allow the high beams to flash alternately from left to right.

The completed system shall be capable of using high beam to override flashing function and will flash high beams only when the low beam headlamps are selected.

Audible Alarm for Open Door Light
An audible alarm shall be wired to the open door light, which will sound when a door is open and the air brake is off with the vehicle in gear.

## BATTERY JUMPER STUDS

Battery jumper studs shall be provided in the driver's step area. The studs allow the vehicle to be jump-started or cab to be raised in an emergency due to battery failure.

## INSTRUMENTATION

An ergonomically designed instrument panel shall be provided. The gauges shall be backlit with red LED lamps. All gauges shall be driven by stepper motor movements. The instrumentation system shall be multiplexed and shall receive engine and transmission information over the J1587 data bus to reduce the number of redundant sensors.

The instrument panel shall contain the following gauges:
One (1) electronic tachometer with integral digital hour meter. The scale on the tachometer shall read from 0 to 3000 RPM. The hour meter shall display engine hours of operation.

One (1) electronic speedometer with integral digital odometer/trip odometer. The speedometer shall have a dual scale with miles per hour (MPH) as the dominant scale and kilometers per hour (KPH) on the minor scale. The speedometer scale shall read from 5 to 85 MPH (5 to 140 KPH). The odometer shall display miles.

One (1) three function gauge with primary air pressure, secondary air pressure and fuel level. The scale on the air pressure gauges shall read from 0 to 140 pounds per square inch (PSI). The air pressure scales shall be non-linear to expand the scales in the region of normal operation. The scale on the fuel level gauge shall read from empty to full.

One (1) four function gauge with engine oil pressure, coolant temperature, transmission oil temperature and a voltmeter. The scale on the engine oil pressure gauge shall read from 0 to 140 pounds per square inch (PSI). The engine oil pressure scale shall be non-linear to expand the scale in the region of normal operation. The scale on the coolant temperature gauge shall read from 100 to 250 degrees Fahrenheit (F). The scale on the transmission oil temperature gauge shall read from 100 to 300 degrees Fahrenheit (F). The scale on the voltmeter shall read from 8 to 16 volts.

The instrument panel shall contain an Annunciator Module that contains the following indicator lights. All indicator lights shall contain LED lamps.

### RED LAMPS
Stop Engine - indicates critical engine fault.
Park Brake - indicates park brake is set.
Low Fuel - indicates low fuel.
Cab Ajar - indicates tilt cab is not locked down. (1)
Volts - indicates high or low system voltage.
Low Oil Press - indicates low engine oil pressure.
High Coolant Temp - indicates excessive engine coolant temperature.
High Trans Temp - indicates excessive transmission oil temperature.
Low Air - indicates low air pressure in either system one or system two.
Low Coolant Level - indicates low engine coolant level. (1)
Low Oil Level - indicates low engine oil level. (1)
Air Filter - indicates excessive engine air intake restriction.

### YELLOW LAMPS
Check Engine - indicates non-critical engine fault.
Check Trans - indicates transmission fault.
Wait to Start - indicates active engine air preheat cycle. (2)
ABS - indicates anti-lock brake system fault.
Water in Fuel - indicates presence of water in fuel filter. (1)
Engine Maint - indicates engine maintenance is required. (1)

**GREEN LAMPS**

Left and Right turn signal indicators.
Aux Brake Active - indicates secondary braking device is active. (1)
High Idle - indicates engine high idle is active. (1)
Low Trac - indicates low wheel traction for automatic traction control (ATC) equipped vehicles, also indicates mud/snow mode is active for ATC system. (1)

**BLUE LAMP**

High beam indicator.

The instrumentation system shall provide a constant audible alarm for the following situations:
Low air pressure.
Low engine oil pressure.
High engine coolant temperature.
High transmission oil temperature.
Low coolant level. (1)
High or low system voltage
Critical engine fault (Stop Engine).

The instrumentation system will provide a three second alarm every three minutes for the following situations:
Low fuel.
Water in fuel. (1)

(1) Feature only available when optionally equipped.
(2) Feature only available on engines with preheat capability.

**OFFICER ROCKER SWITCH PANEL**

The officer's side switch panel shall be a blank panel with no switches to accommodate flush mounted devices.

**ROCKER SWITCH CONSOLE**

A three (3) section, double row switch console shall be provided and shall be an integral part of the engine tunnel, with easy switch access to both the driver and officer. The console will consist of an angled driver's side panel, center main panel and angled officer's side panel.

The switch console shall not be an add on type console.

**DRIVER ROCKER SWITCH PANEL**

The color Mux Vista display will be mounted in the right hand side of the panel. The driver's side panel shall include a rocker type headlight switch with instrument lamp slide dimmer, intermittent windshield wiper/washer switch and secondary braking device rocker switches.

**CENTER ROCKER SWITCH PANEL**

The center main rocker switch panel shall be a blank panel with no switches to accommodate flush mounted devices.

## POWER AND GROUND STUDS - BATTERY DIRECT

Power and grounding studs shall be provided and installed behind the electrical center cover with a breaker. The studs shall be #10 and capable of carrying up to a 40 amp battery direct load.

## ALTERNATOR

A 270 amp 12 volt Leece Neville alternator model #4949PA with integral regulator and #10 screw AC terminals shall be installed.

## PUMP PANEL HARNESS MID MOUNT

An apparatus interface wiring harness for the engine will be supplied with the chassis. The harness shall have a connector to connect to the chassis harness drop out at the back of the cab. The harness shall be for a mid-mount pump panel. The harness shall contain circuits for a Class 1 PSG control head, pressure transducer, ENFO III and 3 in 1 gauge connector multiplexed gauge connector which includes tachometer, engine temperature and engine oil pressure. Separate circuits are also included for engine oil pressure warning light, engine coolant temperature warning light, low fuel light, check engine light, stop engine light, high idle switch and high idle indicator light.

## MARKER LAMPS

Five (5) I.C.C. DOT approved Weldon model #9186-1500-20 Light Emitting Diode (LED) cab marker lamps shall be installed on the face of the cab above the windshield.

## INTERSECTOR LIGHTS

Two (2) Whelen 4x6 LED red wide angle warning lights shall be installed on each cab side over the front wheel wells to act as intersection lights.

## RED WARNING LIGHTS IN CAB DOORS

Four (4) red 2" x 5" LED Whelen flashing warning lights shall be provided on the inner surface of each cab door to serve as an indicator to oncoming traffic that the cab door is open.

## WARNING LIGHT

A Mars model TB8-P warning light shall be installed on the front of the cab below the windshield.

## ALTERNATING HEAD LAMP WARNING SYSTEM

An alternating high beam headlamp flashing system shall be installed into the high beam headlamp system that will allow the high beams to flash alternately from left to right.

The completed system shall be capable of using high beam to override flashing function and will flash high beams only when the low beam headlamps are selected.

## HEADLIGHTS

Four (4) rectangular halogen headlamps with a separate high and low beams in bright bezels shall be provided. The headlamps shall be equipped with a "Daytime Running" light feature, which will illuminate the headlights to 80% brilliance when the master switch is in the "On" position and the parking brake is released.

Two (2) round side turn side turn signal/marker lights shall be provided on the front cab corners.

## TURN SIGNALS - AMBER LED

Two (2) Whelen 4x6 amber LED programmable turn signals shall be installed outboard of the warning lights in matching bezels located above the headlamps.

## FLAT FLOOR ELFD 20" RAISED ROOF TILT CAB

The cab shall be a Spartan Chassis, Inc. Flat Floor, ELFD (extended long four doors), and 20" raised roof, aluminum tilt cab, capable of seating ten (10) firefighters.

The roof shall be raised 20" with windows in the upper portion above the doors.

The raised roof shall extend from the back of the cab to the center of the front doors to provide additional headroom for the driver and officer.

The cab shall be of the Eurospace interior design allowing for easy communication inside the cab. The cab overall length shall be 150.38" with 74.00" from the centerline of the front axle to the back of the cab.

The rear cab wall shall be .090" thick aluminum. The rear floor to the headliner height shall be 75.00".

The cab front skin and floor shall be .190" thick aluminum. The inside width shall be 90.00" and the front floor to the headliner height above the driver and officer shall be 78.00".

All glass used in the cab shall be automotive tint. The windshield shall have a maximum of 2890 sq. in. area and be of the wraparound design 52.88" wide and 27.88" high for maximum visibility. Left and right windshield shall use the same interchangeable glass.

A molded rubber 11" grab handle shall be provided on the hinge post inside the cab at both the driver and officer door for entering and exiting the cab.

The driver and officer seats shall have an 8.25" high x 12.69" wide x 15.13" deep compartment in the seat box beneath them. The compartment shall have a hinged door with an opening of 6.00" high x 12.50" wide.

Intermittent electric wipers with a single motor and electric powered "wet arm" type windshield washers shall be provided. Access to the wiper motor shall be through the driver's side headlamp module located on the front cab fascia.

## CLASSIC FRONT FACIA

The front cab fascia shall be constructed of aluminum, which will attach to the front cab skin and act as a fascia only.

The front fascia will cover the front aluminum cab structure from the bottom of the windshield down to the bottom of the cab. The front cab fascia shall have provisions for four (Hi/Low Beam) headlamps, turn signal lamps and up to four warning lamps.

The front fascia shall allow access to check and fill the engine oil and wiper washer fluid. Access is also provided for servicing the windshield wiper motor and linkage, ember separator, headlamps, electrical bulkhead connectors, transmission ECU and the multiplex V-Mux control.

## FLAT FLOOR CAB DOORS

The cab doors shall be flush, full-length type with hidden .375" stainless steel door hinges. All doors shall be equipped with push button type exterior latches, suitable for use with firefighter mittens, and keyed alike locks that are designed to prevent accidental lockout.

The interior latches shall be flush paddle type, which are incorporated into an upper door panel.

The front doors shall measure 43.00" wide x 77.00" high with .13" thick aluminum skins. The front steps shall be a two (2) step configuration with the lower step constructed of stainless steel open grate material and the intermediate step covered with embossed, NFPA compliant aluminum tread plate.

The following measurements shall apply:
First step: 11.44" deep x 31.13" wide
Intermediate step: 8.62" deep x 33.00" wide
Ground to first step: approximately 21.00"
First step to intermediate step: 11.00"
Intermediate step to floor: 11.00"

The rear doors shall measure 34.00" wide x 97.00" high with .13" thick aluminum skins. The rear steps shall be a two (2)-step configuration with the lower step constructed of stainless open grate material and the intermediate step covered with embossed, NFPA compliant aluminum tread plate.

The following measurements shall apply:
First step: 12.13" deep x 20.44" wide
Intermediate step: 10.50" deep x 23.00" wide
Ground to first step: approximately 21.00"
First step to intermediate step: 12.50"
Intermediate step to floor: 12.50"

## FRONT AND REAR ROLL DOWN DOOR WINDOWS

The front doors shall have a full roll down window 27.00" x 26.00" with a total glass area of 702 square inch each.

The rear doors shall have a roll down window 27.50" x 26.00" with a total glass area of 715 square inch each.

## ABS INNER DOOR PANELS

The inner door panels shall be a vacuum formed ABS composite upper panel and aluminum tread plate lower panel. A vacuum formed ABS composite insert pull cap shall be included with the front and rear door panels.

A clear 6.5"L x 3"H light shall be located in the molded panel of each door and activated when the door is opened.

## DOOR WARNING - CHEVRON

Four (4) Chevron reflective signs shall be installed on the lowest portion of the inner door panels, one (1) on each door. A stripe of reflective tape shall be installed at the outer edge of each door.

## STAINLESS TRIM

A stainless steel trim band, 10" high with upper and lower trim affixed without holes and fasteners shall be installed on the lower exterior sides of the cab and doors.

## ENGINE COVER

The fixed type engine cover shall be a maximum of 29.00" high x 41.50" wide. The cover shall be an integral part of the cab and made of 0.19" thick aluminum.

The interior cab side shall be covered with a vacuum formed ABS composite tapering to 26" on the sides to provide maximum hip and elbow room for the driver and officer.

The engine side of this area shall be heavily insulated with multi-layer insulating materials consisting of foam, a 1.0 lbs per sq ft sound barrier with a facing that resists heat transfer, and held in place by adhesive, aluminum stick pins and retention caps. All exposed insulation seams and edges are sealed to reduce moisture contamination and debris build up.

The cover shall incorporate the integral rocker switch console and incorporate a latching electrical component access cover to allow complete access to the underside of the switch panel assembly, electrical harness and components.

## MOBILE DATA TERMINAL PROVISION - ABS DASH

A Mobile Data Terminal (MDT) provision shall be provided above the glove box on the officer side of the dash. The MDT provision shall be recessed 3.00" below the surface of the dash and 9.50"D x 13.75"W. The glove box shall be 5.75"H x 12.75"W x 5.75"D with a hinged locking door. A 20-amp 12AWG clean power and ground circuit will be provided to the MDT area.

## FULL WIDTH CREW CAB DOOR ASSIST RAILS

Black powder coated cast aluminum assist rails shall be provided and installed on the inside of the rear crew doors the full width of the window glass. The rails shall assist personnel in exiting and entering the cab. The rails shall be located at the retracted door window glass level and will protect the exposed window glass area.

## INTERIOR LIGHTING

The cab interior lighting shall consist of the following:

A red/white dome lamp shall be located over each door. The white lamp shall be activated by its respective door when opened and both activated by an individual switch on the light.

A red/white dome lamp with individual switches shall be located in the headliner, over the engine tunnel to serve as a tunnel surface light.

## FLASHING DOOR AJAR LIGHT

A red flashing door ajar light shall be located in the headliner, centered in the cab. The light shall be 6.00" long x 2.50" wide x 1.75" high and labeled "Do Not Move Apparatus". The light shall be wired to indicate an open door on the cab when the parking brake is released.

## ENGINE TUNNEL LIGHTS

Two (2) Trucklite 4" diameter clear work lights shall be provided and installed under the engine tunnel.

## FABRIC COVERED SEATS - DURABLE BALLISTIC POLYESTER

The seats shall be covered with a high strength, wear resistant fabric of durable ballistic polyester. A PVC coating is bonded to the backside of the material to help protect the seats from UV rays and from being saturated or contaminated by fluids.

## BLACK SEAT COLOR

All seats supplied on the chassis shall be black in color.

## SEATBELT WARNING SYSTEM

A seatbelt use warning system shall be installed in the chassis. The system will provide a visual and audible warning when all of the following conditions are met.

1.) Any seat is occupied (sixty pounds minimum).
2.) The corresponding seat belt(s) remains unfastened.
3.) The park brake is released.

Once activated, the visual and audible indicators will remain active until all occupied seats have the seat belts fastened.

## DRIVER SEAT

The driver's seat shall be a four-way air suspended type Seats Inc. 911 "Universal" high back seat with air control valve located at lower front of seat. The suspension mechanism shall be enclosed by a rubber bellows.

The seat shall be equipped with an adjustable lumbar support, adjustable titling seat back and "knee rack" bottom cushion adjustment.

The seat shall be equipped with a red three-point shoulder harness with lap belt and an automatic retractor attached to the cab.

## OFFICER SEAT

The officer's seat shall be a six-way electric mechanical suspension Seats Inc. 911 "Universal" SCBA high back seat and shall include a tapered and padded seat cushion and back.

The seat back shall include a vertically split hinged headrest and ZICO WMAB-5-D-SP bracket installed by the body builder. A removable padded vinyl cover shall be supplied over the SCBA cavity.

The seat shall be an ABTS (All Belts to Seat) type integrated red three-point shoulder harness with lap belt and an automatic retractor built into the seat assembly. The female seat belt clasp shall extend up from the seat base ~ 14" to be within easy reach of the occupant. The ABTS feature is an engineering break through where the passenger restraint harness is built into the seat module and meets the twenty "G" load test.

## REAR FACING OUTBOARD SEATS

One (1) outboard rear facing crew area Seats Inc. 911 "Universal" SCBA high back individual seat shall be installed in the rear of the cab behind the officer seat. The seat shall be moved inboard 2" to facilitate better donning of protective equipment.

Each "Universal" high back seat shall include a tapered and padded seat cushion and back.

Each seat back shall include a vertically split hinged headrest and ZICO MWAB-5-D-SP bracket with installed by the body builder. A removable padded vinyl cover shall be supplied over the SCBA cavity.

The seats shall be an ABTS (All Belts to Seat) type integrated red three-point shoulder harness with lap belt and an automatic retractor built into the seat assembly. The female seat belt clasp shall extend up from the seat base ~ 14" to be within easy reach of the occupant. The ABTS feature is an engineering break through where the passenger restraint harness is built into the seat module and meets the twenty "G" load test.

## FORWARD FACING CENTER SEATS

Two (2) center forward facing crew area Seats Inc. 911 "Universal" SCBA high back individual seats shall be installed in the rear of the cab. The seats shall be moved outboard so there is 12" between the two seats to facilitate better donning of protective equipment.

Each "Universal" high back seat shall include a tapered and padded seat cushion and back.

Each seat back shall include a vertically split hinged headrest and ZICO WMAB-5-D-SP bracket with installed by the body builder. A removable padded vinyl cover shall be supplied over the SCBA cavity.

The seats shall be an ABTS (All Belts to Seat) type integrated red three-point shoulder harness with lap belt and an automatic retractor built into the seat assembly. The female seat belt clasp shall extend up from the seat base ~ 14" to be within easy reach of the occupant. The ABTS feature is an engineering break through where the passenger restraint harness is built into the seat module and meets the twenty "G" load test.

## FORWARD FACING CENTER SEAT BOX

A seat box 42-3/8" wide x 12" high x 22" deep shall be installed against the center of the rear wall for seat mounting. The seat box shall be made from smooth aluminum and welded to the cab structure for seat mounting integrity. The seat box will be painted the cab interior color.

Both sides of the seat box shall have a hinged door with latch and opening 13-3/4" wide x 10" high to allow access for storage in the seat box.

## PAINT INTERIOR

The interior metal surfaces shall be painted with a Zolatone #20-72 silver gray texture finish.

## DASH AND HEADER TRIM ABS

The cab interior dash trim shall consist of a two (2) piece vacuum formed ABS composite driver and officer panel.

The "A" pillar and center windshield post trim shall consist of a vacuum formed ABS composite driver, officer and center cover.

The header trim shall consist of a vacuum formed ABS composite driver, officer and a two (2)-piece center HVAC cover. Mounted to the trim panels shall be two (2) 5.75" x 22.50" vinyl sun visors.

## INTERIOR TRIM COLOR AND FLOOR MAT GRAY/GRAY/GRAY

The cab interior soft vinyl trim surfaces shall be gray in color.

The cab interior vacuum formed ABS composite trim surfaces shall be gray in color.

The cab interior floor mat shall be gray in color.

The interior cab floor, engine tunnel sides and front seat risers shall be covered with a mutlit-layer mat consisting of; .25" thick sound absorbing closed-cell foam, a heavy weight sound barrier, a .06" thick non-slip vinyl wear surface with a pebble grain finish, and held in place by a pressure sensitive adhesive and aluminum cornering trim. All exposed seams are sealed to reduce moisture contamination and debris build up.

## HVAC SYSTEM

The cab shall be equipped with a ceiling mounted HVAC system. The system shall consist of an overhead heater/defroster/air-conditioning unit mounted above the engine tunnel in a central location with dash-mounted controls.

The ceiling mounted HVAC system includes fourteen (14) adjustable louvers. Six (6) forward facing louvers for windshield, 45,000 Btu's of heat at 460 cfm for defrosting. Four (4) rearward facing louvers to direct air for crew comfort and six (6) for driver and officer comfort. In "Cabin Mode" the system is designed to produce 60,000 Btu's of heat and 32,000 Btu's of cooling. The system shall be capable of lowering the cab interior temperature from 100 degrees to 70 degrees within thirty minutes, with a relative humidity of sixty percent.

A roof-mounted condenser shall be installed in one (1) of the following locations:

1.) Flat Roof (Pumper/Rescue/Mid-Mount Aerial): Centered on cab mid roof.
2.) Raised Roof (Pumper/Rescue/Mid-Mount Aerial): Centered on cab forward of raised roof against the slope rise.
3.) Flat Roof (Traditional Aerial): LH side of cab mid roof.
4.) Raised Roof (Traditional Aerial): LH side of cab mid roof on raised section.

The air-conditioning compressor will be an engine driven Seltec TM-16 and utilize R-134A refrigerant.

The A/C lines will be a mixture of custom bent zinc coated steel fittings and aero quip flexible hose with E-Z clip fittings.

All heater system hoses, including auxiliary units shall be silicone with stainless steel constant torque clamps approved for use with silicone hose.

## DELUXE INSULATION PACKAGE

Additional insulation in the cab shall be installed to improve air-conditioning and/or heating in extreme weather climates as well as reducing road noise. The sides, roof and rear wall of the cab shall contain 1" thick multilayered insulation.

## CAB TILT ACTUATION

The entire cab shall tilt 45 degrees to allow for easy maintenance of the engine and transmission.

The cab tilt actuation shall be with an electric over hydraulic lift pump with a control box on a pendant for safe visual operation.

The lift system shall have an ignition interlock and red lock down indicator lamp, which shall illuminate when holding "down" switch to indicate safe road operation. It shall be necessary to activate the master battery switch with the park brake set in order to tilt the cab.

Two cab tilt cylinders shall be provided with velocity fuses in each cylinder port. The cab pivots shall be 1.90" ball and be anchored to frame brackets with 1.25" diameter studs.

Two spring loaded hydraulic hold down hooks outboard of the frame shall be installed for holding the cab securely to the frame.

A steel safety assembly shall be installed on the right side cab lift cylinder to prevent accidental cab lowering. The safety assembly shall fall over the lift cylinder when the cab is in the "up" position. A cable release system shall also be provided to clear the safety assembly from the lift cylinder when lowering the cab.

## RAISED FRONT GRILLE - GLADIATOR CLASSIC

A two (2) piece, hinged stainless steel raised front grille 39"W x 33.50"H x 1.50"D, with a minimum free air intake of 632.9 square inches shall be installed on the front of the cab. The upper portion of the grille will be hinged and will have two (2) flush push button latches that allow access to the front fluid fills of the cab.

## ELFD COMPARTMENT

The cab shall contain an exterior compartment on each side of the cab behind the rear doors. The compartment opening shall be 16.25" wide x 21.19" high. The compartment size shall be 17.84" wide x 21.19" high x 21.19" deep. The compartment shall have a 17.13" wide, 32.00" high and 1.50" thick hinged box pan style flush mount door with a locking bent D-ring slam latch with door switch to activate open compartment warning light in cab.

## WHEEL WELL LINERS

Full width wheel well liners shall be installed on the extruded cab to limit road splash and enable easier cleaning. The two-piece liners shall consist of an inner liner 16" wide made of vacuum formed ABS composite and a outer fenderette 3.50" wide made of 14 gauge 304 polished stainless steel.

## CAB WINDOWS

Fixed cab side windows, 16.0" x 26.0" (416 square inches) shall be installed behind the front cab doors one each side of the cab. Each window shall be the same height as the windshield to provide maximum visibility.

## EXTERIOR CAB ASSIST HANDLES

Four (4) 18" knurled anti-slip one-piece exterior assist handles shall be installed, one (1) behind each cab door. The assist handle shall be made of 14 gauge 304 stainless steel and be 1.25" diameter to enable easy grabbing with the gloved hand.

## CAB MIRRORS

Two (2) Retrac West Coast style mirrors model 1178H shall be provided. The mirrors shall be Dual Vision, motorized and heated with 7" x 16" head and a convex in the lower portion of the mirror head. The mirror heads shall be mounted on stainless steel bow swing away type arms mounted to the cab doors. The mirror head backs are mold injected black vacuum formed ABS composite.

## TWO TONE PAINT

The cab shall be painted two tone with a finished break line 1.5" below the cab side windows and down to the top of the grill on the cab front fascia.

All cab painting must be completed prior to the installation of glass accessories or any other cab trim to assure complete paint coverage and maximum corrosion protection.

The top is a Navy Blue metallic color the bottom is Red. Exact colors and codes referenced in the body specifications. Color tones will be finalized at pre-construction meeting.

The entire cab must be disc ground to remove any surface oxidation or surface debris that may hinder the paint adhesion. After the surface is machine finished a high quality acid etching base primer shall be applied. Upon the application of required body fillers and their preparation, the cab shall be primed with a coating designed for corrosion resistance and surface paint adhesion. The entire cab then shall be coated with an intermediate solids or epoxy surfacer that is designed to fill minor surface defects, provide an adhesive bond between the primer and the paint and improve the color and gloss retention of the color coats.

The cab shall be finish sanded with 360 grit paper, seams sealed with SEM seal sealer and painted with two (2) to four (4) coats of an acrylic urethane type system designed not only for color retention, but to resist acid rain and most atmospheric chemicals found on the fire ground or emergency scene.

The maximum overall film thickness of the topcoat shall not exceed five (5) mils.

A .5" (1/2") black pinstripe shall be applied on the break line between the two different colored surfaces.

The Spartan Chassis, Inc. standard PPG (DBHS or DCC), Sikkens FLNA or Dupont Imron (5000 or 6000) paint shall be warranted for seven (7) years against cracking, checking or peeling and loss of gloss caused by chalking or fading.

Cab underside and doors shall be rust proofed with a ten (10) year or 100,000 mile warranty certificate against perforation issued in the Fire Department's name.

## HAND SAND AND BUFF FINISH

The base coat clear coat finish shall be power sanded and machine finished to achieve a flat finish on all "A" visual surfaces.

**OPERATORS MANUAL AND PARTS LIST**

Two (2) sets of chassis operator's manuals and parts list complete with wiring and air plumbing diagrams shall be supplied. The wiring and plumbing diagrams shall be of the chassis model.

**ENGINE AND TRANSMISSION OPERATION MANUAL**

Two (2) engine operation and maintenance manuals and two (2) transmission operation manuals shall be included in the Spartan operator's manual.

**ALLISON 4000 EVS TRANSMISSION SERVICE MANUALS**

The following Allison 4000 EVS transmission service and reference manuals shall be provided:
PC2809EN Parts Catalog
SM2457EN Service Manual
GN2055EN Technician Guide
TS2973EN Electronic Controls Troubleshooting Manual

**FIRE EXTINGUISHER**

A 2.5 pound BC D.O.T approved fire extinguisher shall be shipped loose with the cab.

**HYDRAULIC REEL & TOOL STORAGE COMPARTMENT Front Bumper**

The front bumper extension shall be equipped with an enclosed storage compartment, which will consist of three (3) recessed storage areas, or compartments constructed to hold specified equipment.

Compartments shall be constructed entirely from aluminum and be enclosed by use of a single tread brite aluminum hinged door utilizing a stainless steel continuous hinge. Two (2) D-ring release latches shall be provided. They shall be spaced no more than 42 to 45 inches apart.

Compartments shall be weather resistant to prevent road debris and moisture from entering or collecting in the compartment. The driver's side compartment section shall be constructed large enough to facilitate storage of two (2) hydraulic hose reels with a minimum of 100' of hydraulic hose.

The center compartment section shall be available for hydraulic rescue tool storage. The compartment shall provide adequate space for two specified rescue tools to be mounted and pre-connected to hose reels.

The passenger side compartment section shall be constructed large enough to facilitate storage of a pre connected jump line hose of 1-1/2". Hose size and length to be determined at the pre-construction conference.

**WINCH**

Priced separately as requested on page 58 of your specifications.

**WINCH MOUNTING (Side)**

On both body sides of the apparatus, there shall be a 2 inch square receiver hitch installed. They shall be adequately supported to facilitate the use of an electric winch.

Each side hitch location recessed into the body wheel well will be concealed behind a tread plate access door. The door and recessed area shall be large enough to facilitate the pinning of the hitch as well as a 12-volt connection with both hands.

Hitches mounted below the rear compartment side rub-rail shall be securely reinforced to the rear Drop-frame assembly along with the rear tow hooks. Area shall be large enough to facilitate the pinning of the hitch as well as a 12-volt connection with both hands.

At each hitch location, a matching electrical connector for the winch shall be installed along with a dust/weather cover to protect the truck connection.

Side mounting locations will be rated at a significantly reduced capacity to meet safety requirements.

Location's to be determined at the pre-construction meeting.

**WINCH MOUNTING (Front)**

On the front of the apparatus (chassis), there shall be a 2-inch square receiver hitch installed below the bumper of the unit. It shall be adequately supported to facilitate the use of an electric winch. The receiver location shall be centered under the bumper.

At the hitch location, a matching electrical connector for the winch shall be installed along with a dust/weather cover to protect the truck connection.

**WINCH MOUNTING (Rear)**

On the rear of the apparatus (chassis), there shall be a 2-inch square receiver hitch installed below the rear step of the unit. It shall be adequately supported to facilitate the use of an electric winch. The receiver location shall be centered under the rear step.

At the hitch location, a matching electrical connector for the winch shall be installed along with a dust/weather cover to protect the truck connection.

**REAR TOW EYES**

Under the rear tail board there shall be structural steel reinforcement attached to frame rails of chassis to support tow eye assemblies. Mounted at rear center of apparatus it must be capable to with stand the requirements of towing (not lifting) the apparatus without damage.

**EMS CABINET**

A custom EMS cabinet to hold EMS supplies shall be constructed and installed in the cab of the unit. The compartment shall be behind the doghouse area between the ballistic vest / bunker gear compartment, and one rear facing SCBA seat. A reference library area for map books, ect. Shall be incorporated into the rear storage area. The top of this compartment is to have a 1-1/4" lip on all four sides of the compartment top. An adjustable shelf shall be provided for the inside of this compartment.

The compartment shall extend to within 8" of the side of the rear facing SCBA seat this measurement shall be the total width of the compartment. The height of the compartment shall not impede vision through the windshield of the crew seating in the forward facing SCBA seats. The depth shall not interfere with the occupants while setting in the forward facing seats. The distance between the front edge of the forward facing seats and the EMS cabinet shall be at least 17". The exact depth of this cabinet shall be determined at the pre-construction meeting.

The EMS compartment shall have a 12-volt 20-amp power wire. The power wire will terminate in this compartment. Exact location will be determined at the pre-construction meeting.

A 120-volt 20-amp outlet box with four household straight blade outlets shall be installed in the EMS compartment. The outlet shall be powered from the shoreline or the PTO driven generator.

**COMMAND DESK**

A sliding,/fold down or otherwise storable desk shall be provided between the two rear facing SCBA seats against the engine cowl in the crew compartment. (Exact location to be determined at pre-construction meeting) Desk shall have provisions for storage. The desk shall extend and/or expand from its collapsed position into a usable command desk for someone sitting in the center forward facing SCBA seats. Desktop shall provide a smooth writing surface, a way of securing papers, and a marker or pen storage compartment.

The desk top shall be illuminated by use of 12 volt lights mounted on or above the desk with a switch located on or adjacent to the light. Both 12 volt and 110-volt receptacles shall be provided in the cab in or around the desk.

**BOOK AND MAP STORAGE**

Located in the cab, an aluminum storage rack shall be provided to store department binders, books and maps. Nylon straps with Velcro fastening shall be provided to secure binders and books in compartment and provide quick and easy access. The storage area shall be located in the rear crew area. Exact location shall be determined at pre-construction meeting.

**POLISHED ALUMINUM WHEELS**

The wheels on the chassis shall be Polished Aluminum wheels with chrome lug nut caps per Fire Department request.

**CREW CAB COMPARTMENTS**

A compartment shall be built in the forward and rear raised roof section of the crew area of the cab. These compartments shall extend the inside width of the cab above the rear and front facing crew seats. The inside of the compartments will be approximately 14" high x 12" deep. The compartments shall have strip lighting to illuminate the inside of the compartment. Access to the compartments is to be threw cargo netting over the compartment openings.

The exact locations and sizes of the compartments shall be determined at the pre-construction meeting.

Two outside compartments shall be provided one on each side of the cab as stated in the cab specifications section of the ELFD cab compartment layout.

There shall be one compartment constructed behind the driver's seat. The cabinet shall extend from the inside wall of the cab to the compartments at the rear of the engine doghouse. The compartment shall have a short closet-style hanging bar installed and an adjustable shelf in the top over the hanger bar. The compartment shall have a roll-up door and be capable of storing the department supplied four XXL Ballistic vests and the drivers bunker gear.

**FLUID IDENTIFICATION PLATE**

A permanently engraved plate shall be installed in the cab specifying the quantity and type of fluids used in the apparatus.

**FUEL TYPE PLATE**

A permanently engraved plate shall be installed on or near the fuel fill to designate the chassis fuel type.

**SEATING LABEL**

There shall be a label located in the cab or in view of the driver, stating maximum seating capacity.

**VEHICLE HEIGHT LABEL**

There shall be a label located in the cab or in view of the driver, stating the overall height of the vehicle.

**SEAT BELT WARNING LABEL**

There shall be a label located at all seating areas, warning personnel that death or serious injury could result from not wearing seat belts while the vehicle is in motion.

**RIDING ON STEP WARNING LABEL**

There shall be a label located at all exterior stepping surfaces, stating "Warning: Death or serious injury may result from riding on any stepping surface when the vehicle is in motion.

**REAR MUD FLAPS**

There shall be a set of rear anti-spray black mud flaps shall be installed in the rear wheel well.

**BODY CONSTRUCTION**

Construction material of the body shall be aluminum, fully welded, with no rivets. The use of rivets, bolted panels, or adhesive as a structural fastening system is not acceptable. All aluminum body parts are to be welded for unitized construction to give maximum strength throughout the body.

All welds whether seen or not, shall be of good craftsmanship, and pleasing appearance. Welds, which are visible, shall be either ground smooth, cleaned or power wire brushed. We are stating that we want Fire Truck quality workmanship not standard delivery practice.

The entire body is to be modular in design, and shall be fully capable of being removed and remounted on another chassis. The body shall be engineered to provide maximum storage, while maintaining maximum structural rigidity, and long term integrity. The apparatus body structure shall be warranted for twenty (20) years.

The body under-structure shall consist of heavy duty 6" x 3.25" 6063-T6 aluminum channel extrusion lower outer rails, and 3" x .170" x 2.33, 6061-T6 alloy I beam cross members.

All floors shall be .125” aluminum sheet with 3" x .170" channel extrusion reinforcements; 6061-T6 alloy, capable of supporting a five hundred (500) pound load.

The body corner and intermediate Mid-post compartment divider extrusions shall be heavy-duty 6063-T6 alloys, custom extruded aluminum welded as an integral part of the body. Each extrusion shall be "multi-disciplined". Serving as a structural load-bearing member, slotted to provide an internal seat from which header and compartment partitions can be secured, while also serving as a roll up door track. The extrusions shall have an integrated door track channel eliminating the use of bolt on door tracks and providing larger door openings and cleaner installations. The Corner posts shall be heavy duty 4 x 3-5/8 6063-T6 alloy, with .375 wall thickness. Each Mid-post shall be heavy duty 2-5/8 x 3-1/2 6063-T6 alloy with .375 wall thickness.

**Body Corner Trim:**

The leading edge of the front and rear corner post of the body shall have a polished stainless steel 1.5 inch trim cap applied to protect the paint from chipping on the corners of the body.

All exterior panels shall be 5052-H32/H34 corrosion resistant aluminum. The roof and wall beams shall be MIG welded to body exterior panels.

Roof and sidewall panels shall be one piece. The roof rails shall be of .1875" aluminum of 5052-H32/H34 alloys and shall be a continuous formed sheet to "square up" the top of the body to enhance looks and provide a flat mounting surface for lights. The roof rails shall extend up from the integral drip channel approximately 32" at the front, and sides. Rails shall be formed over to create a flange around the top to give rigidity to the sidewalls.

The roof sheet shall be of .125" aluminum tread brite welded around perimeter; 3004-H14 alloy. The roof shall support a two hundred fifty (250) pound person at any location without damage to the roof.

The bulkheads shall be of .125" aluminum tread-brite, MIG welded to the corner post and header; 3004-H14 alloy. Partitions shall be .125" aluminum sheet, welded to inner framing of Corner Posts and Mid-posts; 3004-H38 alloy.

All header walls and partitions dividing the compartment shall be of a double wall construction. This method will not only provide extra body strength, it serves several other unique functions. The partition walls, like the extrusions, are "multi-disciplined". They provide structural integrity that single wall construction cannot, plus they provide a raceway for all wires required for door switches and compartment lighting, while also providing refuge for compartment lighting. Drawings shall be supplied upon request, to show details of wall construction.

All compartments shall be of sweep-out type with no lip at bottom edge. The compartment floors shall be raised 1" above the lower sill to prevent water from entering the bottom of the opening. Each compartment shall be fitted with a drain and located in such a manner as to minimize or eliminate water from entering.

All compartment sills shall be overlaid with fire industry grade tread plate aluminum to protect body finish from damage or scratches when accessing the compartments.

The outer lower channels shall be clad with .125" aluminum tread plate. The tread plate shall be installed with a special fastening system. There shall be no welding of this plate.

Both the front and rear exterior walls of the body shall be constructed from .125" aluminum tread brite to provide a pleasing and maintenance free appearance.

There shall be .125" aluminum tread brite installed around the rear wheel well areas. This shall be overlaid and shall be sealed at all seams. The rear wheel wells will have a polished fenderette installed on them. A rubber welting will be provided between the body and fenderette to seal the seam and restrict moisture.

The rear tailboard shall be constructed from impact resistant unitized steel, trimmed out in aluminum tread brite and securely mounted to the unit's super structure. It shall be a minimum of 9 deep and approximately 20 from ground to the tailboard. As specified in NFPA 1901-2003 edition sections 15.7. -15.8 the tailboard shall be designed to sustain a minimum static load of 500lbs with out deformation and shall be punch raised to provide skid resistance when stepping. It shall adequately support the stepping and standing of a fire person in full turn out gear but not be used to transport firefighters.

The body mounting system shall feature cross members at the front panel and at each end of the wheel box for bolting directly to the steel frame, which straddles the frame rails. Mounting should be isolated from the steel frame by other synthetic material.

There shall be minimal clearance between cab body and box. Consideration shall be given for the presence of pushup floodlights and any other equipment placed between the cab and body.

This body channel support shall be isolated with a .125" UHMW polyethylene type 819. The isolator shall lay the full length of both sides of frame rails.

All dissimilar metals shall have a barrier material between them to prevent electrolysis.

On all items that are bolted or fastened onto a painted surface there will be isolation strips installed between mating surfaces. This is to prevent problems associated with dissimilar metals and cutting the painted surface by sharp edge of installed items

The overall body width shall be 96" and overall body-only height of 110".

The entire body is to be modular in design, it shall be fully capable of being removed and remounted on another chassis. The entire rescue module will be undercoated prior to mounting on the chassis**.**

**DIMENSIONS**

Body Length: 186" (15.5 feet)

Body Height: 108"

Body Width: 96"

Cab to Axle: 142"

Compartment dimensions of this rescue vehicle are as follows:

Driver Side #1: **57" wide x 72" high x transverse in front 26"**

Driver Side #2: **58" wide x 38" high x 24" deep**

Driver Side #3: **54" wide x 72" high x 24" deep**

Passenger Side #1: **57" wide x 72" high x transverse in front 26"**

Passenger Side #2: **58" wide x 38" high x 24" deep**

Passenger Side #3: **54" wide x 72" high x 24deep**

Rear# 1: **44" wide x 72" high x transverse**

## BODY MOUNTING SYSTEM

The body mounting system shall feature cross members at the front panel and at each end of the wheel box for bolting directly to the steel frame, which straddles the frame rails. Mounting should be isolated from the steel frame by other synthetic material.

## SIDE DOOR CONSTRUCTION

The compartment doors shall be of the type that rolls up on themselves. The door shall have an adjustable tubular type counter balance.

All door tracks shall have track, post, and track protector extruded in an integral heavy-duty section for added strength 6061-T6 alloys. The door track shall be an integral part of the body framework. The door shall be sealed on all sides with black weather stripping. Doors shall be capable of being removed for servicing.

All doors shall be of heavy duty extruded aluminum sectionals; 6063-T6 alloy for finishing purposes.

The door slide system shall consist of a nylon slide with end shoes. They shall slide inside of the aluminum door track.

There shall be no door track liners installed; this will prevent any moisture build up or electrolysis from dissimilar metal contact.

The doors shall have lift bar latches. All doors shall be equipped with indicator switches to alert the driver that one or more doors are not fully closed. These switches may all be connected to a single flashing warning light on the dash of the cab. Door Style: Todco Rollup doors

## REAR DOOR CONSTRUCTION

The rear compartment doors shall be provided with a double-hinged, box pan doors. The doors shall be flush style or lap style doors. The doors are to be, made of smooth aluminum painted job color. There shall be a large red / white Chevron decals installed on the rear doors.

## HOSE BED

There shall be a NFPA compliant hose storage area provided above the booster tank and below roof top walkway. The floor of the hose bed shall be made of a removable perforated or corrugated aluminum surface, which will aid in hose aeration. The hose bed shall be free from all objects that may pose potential harm or premature wear of the hose stored in it. The hose bed shall be capable of holding a minimum of 1000' of 5-inch hose and 500' of 3 inch D.J. hose with 3" Stortz couplings and 500' of 2.5 inch D.J. hose with 2.5-inch NST couplings.

## HOSE BED DIVIDERS

There shall be two (2) D.A. sanded aluminum hose bed dividers provided and mounted per fire department instructions. Uni-strut shall be installed in the hose bed so to allow the hose bed divider to be adjustable.

There shall be two (2) handhold openings provided. One (1) at the rear in a vertical position and one (1) approximately 24" in from the rear horizontal position.

## HOSE BED BULKHEADS

A bulkhead shall be installed between the water / foam towers and the hose storage area of the hose bed. The bulkheads shall be the same height and design as the hose bed sidewalls. All three (3) fill towers shall be against the front wall of the body.

## HOSE BED COVER

An assisted bi-fold tread plate cover shall be furnished for the hose bed cover. It shall be strong enough to walk on and have either a shock or actuator assist to remove. Acorn nuts shall be used wherever needed so that there is no exposed thread in the hose bed.

Aluminum diamond plate lids shall be supplied for each fill tower. The lids shall latch down in the close position. The lids shall provide fill access to the tanks or cells without raising the hose bed covers.

The fill towers shall have access threw the aluminum hose bed covers. The aluminum diamond plate covers or doors will have latches to hold them in the closed position.

There shall be one (1) red vinyl flap attached to each aluminum hose bed cover. The vinyl flaps shall cover the area at the rear of the hose bed from top to bottom. The flaps shall be independent of each other and shall be attached with Velcro fastenings. The bottom edge of each flap shall be weighted and also have an eyelet on each outer corner.

## ROOF TOP STORAGE CONFIGURATION

There shall be a series of storage compartments on each side of the roof mounted against the extended head rail.

Compartments shall be an enclosed compartment designed for equipment storage. There shall be one compartment on each side running full length. Each compartment lid shall be divided into sections with two separate flip up lids per compartment.

The left side roof top boxes shall be shorter than the right side to allow for a stepping area off the rear ladder of approximately 16" x 22"

Each compartment shall extend inward from the body side approximately 30" from the sides leaving a 32" walkway in the center. The compartment depths shall be approximately 18" deep. The boxes shall be securely fastened to the rooftop, by welding or use of stainless fasteners.

There shall be provisions in a roof top box for the storage of the two (2) 12 ft suction hoses. The exact compartment shall be determined at pre-construction meeting.

## ROOF LADDER

A Zico Quic-Ladder shall be installed on the left rear of the body. This ladder shall provide access to the roof of the unit. Ladder shall be constructed of 1-1/4" aluminum tubing, covered between each rung with ribbed neoprene black tubing for a firm grip. The rungs shall be cast aluminum with non-skid surface. Each rung shall have a 3” Deep x 15" Wide surface area.

Ladder features a positional climbing angle. The ladder stores parallel to the body vertical surface when not in use, but pulls out away from the body and locks into a comfortable angle position for ascending and descending from the rooftop. A quick release handle shall allow the release of the scissor mechanism, which will extend the ladder outward from the body until it locks into its final climbing position.

## GRAB RAILS

Hand rails of 1-1/4” diameter aluminum extrusion anti-slip grip, shall be mounted as specified on the apparatus. One (1) horizontally mounted grab rail on each side of the pump house, near the panels to assist the operator onto running boards; one along the rear of the body secured to the right side roof top tool compartment

. Handrail shall meet or exceed the National Fire Protection Associations Pamphlet 1901.

## FOLDING STEPS

There shall be a total of four (4) NFPA compliant folding steps supplied and installed. Two on each side of the unit on the front of the body.

## COMPARTMENT DIVIDER

There shall be one (1) compartment divider installed in specified compartment. Divider shall be constructed of .188" smooth aluminum with a D.A. sanded finish.

## HYDRAULIC RESCUE TOOL MOUNTING

The fire department shall ship their hydraulic powered rescue tools (maximum five pieces) to the body manufacturer. The tools shall have custom brackets fabricated and mounted on the desired shelf or slide tray.

## LADDER STORAGE

In the rear compartment of the rescue body, there shall be a ladder storage compartment installed at the ceiling. It shall be installed at an angle and extend from the rear compartment door to the front of the body. The angle shall allow easier loading and unloading of the ladders. To secure items from hitting the rear compartment door during transit, a latch-able access door shall be provided. The door shall be attached with a stainless steel continuous hinge and incorporate the use of a D-ring stainless steel latch. The compartment shall be capable of supporting one 24' extension, one 14' roof, and one 10' folding ladder.

## SCBA STORAGE IN WHEEL WELL

There shall be four (4) SCBA cylinder storage compartments recessed one in each corner of wheel well. The compartment door shall be a latch-able brushed aluminum type.

## ADJUSTABLE SHELF

The heights of all shelves shall be easily adjustable by using P-1000 aluminum uin-strut, welded permanently to the side bay walls, along with appropriate fasteners. The uin-strut is to be continuous from the top to the bottom portion of the compartment.

Each shelf shall be capable of supporting a minimum weight of three hundred fifty (350) pounds.

All shelves are to be of 3/16" smooth aluminum with press formed flanges of 2" on all four sides and have D.A. sanded finish.

Shelf dimensions shall vary to accommodate the specified compartment for which it is to be mounted.

Nine (9) adjustable aluminum shelves shall be installed. Locations to be determined at pre-construction meeting.

## ADJUSTABLE SLIDEOUT TRAY

The heights of all trays shall be easily adjustable by using P-1000 aluminum uni-strut, welded permanently to the side bay walls, along with appropriate fasteners. The uni-strut is to be continuous from the top to the bottom portion of the compartment.

Each tray shall be capable of supporting a minimum weight of three hundred and fifty (350) pounds, even when fully extended.

All trays are to be of 3/16" smooth aluminum with press formed flanges of 2" on all four sides.

All slide trays shall be on roller mechanisms, which will allow them to extend beyond compartment by ninety percent (90%) of their overall length. An automatic latching system shall be provided to hold the slide trays in their fully retracted and extended positions. The latching system shall be deactivated or unlatched, by simply pulling or pushing the slide tray with approximately 20 lbs. of force. No other latches shall be required to operate the slides, NO EXCEPTIONS.

Tray dimensions shall vary to accommodate the specified compartment for which it is to be mounted.

Four (4) heavy-duty aluminum trays shall be installed. Locations to be determined at pre-construction meeting.

## ARTICULATING SLIDE TRAY

The articulating tray shall provide easier access to the upper portion of the compartments by allowing the tray to roll outside the compartment and tilt the front of the tray forward and downward to a preset distance providing better visibility and access to the trays contents.

They shall be capable of supporting a minimum weight of two hundred and fifty (250) pounds, even when fully extended.

The tray will be of 3/16" smooth aluminum with press formed flanges of 2" on all four sides. It shall be mounted on roller mechanisms, which will allow them to extend out approximately half its length and shall tilt down approximately 30 degrees.

Tray dimensions shall vary to accommodate the specified compartment for which it is to be mounted.

Two (2) articulating slide trays shall be installed. Locations to be determined at pre-construction meeting.

**SLIDEOUT TOOL BOARD**

All slide out tool boards shall have the capability of lateral adjustments by using P-1000 aluminum uni-strut, welded permanently to the top and bottom of the compartment, along with appropriate fasteners.

The tool boards shall be capable of supporting a minimum weight of three hundred and fifty (350) pounds, even when fully extended.

All tool boards are to be of 3/16" smooth aluminum with a formed full-length handle on front and rear of the board. The board shall be mounted on ball bearing type slides, which shall allow the board to roll out with the capability of locking the board in or out.

Board dimensions shall vary to accommodate the specified compartment for which it is to be mounted.

Three (3) aluminum slides out tool boards shall be installed, locations to be determined at pre-construction meeting.

**COMPARTMENTATION**

**L1 COMPARTMENT (FIRST ROADSIDE COMPARTMENT BEHIND CAB)**

This compartment shall contain the following:
Four (4) extruded aluminum tracks mounted for adjustable shelving. Miscellaneous shelves, trays, or tool boards to be determined at pre-construction meeting.

**L2 COMPARTMENT (ROADSIDE OVER WHEEL WELL COMPARTMENT)**

This compartment shall contain the following:
Four (4) extruded aluminum tracks mounted for adjustable shelving.
Miscellaneous shelves, trays, or tool boards to be determined at pre-construction meeting.

**L3 COMPARTMENT (ROADSIDE COMPARTMENT BEHIND REAR WHEELS)**

This compartment shall contain the following:
Four (4) extruded aluminum tracks mounted for adjustable shelving.
Miscellaneous shelves, trays, or tool boards to be determined at pre-construction meeting.

**R1 COMPARTMENT (FIRST COMPARTMENT BEHIND CAB, CURBSIDE)**

This compartment shall contain the following:
Four (4) extruded aluminum tracks mounted for adjustable shelving.
Miscellaneous shelves, trays, or tool boards to be determined at pre-construction meeting.

**R2 COMPARTMENT (CURBSIDE COMPARTMENT OVER REAR WHEELS)**

This compartment shall contain the following:
Four (4) extruded aluminum tracks mounted for adjustable shelving.
Miscellaneous shelves, trays, or tool boards to be determined at pre-construction meeting.

**R3 COMPARTMENT (CURBSIDE COMPARTMENT BEHIND REAR WHEELS)**

This compartment shall contain the following:
Four (4) extruded aluminum tracks mounted for adjustable shelving.
Two (2) slide out tool board(s) shall be furnished and installed.
Miscellaneous shelves, trays, or tool boards to be determined at pre-construction meeting.

**REAR COMPARTMENT**

This compartment shall contain the following:
Four (4) extruded aluminum tracks mounted for adjustable shelving.
Miscellaneous equipment to be decided at pre-construction meeting.

**PUMP ASSEMBLY Hale Q-Max**

The pump shall be of a size and design to mount on the chassis rails of commercial and custom truck chassis, and have the capacity of 1500 gallons per minute (U.S. GPM), NFPA-1901 rated performance. The entire pump shall be assembled and tested at the pump manufacturers factory.

The pump shall be driven by a driveline from the truck transmission. The engine shall provide sufficient horsepower and RPM to enable pump to meet and exceed its rated performance.

The entire pump, both suction and discharge passages, shall be hydrostatically tested to a pressure of 600 PSI. The pump shall be fully tested at the pump manufacturers factory to the performance spots as outlined by the latest NFPA Pamphlet No. 1901. Pump shall be free from objectionable pulsation and vibration.

The pump body and related parts shall be of fine grain alloy cast iron, with a minimum tensile strength of 30,000 PSI (207 MPa). All metal moving parts in contact with water shall be of high quality bronze or stainless steel. Pump utilizing castings made of lower tensile strength cast iron not acceptable.

Pump body shall be horizontally split, on a single plane in two sections for easy removal of entire impeller assembly including wear rings and bearings from beneath the pump without disturbing piping or the mounting of the pump in chassis.

The pump shall have one double suction impeller. The pump body shall have two opposed discharge volute cutwaters to eliminate radial unbalance. (No exceptions)

Pump shaft to be rigidly supported by three bearings for minimum deflection. One high lead bronze sleeve bearing to be located immediately adjacent to the impeller (on side opposite the gearbox). The sleeve bearing is to be lubricated by a force fed, automatic oil lubricated design, pressure balanced to exclude foreign material. (No exceptions.) The remaining bearings shall be heavy-duty, deep groove ball bearings in the gearbox and they shall be splash lubricated.

The pump shaft shall have only one packing gland located on the inlet side of the pump. It shall be of split design for ease of repacking. The packing gland must be a full-circle threaded design to exert uniform pressure on packing and to prevent cocking and uneven packing load when it is tightened. (No exceptions.) It shall be easily adjusted by hand with rod or screwdriver without special tools or wrenches required. The packing rings shall be of a unique, permanently lubricated, long-life graphite composition and have sacrificial zinc foil separators to protect the pump shaft from galvanic corrosion. (No exceptions.)

Optional mechanical seal in place of pump packing. One (1) only required on the suction (inboard) side of the pump. The mechanical seal must be two (2) inches in diameter and shall be spring loaded, maintenance free and self-adjusting. Mechanical seal construction shall be a carbon sealing ring, stainless steel coil spring, Viton rubber cup, and a tungsten carbide seat with Teflon backup seal.

Pump impeller shall be hard, fine grain bronze of the mixed flow design; accurately machined and individually balanced. The vanes of the impeller intake eyes shall 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, and of wraparound double labyrinth design for maximum efficiency. (No exceptions.)

The pump shaft shall be heat-treated, electric furnace, corrosion resistant stainless steel to be super-finished under packing with galvanic corrosion (zinc foil separators in packing) protection for longer shaft life. Pump shaft must be sealed with double-lip oil seal to keep road dirt and water out of gearbox.

**GEARBOX**

The gearbox shall be assembled and tested at the pump manufacturers factory. (No exceptions.)

Pump gearbox shall be of sufficient size to withstand up to 16,000 lbs. ft. of torque of the engine. 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. (No exceptions.)

The pump ratio shall be selected by the apparatus manufacturer to give maximum performance with the engine and transmission selected. If the gearbox is equipped with a power shift, the shifting mechanism shall be a heat-treated, hard-anodized aluminum power cylinder, with stainless steel shaft.

An in-cab control for rapid shift shall be provided that locks in road or pump. For automatic transmissions, three green warning lights shall be provided to indicate to the operator(s) when the pump has completed the shift from Road to pump position. Two green lights to be located in the truck driving compartment and one green light on pump operators panel adjacent to the throttle control. For manual transmissions, one green warning light will be provided for the driving compartment. All lights to have appropriate identification/ instruction plates.

**Certification**

The pump will meet and perform the following test and certification stating, same issued
100% of rated capacity @ 150# net pump pressure
100% of rated capacity @ 165# net pump pressure
70% of rated capacity @ 200# net pump pressure
50% of rated capacity @ 250# net pump pressure

**PRIMIMG PUMP**

The priming pump shall be a positive displacement vane type, electrically driven, and conform to standards outlined in NFPA Pamphlet No. 1901. One priming control shall both start the priming motor, and open the priming valve. The priming system shall be Hale EVS.

**MOUNTING**

Extra heavy-duty pump mounting brackets shall be furnished. There shall be bolted to the frame rails in such a position to perfectly align the pump so that the angular velocity of the driveline joints will be the same on each end of the drive shaft. This will assure full capacity performance with a minimum of vibration. Mounting hardware shall utilize grade 8 bolts.

**AUXILIARY COOLER**

An auxiliary cooler or heat exchanger shall be installed in the engine compartment between the engine and the chassis radiator. The cooler shall permit the use of water from the pump for cooling of water circulating through the engine cooling system. This cooling shall be done without mixing engine and pump water.

**PLUMBING**

Pump plumbing shall utilize a stainless steel manifold system. Discharges and auxiliary inlets shall be plumbed using these manifold systems. Any plumbing connections shall have flexibility to prevent undue stress to the plumbing systems. Victaulic or rubber couplings shall be used where necessary to allow flexing of plumbing, which will prevent damage or loosening of piping. High-pressure hose, rated for the fire industry along with stainless steel connections shall be utilized where necessary. Pump and plumbing shall meet the standards of the latest NFPA requirements.

**VALVES**

All intake and discharge valves shall be Hale brand Torrent all Stainless Steel quarter turn full flow valves. Each valve shall be operated by a control located on the pump panel. Any valve 3 or larger shall be provided with a slow close feature.

**STEAMER INLETS**

A 6" steamer inlet shall be provided on the left side and right side pump panel. They shall have NST threads and terminate with a screen and long handled chrome cap.

**STORTZ ADAPTERS**

A 6" NST female by 5" Stortz adapter with 30-degree droop shall be provided. A Kochek 5" Stortz by 3" Stortz adapter with cap and cable shall also be provided for the suction inlet.

**MASTER DRAIN**

The master drain will be mounted under the running board on the left side of the vehicle for ease of operation. The drain will have the capacity to drain all lines and main pump at the same time.

**THIRD PARTY PUMP TEST**

The pump shall undergo a third party test per Class A requirements of NFPA 1901 prior to delivery of the completed apparatus. The acceptance certificate shall be furnished with the apparatus on delivery.

The builder will notify Worthington fire 10-days prior to pump testing. Pump testing will not be done with out Worthington Fire members present to observe the pump test.

**FIRE PUMP WARRANTY**

The Hale fire pump shall carry the manufactures five-year "Pro-Tec " warranty covering defective parts and workmanship. A copy of the pump manufactures warranty policy shall be provided with the completed apparatus.

**PUMP MANUALS**

Two (2) sets of fire pump service and operation manuals shall be provided with the completed apparatus.

**PUMP MODULE**

The pump module shall be a self-supported structure mounted independently from the body and chassis cab. The design shall allow normal frame deflection without imposing stress on the pump module structure of side running boards. The pump module shall be a welded framework utilizing structural components properly braced to withstand the rigors of chassis frame flex. The pump module shall be bolted to the frame rails at four points.

There shall be a dunnage storage area located above the pump. The dunnage area shall be recessed into the pump compartment and shall be constructed of .125" fire apparatus quality aluminum tread brite

Aluminum tread plate running boards shall be installed along both sides of the pump house to provide access to the operator's panel. Running boards shall be separate from the pump house and not be an integral part of a compartment. They shall maintain at least a 1/2 clearance from pump hose. Each step shall be rigidly braced and supported.

**DUNNAGE COMPARTMENT**

A compartment shall be installed in the dunnage area it shall extend from the floor of the dunnage area to within 10" of the top of the fire body. This compartment is to be 18" wide and through to the other side. This compartment is to be as high as possible. Actual size shall be decided at pre-construction meeting.

The dunnage compartment is to have a vertical hinged double box pan door on each side and a latching system consisting of "D" ring style latches. Inside this compartment shall be adjustable shelves with uni-strut. The doors of this compartment are to be painted the same color as the upper portion of the body.

The hydraulic generator shall be installed in a well on top of the dunnage compartment on the right side of the apparatus. Top of the well is to be left open for cooling of the hydraulic generator fluids. The generator shall be next to the deck gun mounting. A quarter turn valve shall be provided in line for changing the hydraulic fluid in the hydraulic unit. The drain hose shall exit to the underside of the pump house compartment.

**PUMP PANELS**

The pump house side panels shall be constructed from 14 gauge stainless steel panels and shall be removable in order to access the internal pump house.

Above both side pump panels, there shall be stainless steel hinged access panels to access the pump house. The left side panel or instrument panel shall be horizontally hinged for pump maintenance and gauge inspection. The right side hinged access panel shall be an inspection door. Each panel shall be hinged using a continuous stainless steel hinge and be operated by a two (2) Eberhard style trigger latches.

Controls for pump system will be accessible at the side mounted operators panel.

The upper portion of the both the side operators panel and right side will be formed to extend upward and have stainless steel hood returning forward, thus forming a illumination hood for panel lights. Under this hood there will be two (2) halogen lights with switch located on the pump panel.

The side mount valve controls will be T handle type. The valve control levers will extend through the side panels and be supplied with a twist lock device. The valve control levers will utilize direct linkage and will be uniformly grouped with each respective gauge.

All controls, discharge and suction gauges are to be identified at the gauge and discharge and suction points as well as open-closed positions with identification plates of color background and natural letters.

Pump discharge and suction inlets will extend through stainless steel panels at each side of the apparatus. The Class 1-3/4 drains valves for each of the 2-1/2 or larger side discharges will be supplied.

**INSTRUMENT PANEL**

The instrument panel must contain the following gauges and equipment. These are to be located according to N.F.P.A. 1901 applicable codes.

A Class One Captain Pressure Governor will be supplied on the pump panel. The unit shall regulate the engine speed to maintain a steady pump pressure regardless of the flow rate. Operation shall be changeable from pressure mode to RPM mode and back again if desired while pumping without any pressure variation using the MODE button. Pressure or RPM setting shall be varied using the INCREASE and the DECREASE buttons. A PRESET button allows a preprogrammed pressure or RPM to be set quickly. This preprogrammed Pressure or RPM setting shall be stored in the memory even with the power off. An IDLE button allows for quick shutdown after each operation. EFC shall bring the engine to idle in the event of pump cavitations. It shall resume operation automatically once water is available to the pump again.

The Captain shall display the pump Discharge and intake pressure. It shall display pressure in psi up to 600 psi. The Intake pressure display window shall also display the control setting each time a setting is changed; the engine RPM shall be displayed in 10-RPM increments. The visual alarm is not cancelable while the audio alarm shall be cancelable using the SILENCE button. All warnings shall reset automatically when the problems are corrected.

A 6" master gauge shall be installed if room permits otherwise 4-1/2" Class one gauges shall be supplied for the master intake and discharge.

A Class One 2-1/2 compound pressure gauge shall be supplied for each discharge 1-1/2 or larger unless otherwise specified. The specified pressure gauge will be located directly be of the liquid silicone filled type. Water pressures and suction gauges will be filled with liquid silicone solution to assure visual reading to with 1% accuracy and function accurately in sub-zero temperatures.

This liquid silicone gauge eliminates the need of snubber valves.

The engine oil pressure, engine water temperature, tachometer, and audible & visual warning devices shall be contained in an all-in-one instrument panel.

A Class One "All-In-One" instrument panel shall be installed on the pump panel with in easy access of the operator. The all-in-one module shall eliminate the use of multiple gauges, alarms and warnings to simplify the pump operator's panel. The unit provides a large display for the engine RPM, battery voltage, and display engine oil pressure and coolant temperature. Plus provides visual and external audible warning such as, horn or a bell to identify any monitored failure. Unit also, accumulates and displays engine hours, pump operating hours and incident times.

The throttle and pump in gear indicator will also be installed in the center of the pump operator's panel.

The following instruments and controls will be supplied at the operator's panel:
One (1) -30 x 600 PSI chrome 6" main pressure gauge. If room allows
One (1) -30 x 600 PSI chrome 6" main suction gauge. If room allows
One (1) 0 x 600 PSI chrome 2-1/2 individual pressure gauges for each 1-1/2 or larger discharge.
One (1) Class One Enfo III instrument panel
One (1) Class One Captain Pressure Governor
One (1) Intelli Tank lighted level water gauge.
One (1) engine cooler control.
One (1) tank fill control.
One (1) pump to tank control.
Pump cooling controls.
Pump discharge controls.
Relief valve control.
Primer control
U.L. test plug panel.

## LABELS

Each control and gauge will be clearly marked by a color-coded nameplate, permanently affixed to the operator's panel.

All discharge and suction gauges are to be identified at the gauge and discharge and suction points as well as open-closed positions with identification plates of black background and natural letters.

## HOSE WELL STORAGE (Pump House Running Board)

A hose storage tray / bed shall be provided in the right side running board. Tray shall accommodate up to 25' of 5" hose. Each tray bottom shall be vented to prevent moisture build up and lined with plastic tile. Tray shall be equipped with a retaining strap to secure stored hose when vehicle is in motion.

**TANK TO PUMP**

The tank to pump valve shall be a 3" inline, installed between the water tank and the pump. Controls for the valve shall be provided on the operators control panel.

**TANK FILL**

One (1) 2.5" inline valve shall be supplied off the discharge side of pump and be plumbed into the front head of the tank using high-pressure hose.

**LEFT SIDE DISCHARGES**

One (1) 2.5" quarter turn discharge valve shall be provided behind the left side pump panel. Control for discharge valve shall be provided on operators pump panel. The discharge shall terminate with a 30-degree elbow with male NST threads, and have a high polished chrome cap with chain. Each discharge is to be equipped with a .750" Class 1 drain valve. Drains shall discharge below the running board. The discharge is to have a 2.5" Class 1, Sub ZII compound gauge.

There shall be a chrome plated Akron style 337 reducer of 2-1/2" NST female x 1-1/2" NST male supplied with the discharge.

**RIGHT SIDE DISCHARGES**

Two (2) 3.0" Hale Torrent Stainless steel quarter turn slow close discharge valves shall be provided behind the right side pump panel. Control for discharge valve shall be provided on operators pump panel. The discharges shall terminate with 30-degree elbows with male NST threads, and have high polished chrome caps with chains. Each discharge is to be equipped with a .750" Class 1 drain valve. Drains shall discharge below the running board. Each discharge is to have a 2.5" Class 1, Sub ZII compound gauge.

There shall be one (1) 3" NST x 3" Stortz adaptor and one (1) 3" NST x 5" Stortz adaptor installed on the respective discharges. The adapters shall have a chrome cap, chain or cable supplied.

**REAR DISCHARGE**

There shall be one (1) 3" rear discharge provided, and located in the right rear of the unit as specified. The discharge shall terminate with a 30-degree elbow with male NST threads and a chrome cap and chain. The discharge is to be equipped with a .750 Class 1 drain valve. Drains shall discharge below the tailboard. The discharge is to have a 2.5" Class 1, Sub ZII compound gauge. There shall be a 3" NST x 3" Stortz adapter with cap and chain supplied with the rear discharge.

**FRONT JUMP LINE**

There shall be a 1.5" gated discharge outlet furnished at the front of the apparatus in the front bumper extension. The front discharge shall be plumbed with 2 pipe and terminate with a 1.5 NST swivel. Controls for discharge shall be located at the operator's panel. The discharge is to have a 2.5" Class 1, SUBZII compound gauge provided at pump operators panel.

**DELUGE PLUMBING**

Plumbing for one (1) 3-deck gun discharge will be installed in the area directly above the pump compartment in the front upper section of the apparatus body. The discharge will be controlled by a 3"-inline valve. The discharge is to have male NST threads. The discharge is to be equipped with a .750 Class 1 drain valve. Drains shall discharge below the running board. The discharge is to have a 2.5" Class 1, Sub ZII compound gauge. The stainless steel plumbing shall terminate with an ASTM RF flange to accept monitor adapter installation.

**DECK MONITOR**

An Elkhart Vulcan with discharge pipe and SM-100 F Select-o-Matic LX -100 detachable foam nozzle will be attached to the 18" TFT Extend-a-Gun that telescopes from the dunnage area to just above the roof line of the cab, and top edge of the body. The Elkhart Vulcan when nested will be on top of the dunnage compartment.

**CROSSLAYS**

There shall be one (1) divided triple cross lay hose bed installed above the pump house. The bottom of the hose bed is to be no more than 72" from the ground.

The hose bed shall be divided into three sections; two sections shall be capable of holding 200 feet of 1. 75" hose, while the third section shall permit the storage of 200' of 2.5" hose. The hose bed is to be constructed of perforated aluminum flooring for maintenance free service. The hose bed dividers shall be installed on an aluminum track to allow the department adjustability.

The 1.75" cross lays shall be equipped with 2" swivels, 2" plumbing, and 2" high pressure reinforced hose. The 2.5" cross lays shall be equipped with 2.5" swivels, 2.5" plumbing, and 2.5" high pressure reinforced hose. Controls for the cross lay shall be provided at the operator's panel. A 2.5” Class 1, Sub ZII gauge shall be supplied for each cross lay.

**SUCTION Auxiliary Left Side**

One (1) 2.5” auxiliary suction valve with chrome female swivels and NST threads shall be provided and be mounted on left side pump panel.

**AUXILIARY COOLER**

The pump shall have a 3/8 line installed from the pump discharge to the water tank to cool the pump during long periods of pumping when water is not being discharged. The pump cooler shall be controlled from the pump operators panel by a 3/8 valve consisting of a cast bronze body with 1/4 turn chrome plated bronze ball, reinforced Teflon seals, and blow-out-proof stem rated to 600 PSI. The valve shall be installed through the pump panel and clearly labeled.

**SUCTION RELIEF VALVE**

This unit shall be equipped with a Class One 2-1/2" relief valve. The NFPA 1901 compliant valve will be pre set at 125 PSI and shall be adjustable from 50 - 200 PSI and will be mounted on the suction side of the pump. The valve body will be of bronze material. Adjustments are made on the valve.

## THERMAL PROTECTION DEVICE

A thermal protection device that monitors pump water temperature and opens to discharge water to cool the pump shall be installed on the pump. The thermal protection device shall be set to relieve water when the temperature of the pump water exceeds 120 o F (49 C).

The components of the thermal protection device shall be manufactured of brass and stainless steel and be compatible with most foam concentrates. The thermal protection device shall have 1-1/4 inch NPT threads for easy adaptability to existing pump discharge openings. The discharge line shall be 3/8 inch diameter tubing vented to atmosphere or back to the booster tank. An indicator light shall be provided on the pump operator's panel.

The thermal protection device shall have a hydrostatic test rating of 600 PSIG (41 BAR).

## HALE MASTER INTAKE VALVE Manual

The inlet valve shall be a full flow butterfly type valve designed to mount on the (right) side of the fire pump between the suction extension and suction tube behind the pump compartment panel. The valve shall not interfere with other suction or discharge openings on the fire pump or with pump operating controls when properly mounted. The entire valve shall be manufactured and tested at the pump manufacturers factory. The valve body and related components that are in contact with water shall be manufactured of fine-grained corrosion resistant bronze.

The butterfly disc shall be manufactured from 80,000-PSI minimum yield strength heat-treated cast steel then coated with a durable nitrile rubber to provide a positive seal when the valve is closed. Testing and rating of the valve shall be accomplished at the valve manufacturers factory. The valve, less relief valve, shall be hydrostatically tested to 600 PSIG (41 BAR). The valve shall then be vacuum tested to 26 inches (660 mm) Hg.

A pressure relief valve shall be provided that is factory set to 125 PSI (9 BAR) and field adjustable from 75 to 250 PSI (5 to 17 BAR). The pressure relief valve shall provide overpressure protection for the suction hose even when the intake valve is closed. An integral relief valve-mounting pad shall be provided on the valve body. The outlet of the pressure relief valve shall have 2-½ inch NPT threads to allow directing the discharge flow away from the pump operator position.

A manual hand wheel located next to the suction tube shall operate the inlet valve. The valve shall be provided with a panel placard indicating control operation. The placard shall have status lights to indicate whether the valve is open, closed or traversing from one position to another. The valve shall be provided with a gear actuator that will cycle the valve from OPEN to CLOSED position in no less than 3 seconds. The gear actuators shall be sealed units designed to provide reliable service in the harsh pump compartment environment. The ratio of the gear actuator shall be such that the hand wheel will close the valve in no more than 10 complete turns.

The valve body shall have a ¾ inch female NPT threaded port on the top to allow installation of an NFPA compliant large diameter hose air bleeder valve. The air bleeder valve shall be mounted on the operator panel and be controllable by the pump operator. Air bleeder valve connections shall have a restriction no larger than ¾ inch (19 mm) to prevent water hammer when filling hose.

The valve body shall have a ¼ inch female NPT threaded port on the bottom to permit connection of an individual water drain valve.

## PUMP COMPARTMENT LUBRICATION MANIFOLD SYSTEM

A white food grade lubrication manifold shall be installed within easy reach behind the hinged maintenance access panel. Each of the discharge and intake valves in the pump module lubrication points shall be plumbed to the manifold. Exact placement of the manifold shall be determined at the pre-construction meeting.

## GAUGE PANEL HEATER

An MC Products 5000 gauge and line heater shall be installed for all the gauge and gauge lines. The system shall be installed to the pump gauges, foam system gauges, and foam lines.

## CROSSLAY HOSE BED COVER Tread plate

There shall be an aluminum tread plate hose bed cover installed over the cross lays hose beds. Cover shall open by use of a full-length continuous stainless steel hinge installed at the front of the hose beds. Provisions shall be made to prevent the lid from contacting the cab and marring the paint when in its open position.

## FOAM-PRO FOAM Proportioning System

The apparatus shall be equipped with an electronic, fully automatic, variable speed, direct injection, rotary gear pump, discharge side foam proportioning system, The system shall be capable of handling Class A foam concentrates and most high viscosity normal hydrocarbon or polar solvent Class B foam concentrates. Foam proportioning operation shall be based on direct measurement of water flow, and remain consistent within the specified flows.

The system shall be equipped with an electronic control unit, suitable for installation on the pump operator panel that provides digital indication of system operation. Incorporated within the control unit shall be a microprocessor that receives input from the system flow meters, while receiving input as to foam concentrate pump output, comparing these values to ensure the operator preset proportional amount of foam concentrate is injected into the discharge side of the fire pump.

The control unit shall enable the pump operator to perform the following control and operation functions for the, foam proportioning system and will give visual indications

1. Provide push button control of foam proportioning rates from .1% - 9.90 % in .1% increments
2. Show current flow rate of water
3. Show total volume or water discharged during and after foam operations are completed
4. Show total amount of foam concentrate consumed.
5. Show foam concentrate injection rate
6. Simulate flow rates for manual operation
7. Perform set up and diagnostic functions for the foam proportioning system
8. A bar graph comprised of LEDs will indicate when foam is being injected and the approximate foam system capacity. The bar graph will indicate when system capacity is not within design capabilities.
9. Enable system calibration and storage for both Class A and Class B foam Concentrates.
10. Flash a low concentrate warning when the foam concentrate tank(s) runs low.
11. Flash a no concentrate warning and shut the foam concentrate pump off, preventing damage to the pump, should the foam tanks empty.

A 12 volt electric motor driven positive displacement rotary gear type foam concentrate pump, rated up to 5.0 GPM (19 LPM) with operating pressures up to 400 PSI, shall be installed in a suitable location on the apparatus. A distribution box (mounted to the base of the pump / motor assembly) shall receive 12 Volt DC power from the apparatus electrical system, signals from the, foam feedback sensor and signals from the control unit; and will power the ¾ HP electric motor, close coupled to the rotary gear pump, in a variable speed duty cycle to ensure that the correct proportion of concentrate, preset by the pump operator, is injected into the water stream.

**The foam system shall be plumbed to the following outlets:**
Front 2.5" jump line
Two (2) 1.75" cross lays
One (1) 2.5" cross lay
Deck Gun discharge.

**BOOSTER TANK**

A 500-gallon fiberglass tank shall be provided. The shell shall be constructed of 1/2" composite laminate. All transverse and longitudinal baffles are attached to interior of the tank tub with fiberglass chop strand, directional reinforcement fiberglass matting and wax free polyester resin, bonded both sides of connecting joint to insure maximum interior structural support.

The fill tower shall be constructed of 1/2" composite laminate. It shall measure 12"x12"x12". Its location shall be to the left side and front corner. The floor of the fill tower shall be a perforated sheet (removable-type screen), to prevent small objects from falling into the tank. The fill tower shall be mounted to allow air to escape while filling.

The tank shall be tested and certified to comply with NFPA 1901 prior to shipment to the truck manufacturer facility. The tank shall be warranted for an unlimited time after delivery, to the origin-al owner. The warranty shall warrant 100% from defects in material and workmanship, under normal use and service. The tank manufacturer shall compensate the fire department (in the U.S.A.) $200 per day for every day a valid warranty claim causes the customers apparatus to be out of service (downtime).

The fiberglass tank shall rest on 1/4" thick by 3" wide hard rubber belting strips, which completely isolates the tank from the body main frame.

There shall be one 3"x3"x3"x3/16" angle welded to each corner of the body cross member for cradle mounting of the tank. The angles shall be mounted vertically in each corner and wrap around each corner of the tank to prevent side to side and front to rear movement of the tank. The tank shall be isolated from the corner angles with 1/4" x 3" wide hard rubber strips.

The body cross members shall be constructed of 3"x3"x 3/16" square tubing and shall be spaced 15" on center. Each cross member, including the full-length end cap tubing, shall extend 1/2" past the bottom of the tank on each side. The end cap tubing shall be constructed of 1-1/2"x 3"x 3/16" rectangular tubing welded to each side of the body cross members in full-length sections creating a solid outer foundation for the tank to rest on.

Any "T" type tank with a rear step overhang exceeding 18" shall have a full length 1-1/2"x 3" x 3/16" cross member welded to the body sides to support the step overhang. The cross member shall be centered below the step. There shall be full length 1/4" thick by 3" wide hard rubber strips on the cross member for the step overhang to rest on.

## INTEGRAL FOAM TANKS

There shall be two (2) 30-gallon foam tanks furnished as an integral part of the booster tank.

One 30-gallon tank shall be for Class "B" foam concentrate and be labeled:
"CLASS (B) FOAM TANK FILL"

One 30-gallon tank shall be for Class "A" foam concentrate and be labeled:
"CLASS (A) FOAM TANK FILL

## FOAM CELL FILL SYSTEM

Both A & B foam cells shall be able to be filled from the right side pump panel. The foam concentrate intake and controls shall be mounted in this location. Foam fill pump shall be powered by a FoamPro 110-volt system with two (2) foam fill valves located on the operators pump panel providing filling of both the "A" and "B" foam cells.

## WATER LEVEL AND FOAM LEVEL INDICATORS

Water and Foam tank level gauges will be MC Products gauge bank lighted in BLUE with blue LED's and Amber for the foam tanks in circular gauge style to indicate the levels of the water tank. A center single Blue LED will remain lit when the apparatus is shut off. This LED will only stay lit when the water booster tank is full to facilitate a quick walk by tank level check on the apparatus floor.

Foam tanks will have the same MC module of level gauges as previously mentioned for the water booster tank. Foam gauges will use the same LED's as water and be backlighted in Amber.

The apparatus shall be equipped with a MC products Prism water tank level gauge for indicating water level. The water tank level gauge shall indicate the water level on an easy to read LED circular display and show increments of 1/4 tank capacity. The water tank level gauge system shall include: 17 flashing red lights. 13 flashing green lights, 9 flashing amber lights, 5 flashing amber/red lights, 17 flashing red lights.

With center indicating light when unit is off in the following colors:
blue, green, amber red, red.

Differential pressure transducers will be PVC series 2000 sensors.

## 12 VOLT WIRING

Persons familiar with emergency vehicle systems shall perform all electrical work.

Circuits shall serve all of the emergency electrical equipment separate and distinct from the vehicle chassis circuits. Body wiring shall be color and function coded, grease, oil and moisture resistant, routed in protected locations, neatly and securely fastened, and all apertures properly grommet for passing wiring. Solder-less insulated connectors shall be provided where required.

The electrical system shall be completely controlled through a distribution center. The center shall incorporate automatic reset circuit breakers connected to relays to control each electrical circuit. Each circuit breaker and relay shall be sized to the load to be carried.

The 12-volt electrical system shall be controlled through a switch panel located in the cab and at a location that is easily accessible for the driver. The panel shall include switches arranged in the most convenient and practical manner possible.

The switch panel shall operate the relays and not carry the circuit load. The panel shall control individually all emergency warning light circuits, which shall also be controlled by warning master switch.

All compartment wiring shall run in conduit and securely fastened.

All heavy ampere-carrying cables requiring terminals shall have the terminals both crimped and soldered for good electrical connections. These circuits shall include the starting, charging and siren circuits.

All wiring shall be color-coded and a schematic shall be supplied upon delivery of the truck. The diagram shall represent the exact wiring application, not a proposed system.

The distribution center, relays, strobe power packs and all other control devices shall be located in a convenient location for service.

Body shall be equipped with all lighting as required by Federal Motor Vehicle Safety Standards.

All electrical and emergency lighting equipment shall be supplied with automatic reset circuit breakers of appropriate amperage. All circuits shall be operated through a Bosch or equal continuous duty relay to remove load from all switches.

**BATTERY DISCONNECT SWITCH**

A Cole Hersey brand M-284-01 master battery disconnect switch shall be installed in a convenient location to the driver.

**BATTERY LIGHT**

A green "battery on" pilot light that is visible from the driver's position shall be provided.

**STOP / TAIL / TURN / BACKUP LIGHTS**

Body shall be equipped with stop, tail, and turn and back up lights as required by Federal Motor Vehicle Safety Standards.

New Whelen brand 700 series L.E.D stop/tail, turn and back-up lights in cast aluminum housings shall be mounted to the rear of the apparatus according to the FMVSS requirements. The back up light shall remain halogen white.

**CLEARANCE / MARKER LIGHTS (L.E.D)**

The apparatus body shall be equipped with Truck-Lite brand L.E.D marker lights. Lights shall be of the proper color and in accordance with the Federal Motor Vehicle Safety Standards (FMVSS).

A license bracket shall be provided at the rear of the unit with required lighting.

**COMPARTMENT LIGHTS**

A minimum of two (2) low voltage strip lights shall be installed as compartment lights for each exterior body compartment NO EXCEPTION.

**COMPARTMENT OPEN LIGHT**

A large red light shall be mounted in the cab visible from the driver and officer's seat.

Each compartment door shall be equipped with a door open indicator switch. When contact is broken at these switches, it shall activate the compartment open light in the cab.

**ENGINE COMPARTMENT LIGHT**

There shall be one (1) light installed in the engine compartment to illuminate the engine area. There shall be a switch located adjacent to or on the light.

**PUMP COMPARTMENT LIGHT**

There shall be one (1) light installed in the pump compartment to illuminate the pump house area. There shall be a switch located adjacent to or on the light.

**GROUND AREA LIGHTING**

There shall be six (6) Whelen model G5 super L.E.D. lights mounted under the unit to provide proper ground area illumination in areas designed for the personnel to climb onto or descend from the apparatus.

**BATTERY CONDITIONER**

There shall be a Kussmaul Auto Charge Super kit installed on the chassis. It shall consist of an Auto Charge1000 120 volt AC battery conditioner with a Super Auto Eject, and remote bar graph.

The battery conditioner (charger) system shall be wired to the chassis batteries and will recharge them to required levels. Conditioner shall provide full 15 amps of output as well as supplying up to 3 amps for loads connected directly to the battery such as radio memory, etc. System shall be connected through a 110 volt shoreline inlet or receptacle located on the cab. A 10 element LED charge indicator shall be mounted on the driver’s side of the cab near the shoreline inlet.

The shoreline inlet shall be a Kussmaul Super Auto-Eject input connector with a weather proof, sealed box and cover. Auto Eject is designed to connect a 120-volt AC source to the vehicle. Unit shall automatically disconnect 120 volt AC power source by ejecting plug from the receptacle when vehicle-starting system has been energized. Super eject shall be installed in location to be determined by the fire department.

**STREAMLITE**

Five (5) Streamlite Fir Vulcan flashlights shall be supplied. Four (4) shall be mounted and wired to the chassis 12-volt electrical system to maintain battery charging. The chargers shall not be interrupted when the battery disconnect switch is in the "off" position.

Mounting location shall be directed at the pre-construction meeting by the fire chief.

The fifth Fire Vulcan shall be shipped loose with an AC/DC charger.

## EQUIPMENT MOUNTING CAB

There shall be one (1) pressurized water/ foam fire extinguisher supplied and mounted in the cab.

The following equipment shall be supplied by the fire department for mounting in the cab:
Halligan with flat head axe married together.
Sledge hammer 8 lb. with fiberglass handle.
Four (4) 800 walkins model #HO1UCH6PW1BN.
One (1) thermal imaging camera MSA 5000 with charger and mount.
One (1) Halligan 36" (single piece steel).
One (1) TNT Denver tool.

Mounting brackets for the tools shall be either custom fabricated or purchased PAC tool mounting systems.

## WARNING LIGHTING - MODES OF OPERATION

There shall be two modes of operation, calling for the right-of-way and blocking the right-of-way. When the master optical; warning system switch is closed, and the parking brake is released or the automatic transmission is not in park, the warning devices signaling the call for right-of-way shall be energized. When the master optical warning system switch is closed, and the parking brake is on or the automatic transmission is in park, the warning devices signaling the blockage of the right-of-way shall be energized.

## LIGHT BAR

One (1) Power Arc model L.E.D 80” LED PA 80LB RCRRCR shall be permanently mounted as far forward as possible on the cab roof.

The light bar shall have four (4) LED Red sweep light bar components outside of the clear halogen front sweep and two (2) LED red front sweeps light bar component will be mounted in the center of this light bar system. All lenses will be clear.

The light bar shall be switched from the in cab switch panel. This light bar in combination with the lower lighting devices fulfills the requirements for Zone A, B, C, and D.

Any clear warning light(s) in the light bar shall be disabled automatically for tile "Blocking Right of Way" mode.

Calling right of way- Positions 1,2,3,4,5,6,7,8-*
Blocking right of way- Positions 1,2,3,6,7,8, -*

These components cannot be changed for NFPA 1901, 1966 edition compliance.

## WARNING LIGHTS

A complete lighting package from Power Arc covering the rear and side zones shall be supplied as required by NFPA 1901. The package shall contain the following lights.

**Lower Zone "A" front of Chassis Cab:**
There shall be a two (2) PowerArc model LED PA210-R red LED, sweep lights mounted on the front of the unit (zone A lower). The lenses color shall be clear, mounting brackets shall be mounted on the chassis to maximize coverage area.

**Upper Middle Apparatus:**
One LED 105-1RC-F6R
One LED 105-2RC-F6R

Upper middle apparatus lights shall be mounted on the sides of the apparatus header as far forward as possible. The sweep of the lights shall be to the sides and rear of the apparatus so as not to reflect in the rear view mirrors of the cab.

**Lower Sides:**
There shall be a total of four (4) 60R00FRR 600 series L.E.D. surface mount lights mounted on the unit. There shall be two (2) red 600 series L.E.D lights mounted one (1) on each side of the unit over the body wheel wheels. Two (2) red 600 series lights mounted one (1) front each side over the wheel wells. Each light shall be mounted using a 6Eflange.

**Upper Rear:**
One (1) LED 180-H-1L Clear Lens, Red LED
One (1) LED 180-H-2R Clear Lens, Red LED

**Middle Rear:**
One (1) PA 210H-1L Amber Lens
One (1) PA 210H-2R Amber Lens

**Lower Rear:**
One (1) LED 180-H-1L Clear Lens, Red LEDs
One (1) LED 180-H-2R Clear Lens, Red LEDs

**ELECTRONIC SIREN**

There shall be one (1) Whelen model WS-295 electronic with noise canceling microphone shall be installed in the cab area.

**MECHANICAL SIREN**

There shall be one (1) Federal model Q2B siren installed. The Q2B shall mount per fire department request and activated by Line master brand Model 491-S floor switches. The floor switches shall be located one on each side of the driving compartment. There shall be a "Siren Brake" switch included on the cab switch panel.

**SPEAKER**

There shall be one (1) compact Cast Product SH2015 flush mount speakers with 100-watt driver and polished finish will be supplied, recessed in the front chassis bumper

**AIR HORNS**

Two (2) Grover emergency Stutter Tone air horns shall be supplied and mounted in the front bumper.

**AIR HORN CONTROL**

The horns shall be activated by a Lanyard control mounted on the officer side and by a foot switch on the driver side.

**SCENE LIGHTS**

The unit shall be equipped with eight (8) Whelen 9E series surface mounted 8-32degree halogen lights. Scene lights shall be mounted two (2) on each side of the chassis cab, one (1) on each side mounted as high as possible. Two (2) on the sides of the body one (1) on each side centered on the head rail as high as possible.

There shall be four (4) Whelen9E lights mounted on the rear of the apparatus body, mounted as high as possible, two (2) on each side.

**HOSE BED LIGHTING**

There shall be three (3) Whelen 508 series scene lights mounted on the rear of the chassis cab-raised roof to provide lighting for the apparatus hose bed area.

**SCENE LIGHTS ACTIVATED IN REVERSE**

The rear scene lights shall be activated when the unit is placed in reverse. This mode is in addition to the switches provided in the cab and/or at the lights.

**GENERATOR**

The generator system shall be a Harrison model 15.0MAS-16R and rated at 15 KW or approved equal. The system shall be designed and assembled by a company with no less than 10 years experience in the manufacture of hydraulic driven systems.

The motor/generator shall be placed in a tray frame assembly which affords protection to the components and provides a unitized mounting module containing motor/generator, reservoir, oil cooler, filtration system, and a manifold containing a cross port check valve plus system re-life valve. The generator shall be a commercial type with a heavy-duty bearing and of brush-less design to ensure low maintenance. No brushes or slip rings will be allowed. The reservoir shall include an oil level gauge, oil temperature gauge, fill cap, fill strainer, and a boost unit to provide a positive pressure to the pump suction port. The generator and hydraulic motor shall be close coupled and permanently aligned using a Morse taper with a through bolt to secure the motor to the generator. No two bearing generators or shaft coupling devices are allowed.

The system must be capable of producing the rated full-load power when driven from the vehicle PTO from high idle to maximum engine speed.

The hydraulic motor and pump shall be of axial piston design to provide low internal leakage and a high degree of frequency stability. No gear pumps or gear motors are allowed. The pump will match to the system with the proper orifice, pressure compensator and load sensing to provide a stable output over the rated speed range of the pump and with electrical loads from no-load to full-load.

The system shall be capable of normal operations using a commonly available ATF fluid, such as GM DEXTRON II, or equivalent. All fluid service points shall be in close proximity for ease of scheduled maintenance.

The system shall be warranted by the manufacturer for a period of not less than two years or two thousand hours, which ever comes first.

## BREAKER BOX

The main breaker box shall be a Square D QO series load center with the appropriate circuit breakers rated to wire size and load demand. The circuit breaker panel shall be equipped with a straight-in-main, uniform termination lugs, three ground bar mounting locations (left, right, and end) and QO series circuit breakers. An engraved label shall be furnished next to or adjacent to each breaker to indicate switches and circuits.

## LOAD CENTER / BREAKER BOX

A minimum twenty (20) space Square D QO series circuit breaker boxes / load centers shall be installed in the drivers side over wheel well compartment. The breaker box shall be rated at a minimum of 100 amps and supplied with one (1) main breaker rated for the maximum amperage output of the specified generator. Load center shall feature:

- Exclusive shielded copper bus features electro tin plated copper bus bars sandwiched between two rugged polymer shields to insulate and secure the interior.
- Straight-in mains wiring and uniform termination lugs help minimize service cable bends, cutting waste and saving installation time.
- Convertible mains allow fast field conversion between main breaker and main lugs to meet changing job requirements.
- Single, captive interior mounting screw can't be lost. Interior mounts quickly and can easily be removed.
- Split branch neutral with up to 50% more terminations than UL requirement simplifies wiring and reduces clutter.

Specified breakers, as outlined herein, shall be compatible for installation in the box

Circuit breakers shall be Square D type QO (plug-on) thermal magnetic trip, with an integral crossbar to ensure simultaneous opening of all poles in multi-pole circuit breakers. Breakers shall feature:

- An over center, trip free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication.
- Handles with ON, OFF, and "Tripped" positions.
- A trip indicator shall be provided on the breakers.
- Circuit breakers shall be UL Listed in accordance with UL standard 489 with current ratings as noted on the plans. Interrupting ratings shall be selected to provide the required load center short circuit current rating.

Each breaker shall be rated to specified wire size and load demand required for each item operated from load center.

## 1500-WATT GFE QUARTZ LIGHT (STONCO LIGHT HEAD)

There shall be two (2) GFE Extend-A-Lite HD-1000 Quartz light heads provided on the rear of the body. Each light head shall be equipped with a 1000-watt quartz bulb, top mounted handle and tilt knob assembly installed.

The push-up/pull-up pole lights shall be hard wired to a single gang box installed in the body, adjacent to each light location. Each gang box shall be furnished with a weatherproof cover and a weatherproof cord grip to isolate the connection from moisture.

Single Gang Box with Weatherproof Cover Duplex 5-15 Receptacle- Rear Tripod

## REMOTE SWITCH / QUARTZ LIGHTS

There shall be four (4) 12-volt lighted rocker switches wired through a 110-volt relay and shall be located on the pump operators panel. Each switch shall control the 110-volt lighting fixtures.

## 1500-WATT GFE QUARTZ LIGHT (STONCO LIGHT HEAD)

There shall be two (2) GFE Extend-A-Lite HD-1000 Quartz light heads provided on the front of the body. Each light head shall be equipped with a 1500-watt, 240 Volt quartz bulbs, top mounted handle and tilt knob assembly installed.

### Push-up Extension Pole

Each light head shall be mounted to a GFE E-PS-UP-W push-up Extenda-pole assembly. Each pole assembly shall be constructed with a 58" x 1.71" anodized 6063 aluminum extension pole with a 48" x 1.25" internal anodized 6063-extension pole. Extensions shall be secured at specified heights by use of a locking knob and collar assembly.

The pole shall be mounted in such a way to allow the light and pole assembly to be operated while on the truck. The light shall be located so as not to interfere with any other lights, doors, or handles. Each light head shall be mounted to a GFE E-PS-UP-W push-up Extenda-pole assembly. Each pole assembly shall be constructed with a 58" x 1.71" anodized 6063 aluminum extension pole with a 48" x 1.25" internal anodized 6063-extension pole. Extensions shall be secured at specified heights by use of a locking knob and collar assembly.

## 1000-WATT GFE QUARTZ LIGHT (STONCO LIGHT HEAD)

There shall be two (2) GFE Extend-A-Lite HD-1000 Quartz light heads provided. Each light head shall be equipped with a 1000-watt quartz bulb, top mounted handle and tilt knob assembly installed.

### Tri-Pod Extension Pole Light

Each light head shall be mounted to a GFE E-POD-W tripod Extenda-pole assembly. Each tripod assembly shall be constructed with a 4' aluminum extension pole with sturdy tripod base. Tripod is capable of 11' maximum extended height.

The light shall be provided with brackets to be mounted in a compartment to be specified at the pre-construction meeting. The lights shall be wired with Hubble three prong twist lock plugs.

## 500-WATT FRC BROW MOUNT LIGHT

There shall be two (2) 500 watt 120 volt FRC Focus, model FCA800-S50 brow mount quartz lights installed on the cab roof. Light dimensions shall be 11.5" x 9.3125 x 5.3125", and be finished with a powder coat white finish. Each light can be preset to desired angles. All lights shall provide quick and simplified bulb replacement from the front by removal of just the lens cover.

One light shall be located over each front windshield of the cab.

**ELECTRIC REEL (240-VOLT)**

All 240-volt cord reels shall be a Hannay Model ECR-1620-17-18, 240 volt electric capable of holding 200 feet of 10/4 wires shall be provided with the apparatus. Each reel shall be equipped with a 12-volt electric motor with a sealed push button momentary switch located near that reel in the same compartment.

200 feet of 10/4 wire shall be provide on each reel. The cable shall terminate with a 4-prong 30-amp twist lock plug. Cable color to be Yellow.

**JUNCTION BOX**

A Circle D electrical outlet box model PF51G shall be located on all electric cord reels. The box shall be hard wired on the specified cable, and shall terminate with one (1) 250 volt, 20-amp outlet and three (3) 125 volt, 20 amp outlets. Plug type shall be specified by fire department.

**HANNAY AIR REEL**

There shall be one (1) Hannay EFL1514-17-18 low-pressure air reel installed. The reel shall have 150-foot of 3/8" 300 PSI air hose with ball stop installed. Location to be decided at pre-construction meeting.

The air reel shall be a Hannay model EFL1514-17-18 low-pressure reel, capable of holding 100 feet of 3/8" hose. The reel shall be equipped with a 12-volt electric motor with a sealed push button momentary switch located near that reel in that same compartment.

100 feet of 3/8" 300 PSI hose shall be provided with the reel. The hose color shall be red.

There shall be one (1) low pressure hose reel installed, location to be determined at pre-construction meeting.

The air reel shall be supplied from an auxiliary air tank provided on the apparatus chassis.

**HYDRAULIC REEL**

There shall be three (3) hydraulic reels installed on the apparatus. Two (2) in the front bumper extension and one (1) in a side compartment. Location to be determined at pre-construction meeting.

Each hydraulic reel shall be a Hannay model 2016-17-18, capable of holding 100 feet of twin hydraulic hose. Each reel shall be equipped with a 12-volt electric motor with a sealed push button momentary switch located near the reel in that same compartment.

100 feet of twin hydraulic hose, with a working pressure of 10,000 PSI shall be provided with each reel. Choice of colors in Red/Black or Blue/Yellow.

**CAPTIVE ROLLER**

There shall be a fairlead located at each interior compartment-mounted reel location as specified. The fairlead shall be a retractable captive 4-way roller fairlead. These devices shall be so designed as to extend out of the body when the roll-up door is opened. This shall eliminate the cable or hose from rubbing against the exterior painted body surface. This device shall be activated by simply pulling it out from the body with a web strap. The design will not allow the cable or hose to be deployed until the device has been swung out.

## PAINT

The body exterior shall have no mounted components prior to painting to assure full coverage of metal treatments. Compartment doors will be painted separately to assure proper paint coverage on body, doorjambs and door edges.

All painted surfaces shall follow the following procedure to insure a lasting finish.

Metal surfaces shall be sanded to remove all burrs and imperfections in aluminum, before etching and treatment.

A wax & grease solvent shall be used to clean and prep the aluminum surface. The surface shall then be rinsed with freshwater. This step removes wax, grease and other surface contaminants, thus leaving a bright, clean and conditioned surface.

A self-etching, aluminum primer shall be applied next. The self-etching primer shall fill all of the minor imperfections, scratches, etc. in the metal. This step produces a corrosion resisting conversion coating that fends off oxidation and other surface contaminates leaving a surface that gives excellent paint adhesion.

A sand-able primer shall be sprayed on the metal that seals the surface for the polyurethane paint. A minimum coating thickness of 2 mil shall be applied. Primer is then sanded smooth leaving the best surface for topcoat.

The apparatus body shall then be painted with a minimum of three (3) coats of high luster final finish polyurethane paint.

These steps are followed as recommended by the paint manufacturer to provide a lasting and high quality gloss finish. All paint products shall be provided by the same manufacture as the topcoat finish.

The body shall be painted to match the colors supplied by the Fire Department.

A highly reflective 1" white stripe shall be applied between the red and navy blue colors on the cab. Exact paint lines will be determined at pre-construction meeting.

## TWO-TONE PAINT

The apparatus body shall have a two-tone body scheme as specified by the fire department. The paint break shall be in line with the drip rail above the compartment doors. The lower body section shall be painted to match the dark red color supplied by the fire department. The upper body section shall be painted to match the navy blue color supplied by the fire department.

## LETTERING

Simulated "gold leaf" 3" door lettering on both rear crew doors. "Worthington Division of Fire" with "WORTHINGTON" arched over "DIVISION OF FIRE". The arched lettering will encase a vehicle vocation highly reflect 14" decal to be provided by the Fire Division.

Simulated "gold leaf" lettering with red highly reflective border to read, "ENGINE 101 RESCUE" on the painted fire body. Letters will be 10" tall and the numbers will be 12" tall.

6-3/4" "USA print" numerals "101" to be placed on each front corner of the cab. Exact placement will be determined at pre-construction meeting. Available from 3 Decals .com

4" high reflective lettering on the front upper portion of raised cab to read "CITY OF WORTHINGTON"

Flying American flag highly reflective material above both EMS compartments close to the top (same as medic 10).

Any American Flag applied to this apparatus must have the blue field towards the front of the apparatus

Anywhere navy blue and red paint material meet there will be a 1" highly reflective material white pin stripe applied.

**STRIPE**

10" white, highly reflective stripe with large double "S" design on the forward and rear apparatus doors with red shading in the curves of the "S". Stripe will fade to all red in the rear of the truck and met the chevrons.

Rear of the truck will have a chevron made of highly reflective material with 6" stripes, with red and white. This will be an inverted "V". The chevrons are to be applied to a smooth aluminum surface only.

**DECALS**

There shall be two (2) 18" simulated "gold leaf" Maltese crosses supplied by the fire department and installed on the unit. A Maltese cross shall be installed on the driver's door and the other to be installed on the officer's door.

There shall be a "KEEP BACK 500 FEET" highly reflective material 6" navy blue letters on the rear doors of the apparatus.

A 24" "E/R 101" white reflective material shall be applied to the raised roof of the crew area.

The lettering and graphic design will be determined at pre-construction meeting.

**LADDER'S**

There shall be one (1) Alco-Lite 14' two section aluminum extension ladder model PEL-14 supplied with the unit.

There shall be one (1) Alco-Lite 24' two section aluminum extension ladder model PEL-24 supplied with the unit.

There shall be one (1) Alco-Lite 10' aluminum folding ladder model FL-10 supplied with the unit.

**PIKE POLE'S**

There shall be one (1) 6' Duo-Safety pike pole with a fiberglass handle supplied with the unit.

There shall be one (1) 8' Duo-Safety pike pole with a fiberglass handle supplied with the unit.

There shall be one (1) 10' Duo-Safety pike pole with a fiberglass handle supplied with the unit.

**HARD SUCTION HOSE**

There shall be a 6" x 12' section of hard suction hose with NST threads provided with the completed unit. The hose shall have long handles.

**SUCTION HOSE**

One 20' long x 5" diameter Kochek model RC6082B rubber covered soft suction hose shall be supplied. The hose shall be supplied with one (1) 4" Columbus Hydrant Thread female long handle coupling and one (1) 5" Stortz coupling.

The hose will be stored in the hose well on the right side running board.

**WIRING SCHEMATICS**

Two (2) sets of detailed electrical wiring schematics shall be provided with the completed unit. The schematic shall clearly labeled and describe all electrical circuits for an accurate reference.

**SERVICE MANUAL AND PARTS LIST**

Two (2) manuals shall be provided with the completed unit. Manual shall include equipment and component information as well as warranty and service information.

Two (2) chassis maintenance manuals containing service information, wiring diagrams and lubrication charts on major chassis components are to be provided. Diagrams shall be specific to the unit delivered.

**LIMITED WARRANTY**

The body manufacturer shall warrant the new apparatus for a period of twelve (12) months or 12,000 miles (whichever occurs first) from the date of delivery to the original retail purchaser. The warranty will ensure that the vehicle will be free from defects in material and workmanship that may appear under normal use and service within the warranty period. A copy of the warranty shall be supplied with the bid.

**PAINT WARRANTY**

The body manufacturer shall warrant the new apparatus paint finish for a period of seven (7) years or 84,000 miles (whichever occurs first) from the date of delivery to the original retail purchaser. The warranty will ensure that the vehicle will be free from peeling, cracking, loss of gloss caused by cracking, and any paint failure caused by defective finishes as determined by the manufacturer under normal use and service within the warranty period. A copy of the warranty shall be supplied with the bid.

## ELECTRICAL WARRANTY

The body manufacturer shall warrant the new apparatus electrical system for a period of ten (10) years or 100,000 miles (whichever occurs first) from the date of delivery to the original retail purchaser. The warranty will ensure that the vehicle will be free from defects in the electrical harness and connections under normal use and service within the warranty period. A copy of the warranty shall be supplied with the bid.

## BODY STRUCTURAL WARRANTY

The body manufacturer shall warrant the new apparatus for structural integrity for a period of twenty (20) years from the date of delivery to the original retail purchaser. The warranty will ensure that the vehicle will be free all structural defects of both material and workmanship that may appear under normal use and service within the warranty period. A copy of the warranty shall be supplied with the bid.