NFPA 1901-2009

The National Fire Protection Association "Standard for Automotive Fire Apparatus, 2009 Edition, is hereby adopted and made a part of these specifications for the componentry supplied in the incomplete chassis.

CUSTOM FIRETRUCK CHASSIS

The chassis shall be designed and manufactured by a custom chassis manufacturer. The manufacturer shall demonstrate evidence of manufacturing similar custom vehicles for at least fifty (50) years.

The chassis shall be designed and manufactured for heavy duty fire service with adequate strength and capacity for all components as detailed within these specifications.

CHASSIS FRAME

The frame shall be designed to industry standards. The manufacturer shall provide a life time frame side rail warranty to the original purchaser of the chassis. The frame rails shall be 10.5" x 3.5" x .375" heat treated steel.

A 3/4 length inner frame side rail liner with dimensions of 9.687" x 3.125" x .3125" shall be provided for additional strength and reduce deflection. The frame liner shall extend from the centerline of the front axle and taper 45 degrees forward and shall extend to the rear of the main frame rail.

The frame side rails shall be 110,000 psi minimum yield and shall have a minimum section modulus of 30.38 cu. in., in the frame liner area, calculated by using the square corner shape method. The resulting frame rail resistance to bending moment shall be 3,341,800 in. lb. per rail.

To insure the maximum clamp load for the fastener prevailing torque the crossmembers shall be bolted in place using grade 8 bolts, hardened washers, and grade "C" distorted thread locknuts. Flanged head fasteners shall not be acceptable. The top of the frame rails shall be free of bolt heads.

Frame engine cutouts shall be made with a plasma torch to minimize the heat affected zone of the cut. All cutouts shall have a minimum of 6 inch transitions between rail flange cut depths to reduce the stress concentrations throughout the cutout area. The root of all transition areas shall have a minimum of a 2 inch radius to reduce stress concentrations at the root.

The main frame rails, frame liner and main frame crossmemebers behind the pump shall galvanized to reduce the effect of harsh road chemicals. This warranty shall be in effect for 20 years after delivery of the apparatus to the end user.

CAB MAIN FRAME CROSSMEMBER

In addition to the rear cab support crossmember there shall be a main frame cross member mounted in the rear cab area. This cross member shall be a wide base flanged design to provide frame spacing and excellent strength to prevent frame paralleling. Every frame cross member shall be bolted in place using grade 8 bolts, hardened washers, and grade "C" distorted thread locknuts.

FRONT AXLE

The front axle shall be a MERITOR model "MFS-18-133A-N" with a 18,740 lb. capacity.

CRAMP ANGLE

The chassis shall have a turning cramp angle of 45-degrees. Both left and right turns have a full 45° cramp angle with tires and wheels mounted on the axle and installed in the chassis. The 45°cramp angle is achieved irrespective of options such as front suctions and disc brakes.

FRONT AXLE OIL SEALS

The front axle shall be equipped with oil bath type oil seals as supplied on the axle from the axle manufacturer. The spindles shall be equipped with transparent covers for oil level inspection.

FRONT AXLE BRAKES

The front brakes shall be Cam-Master Q Plus, 16-1/2" X 6" (419 x 152), S-Cam, air operated heavy duty brakes for increased stopping power and brake life in severe braking applications.

The "S" cam brakes shall incorporate a double anchor pin design, for stability and smooth consistent stopping. The camshafts shall be heat treated with rolled spline construction.

The front axle shall be equipped with automatic slack adjusters (ASA) to provide optimum brake performance.

FRONT SUSPENSION

The front suspension shall be a pin and shackle design. Front springs shall be a minimum of ten (10) leaf elliptical type, 53" x 3-1/2" x .499" forged steel. The front springs shall have a military wrapper for safe operation. For a smooth ride the spring rate shall not exceed 3,000 lbs/in deflection.

All front spring pins shall be ground heat treated steel with grease fittings for lubrication.

The entire front suspension shall be designed for heavy duty custom fire apparatus with a capacity at ground of 18,740 lbs.

Double acting hydraulic shock absorbers are to be installed.

STEERING SYSTEM

The steering shall be equipped with a single SHEPPARD M110 integral power steering gear. The engine shall be equipped with a gear driven pump.

A remote steel reservoir shall be provided with the ability to check the fluid level when the cab is in the lowered position.

FRONT TIRES

The front tires shall be 385/65R22.5-18PR (J) GOODYEAR G-296 MSA tread, tubeless radial tires. These tires shall be mounted on 22.5" x 12.25" rims.

INTERMITTENT* SERVICE LOAD RATING

The front axle GAWR using these tires shall be 20,050 lbs. @ 120 psi.

*Intermittent Service use is defined as no more than 50 miles of continuous operation under maximum recommended payload at the maximum speed. If it is necessary to operate continuously for more than 50 miles without stopping for at least 20 minutes, the emergency vehicle must reduce its speed to no more than 50 mph after the first 50 miles of travel.

TIRE SPEED RATING

The maximum tire speed rating is 68 MPH.

ALUMINUM WHEELS

Two (2) polished aluminum wheels shall be supplied and installed on the front axle. The 22.5" x 12.25" wheels shall be highly polished on the outboard side.

SINGLE REAR AXLE

The rear axle shall be a MERITOR model "RS-25-160" with a 27,000# capacity for the fire service.

MERITOR DIFFERENTIAL

The rear axle shall contain a Meritor 160 Series differential with an 18 inch diameter ring gear utilizing hypoid-Generoid gearing and a 2-1/4 inch diameter axle shaft.

AXLE DIFFERENTIAL LUBE

The axle shall have the initial factory fill made with non-synthetic axle lube meeting the axle manufacturer's recommendations.

REAR AXLE OIL SEALS

The rear axle shall be equipped with premium oil bath type oil seals as supplied on the axle from the axle manufacturer.

REAR AXLE BRAKES

The rear brakes shall be Cam type, 16-1/2" X 7" (419 x 178), S-Cam, air operated heavy duty brakes for increased stopping power and brake life in severe braking applications.

The "S" cam brakes shall incorporate a double anchor pin design, for stability and smooth consistent stopping. The camshafts shall be heat treated with rolled spline construction.

The rear axle shall be equipped with automatic slack adjusters (ASA) to provide optimum brake performance.

VEHICLE TOP SPEED

The rear axle shall be geared for a top speed of 65 to 68 mph at engine governed RPM.

NFPA TOP SPEED STATEMENT

NFPA-1901, 2009 Edition - 4.15.2 The maximum top speed of fire apparatus with a GVWR over 26,000 lb (11,800 kg) shall not exceed either 68 MPH (105 km/hr) or the manufacturer's maximum fire service speed rating for the tires installed on the apparatus, whichever is lower.

NFPA-1901, 2009 Edition - 4.15.3 If the combined water tank and foam agent tank capacities on the fire apparatus exceed 1250 gal (4732 L), or the GVWR of the vehicle is over 50,000 lb (22,680 kg), the maximum top speed of the apparatus shall not exceed either 60 MPH (105 km/hr) or the manufacturer's maximum fire service speed rating for the tires installed on the apparatus, whichever is lower.

The speed selected on this apparatus exceeds 60 MPH (105 km/hr) and the customer is aware of NFPA-1901 and the top speed that will be achieved with the finished apparatus.

SINGLE AXLE REAR SUSPENSION

The rear springs shall be a minimum of seventeen (17) main including four (4) auxiliary leaves. The rear suspension shall have a rating of 27,000 lbs. Capacity. The rear suspension shall be a "self-leveling" slipper type with a main torque leaf that contains a military wrapper. The torque leaf shall contain a bronze bushing for long service life.

The rear hangers are to be of the slipper design. For a smooth ride the rear suspension deflection rate shall not exceed 3,790 lbs. per inch.

One (1) inch diameter rear suspension U-bolts are required.

Two (2) main frame cross members shall be mounted in the rear suspension area, bolted to the frame rail as a rear suspension support member. Each cross member shall be a wide base flanged design to provide frame spacing and excellent strength to prevent frame paralleling. Each cross member shall be bolted in place using grade 8 bolts, hardened washers, and grade "C" distorted thread locknuts.

AIR SYSTEM

An air brake system meeting the requirements of the FMVSS-121 shall be provided. The system shall consist of three (3) reservoirs with a 4,362 cu. in. volume. The air system shall consist of the following components:

Dual air system with dual gauges and a warning light and buzzer. A spring actuated parking brake built into the rear axle brakes with a manual control and warning light the in cab. These shall automatically apply in case of air system failure. A mechanical means of releasing the spring brake shall be provided in the event of total loss of air pressure.

A quick build up system shall be provided, capable of building enough air pressure to release the spring brake in less than thirty (30) seconds, when starting with the entire air system at zero pounds pressure.

The brake system shall be a split system. One (1) system serving the rear brakes and one (1) system serving the front brakes. The two (2) systems shall be connected with a double check valve that shall automatically shuttle air from the front system to the rear system should loss of air pressure occur. This system shall also modulate the amount of air so the spring brakes shall apply in direct relationship to the amount of pressure applied to the treadle valve.

The brake system shall be equipped with a Bendix SR-7 valve to provide modulated spring brakes in the event there is low air pressure in the rear axle air supply reservoir.

The spring brakes shall be piped in such a manner that if the treadle valve is depressed while the spring brakes are applied, the spring brakes shall release and remain released as long as the treadle valve is depressed. They shall reapply immediately when the treadle valve is released.

The piping in the air system shall be 2-ply nylon reinforced color coded tubing for all stationary lines.

AIR DRYER

The air system shall include a BENDIX AD-SP air dryer.

The air dryer shall have a spin off desiccant cartridge.

The air dryer shall incorporate an integral turbo cutoff valve. The turbo cutoff valve shall close the path between the air compressor and the air dryer purge valve during the compressor "unload" cycle. This shall allow the air dryer to purge the water and contaminates without any loss of turbo boost or engine horsepower.

A 12 volt heated moisture ejector shall be an integral part of the air dryer. This heater shall be thermo- statically controlled. The electrical connection for the heater shall use a sealed electrical connector to protect against moisture and corrosion.

DEDICATED AIR HORN RESERVOIR

One (1) 2181 cu. in. additional reservoir shall be connected to the chassis air system to provide an air supply for

the chassis air horns. This reservoir shall include a pressure protection valve on the inlet side to allow full use of this tank without draining air from the chassis air system.

MANUAL AIR TANK DRAINS

All air reservoirs shall have manual 1/4 turn drain valves. The drain valves shall be supplied with rubber seats to reduce air system leaks. The reservoir drain valves shall allow the accumulation of contaminants that are collected in the reservoirs to be drained off to the atmosphere.

MERITOR/ROCKWELL/WABCO ABS BRAKE SYSTEM

A four channel, single rear axle model, MERITOR/ROCKWELL/WABCO ABS Braking System shall be supplied.

A frame mounted electronic control unit (ECU) shall monitor and control wheel speed during braking. Wheel sensors, constantly monitoring wheel speed, send information to the ECU. If a wheel begins to lock the ECU transmits an electrical impulse to modulator valves that can apply, release or hold the air pressure in the brake chambers. The rapid modulation of air pressure prevents wheel lock-up and increases driver control.

This ABS system shall be a 4S/4M system with four (4) wheel speed sensors and four (4) modulator valves.

If a fault occurs in one wheel, that wheel shall have normal (non-ABS) brake function. The other wheels shall continue to provide the ABS function. If the ABS system should fail completely, the brake control shall be returned to normal (non-ABS) braking.

An ABS warning light shall be installed on the driver's dash message center. This warning light shall cycle through a test stage at the point of ignition turn on and remain illuminated until the vehicle reaches approximately four (4) MPH. The light shall illuminate in other conditions to warn of an ABS system failure and shall illuminate when the diagnostic function is activated.

REAR TIRES

The rear tires shall be 12R22.5-16PR (H) GOODYEAR UNISTEEL G182 RSD traction tread, tubeless radial tires. These tires shall be mounted on 22.5" x 8.25" rims.

Single rear axle GAWR using these tires shall be 27,000 lbs. @ 120 psi.

TIRE SPEED RATING

The maximum tire speed rating is 75 MPH.

ALUMINUM WHEELS

Two (2) polished aluminum wheels shall be supplied in the outer wheel position of the rear axle. The 22.5" x 8.25"

wheels shall be highly polished on the outboard side.

LASER ALIGNMENT

The chassis shall have a laser alignment performed at the factory before delivery.

Toe In Front Axle - The toe in on a vehicle is set to reduce tire wear and to insure that the vehicle shall steer in a straight line. Toe in measurements are set to a positive 2.5 millimeters total, giving the vehicle 1.25 millimeters from side to side.

Toe In Rear Axle - The toe in on the rear wheels is set up slightly different in that the axle and wheels are set to ride the "crown" of the road. This is achieved by adjusting the toe to a measurement of no less than 1 millimeter, but no more than 2 millimeters. The ideal measurement is 1.5 millimeters total for both sides.

Cramp Angle - Cramp angle is set to achieve the greatest turning radius possible with the selected components of the vehicle. Each front wheel is set to zero degrees. The wheel is then turned until it reaches the steering stops. This measurement is the cramp angle.

TIRE PRESSURE MONITORING DEVICE

Each tire installed on the apparatus shall be equipped with a tire pressure monitoring device. The device shall consist of a valve stem cap to with an LED tire alert to indicate tire pressure conditions. The LED will flash when the tire drops 8 psi below the factory setting.

DIESEL ENGINE

The chassis shall be powered by a Cummins diesel engine as described below:

MODEL:	ISL9-450
NUMBER OF CYLINDERS:	Six
BORE AND STROKE:	4.49 in (114 mm) x 5.69 in (145 mm)
DISPLACEMENT:	543 cu. in. (8.9L)
RATED BHP:	450 hp (336 kW) @ 2100 RPM
TORQUE:	1250 lb-ft (1696 N-m) @ 1400 RPM
COMPRESSION RATIO:	16.6:1
GOVERNED RPM:	2200

Standard Equipment on the engine to include the following:

OIL FILTER:	A full flow / by-pass combination
LUBE OIL COOLER:	High efficiency non-drainback full flow cooling
FUEL FILTERS:	Two fuel filters providing 3 / 10 micron absolute filtration
STARTER:	12 volt
AIR COMPRESSOR:	A Wabco 18.7 cfm compressor shall be provided

ENGINE COOLANT RADIATOR

The engine coolant radiator shall have sufficient capacity to perform under the engine manufacturer installation requirements. The chassis manufacturer shall demonstrate the ability to meet this requirement with the submittal of an approved IQA to the fire department for the apparatus.

This radiator shall have HRPOS top and bottom tanks. These tanks shall have a material thickness of 11 gauge. The top and bottom tanks shall be attached to the header assemblies with a minimum of forty (40) fasteners. These fasteners shall not exceed a center distance of 1.938 inches to reduce the possibility of tank leaks. These fasteners shall be torqued to a value of 29.5 ft-lbs.

The header plates shall be made of 16 gauge brass.

The radiator tubes shall be constructed of .0066 inch thick brass and have a dimensional size of .076 inch x .625 inch. These radiator tubes shall have welded tube seams.

The radiator shall contain three (3) rows of tubes arranged in an inline profile across the radiator core. The entire radiator shall a contain (231) tubes. These tubes shall have a smooth bore to allow for radiator cleaning.

In the critically stressed area, where the radiator tubes are attached to the header plates, this joint shall be accomplished with a welding process on the coolant side. In addition to the welded joint a solder fillet joint shall occur on the air side of the core creating a continuous dual bond.

The radiator shall have a louvered serpentine type core that contains fins constructed of .0024 inch thick copper. These fins shall be spaced to a maximum density of 14 fins per inch of radiator tube. Each fin shall have a louvered surface for high cooling efficiency.

The radiator shall contain an integral coolant de-aeration tank. This tank shall be designed to remove entrapped air or gas from the coolant side of the radiator.

The radiator side rails shall have integrally designed support gussets for the transition to the header attachment.

The bottom tank of the radiator shall have a drain valve for coolant removal.

The bottom tank of the radiator shall have a transmission cooler with a plate-type design. The plates shall have internal turbulators to break up laminar oil flow across the surface. The cooler shall have 1311 square inches of surface area for water surface contact and heat transfer.

The radiator system shall be pressurized with a cap rated per the cooling system requirements of the specific engine manufacturer.

The high efficiency engine fan shall be encompassed with a radiator shroud to provide the proper air flow from the fan blade to the radiator.

The perimeter of the radiator shall have recirculation baffles to eliminate the possibility of recirculation of "hot" air to the face of the radiator core. The bottom of the radiator shall have a recirculation baffle from the radiator to the frame rails.

COOLANT RECOVERY SYSTEM

A coolant recovery system shall be installed on the chassis. This tank is designed to capture coolant overflow when the engine coolant warms and expands. As the engine cools the overflow is then pulled out of the tank and back into the radiator, thus maintaining proper coolant levels.

CHARGE AIR COOLER RADIATOR

The engine charge-air cooler shall have sufficient capacity to perform under the engine manufacturers installation requirements. The chassis manufacturer shall demonstrate the ability to meet this requirement with the submittal of an approved EPQ to the fire department for the apparatus.

This radiator shall have cast aluminum side tanks. These tanks shall have a material thickness of .200. These tanks shall be attached to the charge-air core with the ALBRAZE construction technique.

The external air fins shall be louvered serpentine and constructed of .006 inch thick aluminum.

The internal air fins shall be of the lance-and-offset design for greater air turbulence and higher efficiency. The internal fins are to be constructed of .010 inch thick aluminum.

The charge-air cooler shall be mounted directly in front of the engine coolant radiator. To reduce vibration rubber "iso" mounts shall be used for mounting of the charge-air cooler to the engine radiator.

The charge air cooler shall contain (12) rows of internal fins within a .313 x 2.632 aluminum tube assembly. This tube assembly shall be constructed of .025 thick aluminum.

The charge-air cooler shall contain thermal expansion slots to allow the expansion and contraction of the charge-air core over the wide range of temperatures that are expected in operation.

The charge air piping between the engine and charge-air cooler shall be aluminum tubing with a wall thickness of .065 inch. The system shall utilize four (4) ply silicone rubber woven Nomex hoses with stainless steel pressure bands. These bands are designed to maintain the hose shape under the pressure of the turbocharger boost air. All clamps used on the charge air piping are to be stainless steel constant torque and shall be installed at each joint.

COOLANT

The coolant system shall contain an ethylene glycol and water mixture to keep the coolant from freezing to a

temperature of -34 degrees F.

COOLANT HOSES

The entire chassis cooling system shall have premium rubber hoses. All clamps to be stainless steel worm drive type clamps.

COOLANT SYSTEM CLAMPS

Single wire constant torque clamps shall be used for all cooling system hoses.

HEATER LINE SHUT OFF VALVES

The heater circuit shall have quarter turn shut off valves installed on both the supply and return lines to allow a complete shut off of coolant flow to the cab heaters in hot seasons of the year. These valves shall be installed in addition to the valves in the heater unit(s).

ENGINE AIR INTAKE FILTER

The engine shall be equipped with a K&N heavy duty washable intake air filter. The filter shall utilize a media that does not require oil.

ENGINE OIL

The engine shall have the initial factory fill made with a non-synthetic engine oil meeting the engine manufacturer's recommendations.

ENGINE BRAKE

A "JACOBS" Engine Brake shall be supplied.

The Driver's dash shall include an engine brake control switch.

Activation of the engine brake shall occur at zero throttle position. The transmission ECU shall be programmed to operate in the pre-select downshift mode to maximize the retarding power of the engine brake.

The brake lights shall illuminate when the Jacobs Brake is in operation.

The Jacobs Brake shall be inoperative when the chassis is in pump mode.

The "JACOBS" engine brake shall be covered under the standard five year Cummins engine warranty.

ENGINE FAST (HIGH) IDLE

The chassis shall be equipped with an Electronic Idle Control (EIC) for the electronic engine. Preset speed is factory adjustable.

The fast idle provision shall only function when the parking brake is set and the transmission is in neutral. Manual selection of the fast idle shall be controlled by a driver's momentary switch.

Automatic activation of the fast idle shall occur when a low voltage condition exists, the truck is in neutral and the parking brakes are applied.

Cancellation of the fast idle shall be achieved by resetting the manual switch or by depressing the service brake pedal.

CORROSION INHIBITOR

Corrosion inhibitor shall be provided as an additive to the chassis cooling system.

AUXILIARY ENGINE COOLER

The cooling system shall have one (1) SENDURE auxiliary engine cooler mounted in the upper radiator water pipe. The apparatus shall have the fire pump water circulated to the cooler from a valve located on the apparatus pump panel.

SPARK ARRESTOR

A spark arrestor shall be installed in the chassis air intake system. This arrestor shall be mounted behind the intake grille to filter out airborne embers.

FAN DRIVE

A fully variable fan drive system shall be installed on the engine. Variable operation is required to reduce fan noise and improve response time and lower off-speed for maximum efficiency.

EXHAUST SYSTEM

A single exhaust pipe shall be provided for the engine. The exhaust pipe shall be supplied with a heat wrap. The wrap shall extend from the engine turbo charger to just below the frame rail.

The exhaust tubing from the turbocharger to the exhaust after treatment device shall be stainless steel.

CUMMINS AFTERTREATMENT SYSTEM

The chassis shall be equipped with a Cummins exhaust after treatment system in compliance with EPA 2010.

TAILPIPE

The tailpipe shall extend from the exhaust muffler/aftertreatment device to the rear of the vehicle making a 90° bend to exit the vehicle ahead of the rear tires on the curbside of the vehicle. The end of the pipe shall be cut square or perpendicular to the exhaust pipe centerline.

The pipe shall be unpolished stainless steel.

An exhaust gas diffuser shall be furnished on the end of the tailpipe.

DIESEL EXHAUST FLUID SYSTEM

The chassis shall be equipped with a 5 gallon Shaw Development Diesel Exhaust Fluid (DEF) reservoir system. The reservoir shall contain an Multifunctional Head Unit (MFHU) that contains integrated level and temperature sensors. The MFHU also shall contain a coolant powered heater to thaw DEF in conditions below 12°F (-11°C) to meet governmental regulations. The reservoir shall be located on the left frame rail behind the front axle beneath the cab. The mounting system shall use stainless steel mounting brackets to reduce the possibility of corrosion.

TRANSMISSION

The transmission shall be an Allison 3000EVS automatic transmission with electronic controls.

The transmission shall be equipped with a lock-up control circuit that shall automatically shift the transmission into 4th gear lock-up when the pump is shifted into gear.

TRANSMISSION COOLER

An automatic transmission cooler shall be provided as an integral part located in the bottom tank of the radiator. It shall be designed to withstand 165 psi working pressure and an intermittent pressure of 250 psi. The cooler shall be of sufficient size to maintain the operating temperature within the recommended limits of the transmission manufacturer.

TRANSMISSION FLUID

The transmission shall be provided with heavy-duty transmission fluid meeting Allison specification TES-389.

FIVE SPEED PROGRAMMING

The transmission shall be programmed for five speeds.

First - 3.49
Second - 1.86
Third - 1.41

Fourth - 1.00
Fifth - 0.75
Reverse - 5.03

The transmission shall be able to shift from first through fifth gear without operator intervention. The chassis shall be geared for the top speed in 5th gear.

AUTOMATIC NEUTRAL

The transmission shall be provided with circuitry to provide automatic neutral. Setting the parking brake commands the transmission to neutral when the park brake is applied, regardless of drive range requested on the shift selector. Requires re-selecting drive range to shift out of neutral.

After the transmsission has been activated with the automatic neutral feature the shift lever must be returned to neutral and back to drive for midship pump operations.

REMOTE FLUID LEVEL SENSING

The chassis shall be equipped with an electronic low fluid level indicator system for the engine oil, transmission oil, engine coolant and power steering fluid as part of the instrumentation package. This system eliminates the need for daily checking of fluid levels with manual dipsticks.

Coolant over temperature sensors are only capable of sensing excessive coolant temperature caused by clogged radiators, malfunctioning thermostats, failed water pumps or any other "circulation" problem. Upon loss of coolant, however, these temperature sensors must try to respond to hot air which, being a poor thermal conductor, results in signals that arrive only after the engine is severely damaged.

In a like manner, under leaking oil conditions low oil pressure signals are not obtained until the oil pump is starved for oil. Since the oil pump draws liquid from the very bottom of the crankcase pan, these signals arrive only after virtually all oil has been lost. Again, the damage has already occurred.

The liquid level sensor provides an early warning that fluid is being lost and allows corrective action to be taken before damage can occur. By using a sensor to turn on an indicator light, the low fluid level condition is communicated immediately to the operator.

ENGINE COOLANT

The coolant level sensor is located in the upper radiator reservoir. The corresponding LED indicator light is included in the display module.

ENGINE OIL

The engine oil sensor is in the engine oil sump. It monitors the oil level at approximately the 50% level. The corresponding LED indicator light is located to the right of the instrument panel on the doghouse in clear view of the driver.

POWER STEERING FLUID

The power steering fluid sensor is located in the power steering fluid reservoir at the same level as the "Add" indicator on the dip stick. The corresponding LED indicator light is located to the right of the instrument panel on the doghouse in clear view of the driver.

FUNCTION

The LED indicator lights will illuminate when the ignition is placed in the ON position as a test to insure that the warning circuits are working. They will go out when the starter button is pressed if normal fluid levels are detected. One or more of the lights staying on indicates a low fluid level in the corresponding system(s). Any time the engine is ON and a low fluid level is detected, the appropriate light will illuminate. The sensor output will reset when the ignition is turned off.

TRANSMISSION OIL

The transmission oil sensor is in the transmission oil sump. The fluid level indicator is integrated into the shift selector. Accessing the fluid level status is dependent upon the style of shift selector provided.

The transmission fluid level status is accessed through the "mode" function of the shift selector controls. First, park the vehicle on a level surface, shift to N (Neutral), and apply the parking brake. If equipped with a pushbutton shift selector, simultaneously press the Up and Down arrow buttons. If equipped with a lever shift selector, press the display mode button one time. A code will be displayed on the shift controls indicating that the oil level is HI, LO or OK. If the level is HI or LO, the display will also indicate the number of quarts of oil necessary to be added or removed to bring the oil level into the OK range. It may also display an error code that explains why fluid level information is not available. The fluid level check may be delayed until the following conditions are met:

- The fluid temperature is above 60°C (140°F) and below 104°C (220°F).
- The transmission is in N (Neutral).
- The engine is at idle
- The transmission output shaft is stopped.
- The vehicle has been stationary for approximately two minutes to allow the fluid to settle.

See the Care and Maintenance section of the transmission Owner's Manual for a more detailed description of the fluid check procedure along with a complete list of error codes.

DRIVELINES

Universal joints and driveshafts shall be SPICER 1760 series or equal. The driveshaft tube shall be a minimum of 4.09" diameter with a .180" tube wall thickness. The driveshaft slip joints shall be coated to reduce sliding friction and thrust under high torque loads. Permanent driveline installations shall be balanced to prevent vibration.

TEMPORARY DRIVELINE INSTALLATION

The drivelines and driveline center bearing supports shall be a temporary installation for completion by the apparatus manufacturer.

FUEL TANK

The fuel tank shall have a capacity of 50 gallons (US) and be D.O.T. certified. It shall be mounted with straps bolted to the bottom frame flange to allow for easy removal. The tank construction shall be of 12 gauge steel with

single fuel pickup and return tubes. The baffled tank shall be vented to prevent low vacuum and facilitate rapid filling.

The tank shall have a 2" NPT fill to the driver's side of the chassis.

The fuel tank sending unit is to be mounted to the driver's side of the fuel tank for easy replacement without removing body panels.

FUEL LINES

Polyamide fiber, nylon braided, reinforced tubing with push-on reusable fittings shall be provided for the chassis fuel lines.

FUEL/WATER SEPARATOR

The Cummins engine shall be equipped with an integrated fuel / water separator with a self venting bottom drain valve. This filter shall be able to remove up to 95% of dissolved water and up to 99% of free standing water.

ALTERNATOR

A LEECE-NEVILLE model LN4867J 270 Amp alternator shall be installed on the engine. This alternator is internally rectified and regulated.

FIRETRUCK CAB

The apparatus shall be designed to operate in emergency conditions. These conditions require the apparatus to maneuver into areas at a high rate of speed. To facilitate in these operations a cab-over-engine design is required in order to reduce the overall length of the apparatus thus increasing the maneuverability.

The cab design must be such to provide safe and efficient transport of emergency personnel. The cabin shall be designed with four (4) side doors of the largest size possible and with a grab handle and step arrangement to provide ease of entry and egress.

There shall be up to six (6) positions available for occupant transport with a minimum of four (4) forward facing seating positions in the cab. The number of seats and seating locations are described in detail later in this document.

The apparatus cab shall be of the latest in automotive design, styling and appearance.

CAB MATERIALS AND CONSTRUCTION

The extruded aluminum *xl* cab shall have the following material gauges as a minimum:

- Cab floor - 3/16" (.190") aluminum
- Front skin - 3/16" (.190") aluminum

- Cab side panels - 3/16" (.190") aluminum
- Cab rear wall - 3/16" (.190") aluminum
- Cab driver's floor - 3/16" (.190") aluminum
- Cab officer's floor - 3/16" (.190") aluminum
- Cab crew area floor - 3/16" (.190") aluminum
- Cab roof - 3/16" (.190") aluminum
- Cab doors - 3/16" (.190") aluminum

Roof Rail Section Extending from the front to the rear of the cab above the doors the cab shall have and extruded aluminum section. This section shall be designed to interlock with the roof sheet and incorporate the door drip molding in one single piece.

Upper Transverse Member Amid ship in the cab there shall be a boxed beam header assembly located transverse in the cab from left to right.

Front Door B-Post This vertical box section of the cab located behind each of the front doors provides the slam post for the door latch assembly. This section also is a main member in the cab skeletal system. The B-Post ties into the Upper Transverse Member to provide torsional stiffness in the open space design of the cab.

Rear Door B-Post The box assembly design of the rear door B-post provides an anchor for the rear door latch assembly. This section is the main vertical support at the cab rear corner providing the anchor point for the rear wall structural lattice network.

Roof Panel Rails - The roof panel sub-assembly shall have extruded hat section supports bonded to the roof skin. These roof hat sections shall be joined to the Cab Roof Rail Section to complete the upper cab skeletal structure. These completed Roof Panel Rails shall provide a grid for maximum roof crush and deflection strength. The roof shall support a minimum weight of 250 lbs. / sq. ft. without permanent roof deformation.

Rear Wall Rails - The rear wall assembly shall have extruded hat section supports bonded to the wall skin. These sections shall be joined to the Roof Panel Rails and to the rear door slam post and floor provide a rear wall grid structure with maximum strength.

Cab Front Wall - The front wall of the cab shall be designed with a double wall construction to reduce the effects of exterior noise in the crew and operator compartment.

CAB DIMENSIONS

The cab shall have the following overall dimensional requirements:

- Overall Width - 100 inches
- Roof - 12" Raised
- Center of front axle to back of cab - 60 inches
- Center of front axle to front of cab - 74 inches
- Windshield area - 4,200 sq. in. minimum
- Front grille opening - 478 sq. in. minimum
- Combined side grille opening - 84 sq. in. each minimum
- Cab full tilt angle - 45 degrees minimum
- Cab full tilt height - 185 inches maximum

Cab interior dimensions shall be provided as a minimum in the following chart:

- Drivers side floor width 25-1/2 inches minimum
- Floor to the ceiling in the driver and officers area of the cab 59-1/2 inches minimum
- Floor to the top of the doghouse 28-1/2 inches maximum
- Officers side floor width 24-1/2 inches minimum
- The measurement across the floor from the rear wall to the first vertical portion of the engine enclosure 39 inches
- Floor to the ceiling in the rear of the cab 65-3/4 inches minimum

CAB DOORS

The cab entry and egress shall be designed for a firefighter in full turnout gear. Each door shall open a minimum of ninety degrees to afford the firefighter maximum space.

The doors shall be of a flush design each having exposed, one-piece, polished stainless steel hinges. The hinge shall be made of 12-gauge material with a minimum hinge pin diameter of 1/4 inch.

The door windows shall have interior and exterior glass weather seals to prevent the influx of exterior air.

The doors shall have exterior and interior paddle type latches for ease of opening with a gloved hand. The paddle latches are to have a rubber gasket, on the outside, separating the handle from the finished painted surface.

FRONT DOORS

The cab front doors shall be of the full-length design enclosing the entire step area of the cab. The door shall be a minimum of 38-1/2 inches wide and 74 inches tall. The front door windows shall have a minimum of 712 square inch area of viewing glass per door. There shall be a fixed piece of forward glass in each of the front doors.

REAR CAB DOORS

The rear cab doors shall be similar to the forward doors and shall be located directly behind the front wheel well area. These doors shall be 86 inches high x 34 inches wide. Each door shall have a roll down rear window with a minimum glass viewing area of 670 square inches.

INTERIOR DOOR LOCKS

All doors shall have door locks with interior controls and exterior keyed door locks. The installation shall be in conformance with FMVSS 206, with specific adherence to 49 CFR 571.206 Section 4.1.3 requiring that "Each door shall be equipped with a locking mechanism with an operating means in the interior of the vehicle". All doors shall be keyed alike. The doors shall be equipped with appropriate safety interlocks to prevent accidental locking of the doors when closed.

DASH TRIM

The drivers cab dash console shall be made of black ABS with an appearance of the latest in automotive design, styling. Accompanying the dash console in the forward section of the cab shall be an officers side flat dash for the mounting of a mobile data terminal.

CAB GLASS

AS-1 safety laminate glass shall be used in a two piece, wrap around design with a minimum 3760 square inches of windshield area for maximum visibility. The windshield shall have the style of a one-piece assembly with the practical installation of two pieces for lower replacement cost. The windshield shall be readily available from a nationally recognized automotive glass manufacturer that maintains local distribution outlets.

All glass shall be tinted.

All fixed glass shall be installed with a one-piece triple locked rubber lacing material. Due to long term appearance two-piece chrome trim lock lacing is not desired.

SUNVISORS

The driver and officer side of the cab shall be equipped with a sun visor. The vinyl covered visors shall be a minimum of 17-1/2" by 9".

DRIVER SIDE ELECTRICAL CABINET

Beneath the drivers seat there shall be an electrical cabinet designed to house the main battery electrical disconnect and facilitate the installation of an onboard battery charger or battery conditioner. A bolt on limited access; aluminum diamond plate hatch shall be installed on the front side of the seat box. The access hatch shall have a louvered section to provide air circulation to the cabinet. This cabinet shall not be used for casual storage.

WINDSHIELD WIPERS

Two speed electric pantograph wipers shall be installed. These wipers shall have minimum 24" blades and have 28 1/2" wet arm electric pump washers. A 70 oz. Minimum windshield washer reservoir shall be furnished.

FASTENERS

All cab exterior fasteners shall be stainless steel type fastened to the cab with nutserts.

BATTERY ACCESS

The rear cab steps shall have a removable kick panel, providing access to the batteries for routine maintenance and inspection.

CAB CORROSION TREATMENT

The cab shall have a corrosion preventative material conforming to Mil Spec C-16173-C, Grade 1, applied during and after construction. A 10-year warranty against perforation due to rust or corrosion shall be furnished for the cab.

TRANSMISSION RANGE SELECTOR

The transmission shall be controlled by an electro-mechanical lever type shift control. It shall be internally illuminated for night operation and have an internal lock (hold override button) to securely hold the shifter in the

position selected.

TRANSMISSION OIL LEVEL SENSOR

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

EMI/RFI PROTECTION

The apparatus shall incorporate the latest designs in the electrical system with state of the art components to insure that radiated and conducted electromagnetic interference (EMI) and radio frequency interference (RFI) emissions are suppressed at the source.

The apparatus proposed shall have the ability to operate in the environment typically found in fire ground operations with no adverse effects from EMI/RFI.

EMI/RFI susceptibility is controlled by utilizing components that are fully protected and wiring that utilizes shielding and loop back grounds where required. The apparatus shall be bonded through wire braided ground straps. Relays and solenoids that are suspect to generating spurious electromagnetic radiation are diode protected to prevent transient voltage spikes.

In order to fully prevent the radio frequency interference the purchaser shall be requested to provide a listing of the type, power output, and frequencies of all radio and bio medical equipment that is proposed to be used on the apparatus.

BATTERY BOX TRAY - STAINLESS STEEL

The battery box trays shall be stainless steel to reduce the corrosive potential of the tray. The battery hold down and brackets and hardware shall also be made of stainless steel.

BATTERY BANK

A single battery system shall be provided, utilizing four (4) high cycle type Group 31 batteries.

This system shall be capable of engine start after sustaining a continuous 150 amp load for 10 minutes with the engine off (NFPA-1901).

A battery disconnect switch (Rated at not less than 450 amps continuous) shall be used to activate the system and provide power to the power panel. A green pilot light shall illuminate to indicate that the1 battery bank is activated.

BATTERY CABLES

All battery wiring shall be "GXL" battery cable capable of handling 125% of the actual load. It shall be run through a heat resistant flexible nylon "HTZL" loom rated at a minimum of 300 degrees Fahrenheit. All cable connections shall be machine crimped and soldered.

STARTING CIRCUIT

One (1) engine start button is to be located on the lower right dash panel. It shall be wired to heavy duty solenoid rated at not less than 1100 amps. The battery indicator light is to be located directly above the start button to indicate that the battery bank is on.

ON-BOARD ELECTRICAL AIR COMPRESSOR PUMP PLUS CHARGER

A KUSSMAUL AUTO AIR model 091-9-1200 air compressor with a 40 amp automatic battery charger shall be supplied on the chassis. A pressure switch senses when the system pressure drops and starts the compressor which then runs until pressure is restored. All ball bearing construction, lubricated for life, assures reliable operation and requires no servicing. Compressor Output: 0.30 CFM@80 PSI; 0.35 CFM@60 PSI. Pressure Switch: Adjustable Set Point-Factory set to 75 PSI Cut-in, 95 PSI Cut-out.

The Pump Plus 1200 charger senses the batteries in the vehicle and recharges exactly as much as required. When the batteries are fully charged, all charging stops. The state of charge of the batteries is indicated on a remotely located bar graph display whenever power is applied to the vehicle.

A selector switch is provided on the charger to operate the compressor either as a D.C. compressor or as an A.C. compressor. In either switch position the compressor operates from the vehicle's battery. When "D.C." is selected, the compressor operates whenever the pressure switch senses low system pressure. This is useful when parking the vehicle away from the 120 volt input power. For those operators who wish to limit compressor operation to the times when the shoreline is connected to the vehicle, the Selector Switch should be placed in the "A.C." position. This will operate the compressor when the A.C. power is available, but shuts off the compressor when the shoreline is removed. In either switch position the compressor is operated by the vehicle's battery.

The compressor shall be located in the officer's side front step well with a bolt on style access panel. As installed in the chassis the compressor power selector switch will be placed in the A.C. position.

The remote charge indicator shall be located on the driver's seat box adjacent to the master battery switch.

SHORELINE AUTO-EJECT

A KUSSMAUL Super Auto Eject, model 091-55-20-120, with weatherproof cover shall be provided.

The Super Auto Eject is to be completely sealed to prevent internal contamination of the working components.

The internal switch arrangement of the Super Auto Eject shall be designed to close and open the 120-volt AC circuit after the mating connector is inserted and before the connector is removed. This design shall prevent arcing at the connector contacts to provide long life.

The electrical connection shall be provided as a 120-volt AC - 20 amp type using a NEMA 5-20P connector.

The Auto-Eject cover shall be a Kussmaul 091-55RD, red in color.

The Auto Eject assembly shall be mounted on the exterior of the cab behind the driver's door.

BATTERY JUMPER STUDS

Battery jumper studs shall be provided on the chassis. The jumper studs shall be mounted underneath the cab, on the rear of the driver's side battery box. The studs shall be connected to the chassis batteries with 1/0 color coded cables, red for the positive cable and black for the negative cable. The studs shall be protected with color coded plastic covers when not being used.

ENGINE DOGHOUSE

The engine doghouse inside the cab will be padded with a layer of sound and heat absorbing foam and covered with heavy duty vinyl trim upholstery to match or accent the interior of the cab.

The underside of the engine enclosure shall be covered with a sandwiched material for interior cab noise and heat rejection. This sandwiched acoustical material shall have one layer of 1/8" foam, a 3/16" single barrier septum and a 7/8" layer of foam to provide on overall thickness of 1-3/16". The sandwich material shall be chemically bonded to prevent layer separation. A finished surface treatment of metalized film shall be provided on the engine side of the barrier. The acoustical barrier shall be held in place with mechanical fasteners in addition to adhesive.

The insulation for protection from heat and sound shall keep the dBa level within the limits stated in the current edition of NFPA 1901.

CAB DOORS - INTERIOR TRIM

To provided durability the interior of the cab doors shall be finished with full length aluminum panel that is finished with Zolatone high abuse paint.

INTERIOR CEILING PADDING AND TRIM

The cab front interior ceiling shall have a one-piece, removable, vinyl headliner to cover all wiring and tubing used for lights and antenna leads.

REAR WALL COVERING

The rear interior wall of the cab shall have a two-piece, removable, wall covering to finish the interior trim, cover all wiring and tubing used for lights and antenna leads.

FLOOR COVERING

The front and rear floor areas of the cab shall be covered with "HUSHCLOTH" sound barrier floormats. This floormat shall be a three ply material with a 3/16" thick open cell isolation barrier of Polyurethane, a 3/32" thick closed cell Nitrile mid barrier for section reinforcement, and a 1/16" thick embedded pebbled grain wear surface.

REAR FACING SEAT BOX COVERING

The rear facing seat box area of the cab shall be covered with "HUSHCLOTH" sound barrier floormat. This floormat shall be a three ply material with a 3/16" thick open cell isolation barrier of Polyurethane, a 3/32" thick closed cell Nitrile mid barrier for section reinforcement, and a 1/16" thick embedded pebbled grain wear surface. The seat box covering shall blend with the cab interior paint color.

REFLECTIVE MATERIAL - INTERIOR CAB DOOR

The cab and crew compartment doors shall have a minimum of 96 square inches of white reflective material affixed to the inside of each door.

INTERIOR CAB STEP TRIM

The cab steps shall be completely enclosed behind each door. The top surface of the steps shall be covered with non-skid aluminum treadplate trim.

RADIO COMPARTMENT

Beneath the officer's seat there shall be a radio compartment with an interior dimensions of 19-1/2" wide x 17" long x 7" high.

CAB STEP DIMENSIONS

The front cab steps shall have the following overall dimensional requirements:

- Driver's lower step size 10-1/4 inches deep minimum
- Driver's lower step size 29-1/2 inches front to back

- Officer's lower step size 10-1/4 inches deep minimum
- Officer's lower step size 29-1/2 inches front to back

INTERMEDIATE CAB STEP

The cab shall have a full width intermediate "LaserGrip" anti slip inside step. The intermediate step shall be approximately 9 inches from the top of the lower step to the top of the intermediate step.

INTERIOR CAB STEP TRIM

The cab steps shall be completely enclosed behind each door. No portion of the cab entrance step shall be exposed when the door is in the closed position. The lower step shall be sealed from the underside of the cab to eliminate road splash from entering the step area while the vehicle is driving. The horizontal step surfaces shall be covered with bright aluminum tread plate meeting the requirements of NFPA-1901.

The vertical toe kick surface area of the cab step wells shall be covered with aluminum tread plate.

COMPARTMENT OPEN LIGHT

A Red Open Compartment Flashing Light, Whelen OS Series LED shall be mounted on the driver's side face of the overhead panel. A chrome flange is to be supplied with the light.

This light is wired with a flasher to the power panel for completion to circuit on the body.

The light circuit shall be wired so that the light circuit is deactivated when the parking brakes of the apparatus are applied.

A label shall be applied adjacent to the light '**DOOR OPEN**'.

Interior Lighting Group - 1871W - 1871SFO

LED Strip Light Interior Light Packages

CAB FLOOR STEP LIGHTING

The floor of the cab shall be trimmed with a ribbed aluminum extrusion. The extrusion shall protrude as a approximately 3/4" over the floor area to provide a mounting channel and guard for an LED integrated light. The LED lighting shall iluminate the step area of the cab and all step lights shall be illuminated when any door is opened and the battery selector switch is in the on position.

DRIVER & OFFICER AREA WHITE LED CAB LIGHTING

There shall be a white LED strip lighting mounted above the full length of each front door in the cab. The strip light shall be mounted in an aluminum extrusion and shall face the center of the cab.

The lighting shall be operated opening a cab door.

CREW AREA WHITE LED CAB LIGHTING

There shall be a white LED strip light mounted in the cab. The LED strip light shall be mounted on the bolster in the center of the cab and shall run the full width of the cab. The strip light shall be mounted in an aluminum extrusion and shall face the rear of the cab.

The lighting shall be operated opening a cab door.

CREW AREA WHITE LED CAB LIGHTING

There shall be a white LED strip light mounted in the cab. The LED strip light shall be mounted at the ceiling on the rear wall and shall run the full width of the cab. The strip light shall be mounted in an aluminum extrusion and shall face the rear of the cab.

The lighting shall be operated opening a cab door.

CREW AREA WHITE LED CAB LIGHTING

There shall be a white LED strip lighting mounted above the full length of each cab crew door in the cab. The strip light shall be mounted in an aluminum extrusion and shall face the center of the cab.

The lighting shall be operated opening a cab door.

CREW AREA RED LED CAB LIGHTING

There shall be a red LED strip light mounted in the cab. The LED strip light shall be mounted on the bolster in the center of the cab and shall run the full width of the cab. The strip light shall be mounted in an aluminum extrusion and shall face the rear of the cab.

The lighting shall be operated by a toggle switch mounted on the forward post of the crew area door on each side of the cab.

CREW AREA RED LED CAB LIGHTING

There shall be a red LED strip light mounted in the cab. The LED strip light shall be mounted at the ceiling on the rear wall and shall run the full width of the cab. The strip light shall be mounted in an aluminum extrusion and shall face the rear of the cab.

The lighting shall be operated by a toggle switch mounted on the forward post of the crew area door on each side of the cab.

HEATER / DEFROSTER

A 57,600 BTU heater with a three speed fan shall be mounted in the front of the cab, centered over the windshield. This heater shall have six (6) adjustable vents to assure windshield defogging.

DEFROSTER FANS

Two (2) 6" windshield defroster fans shall be mounted on the overhead console, one each side of the center of the cab.

45,000 BTU AIR CONDITIONING

A climate control system shall be furnished in the cab. The system shall consist of a 46,000 BTU air conditioning evaporator centrally located on the forward slope of the raised roof.

The system is to have a 13.1 cu. in. minimum compressor mounted on the engine to provide the compressed refrigerant to the system. The compressor is to be plumbed to a heavy duty truck, triple fan air conditioning condenser mounted on the cab roof. The condensing unit shall have an aerodynamic shroud that is painted to match the color of the cab roof. There shall be an extended life filter receiver/dryer with a pressure relief valve installed to protect the system from contaminates, moisture, and high pressure. It is to have a sight glass for visual inspection and ease of service.

The evaporator shall have an externally equalized expansion valve and be thermostatically protected to prevent freeze up. Dual high performance 3-speed blowers shall provide a minimum of 700 CFM air flow. Each blower is to be controlled separately. Eight (8) downward facing adjustable diffusers with shutoff capability shall be utilized to direct the air flow through the cab.

The air conditioning controls, on/off switch, thermostat control, and blower switches shall be located on the climate control display module within reach of the driver.

The climate control system shall utilize both automatic and manual control methods.

The climate control display's system standby screen shall maintain all of the climate control functions OFF.

The climate control display's automatic operation screen shall allow the user to select a desired temperature and the climate control system shall automatically choose the temperature mode (cool or heat) and the fan speed (low, medium or high) to maintain the desired temperature.

The climate control display's manual operation screen shall allow the user to set the temperature mode (cool or heat) and the fan speed (low, medium or high) as desired.

CAB INSULATION

Foam rubber type insulation shall be installed in the rear wall and the cab ceiling to provide a better sound and heat barrier. The insulation shall be a minimum of 1" thick. The material shall be compliant with FMVSS-302.

FLOOR HEAT - DRIVER & OFFICER

There shall be two (2) quartz heaters provided for floor in the front of the cab, one (1) for the driver and one (1) for the officer's floor area. The heater shall contain polymer composite heating elements encapsulated in a vacuum sealed quartz tube specifically designed for direct current. The polymer elements shall feature a life expectancy of 10,000 hours and shall be designed to be the ultimate in durability where vibration, moisture, and durability may be a factor. The polymer element shall be vacuum sealed in a "Ruby" Quartz tube to protect it from any moisture or harsh conditions. Injection molded high temp silicone tube boots shall be designed to absorb vibration and will minimize any shock to the elements. A single heater control switch shall be provided to control both heaters with two heat settings.

REAR SUPPLEMENTAL CAB HEATER

An auxiliary heater shall be installed on the rear wall of a tilt cab, centered, at the floor line, If there are forward facing seats the heater shall be located under the seats. This heater shall be capable of 325 SCFM air flow and be rated for 25,000 BTU/HR with a delta T of 180 degrees F.

DRIVER INSTRUMENTATION AND CONTROLS

The gauges shall have red LED back lighting for enhanced visibility. Upon on initial ignition sequence a lamp check function shall illuminate the warning light telltales, the self diagnostic message center shall sequence the warning light telltales if data link communications are lost. The instrument panel shall include the following gauges and indicators.

Electronic speedometer with LCD odometer
Tri cluster gauge that includes:
- Electronic tachometer
- Engine coolant temperature gauge, with warning light and buzzer
- Engine oil pressure gauge, with warning light and buzzer

Transmission fluid temperature gauge, with warning light and buzzer
Two air pressure gauges, with warning light and buzzer
Voltmeter, with low voltage warning light and buzzer
Fuel level gauge

High beam indicator light
Parking brake set light
Turn signal indicator lights

The lighting control panel is to be located to the left side of the instrument panel. The lighting control panel shall include the following:

Headlight control switch
Dash rheostat for instrumentation lighting control
Wiper and washer control switches

The engine control panel is to be located beneath the instrument panel on the driver's right hand side. The engine control panel shall include the following:

Keyless ignition switch with a green pilot light

The apparatus control panel is located beneath the instrument panel on the driver's left hand side. The apparatus control panel is designed for the location of pump shift controls.

AUDIBLE TURN SIGNAL REMINDER

There shall be an audible alarm that shall sound when the turn signal remains flashing for a distance greater than one mile. The reminder shall not sound when the hazard lights are operating.

AUDIBLE LIGHTS ON REMINDER

There shall be an audible alarm that shall sound when the headlight switch is left in the on position and the ignition is off. The alarm shall self cancel after 2 minutes of operation.

AUDIBLE PARKING BRAKE REMINDER

There shall be an audible alarm that shall sound when the parking brakes are NOT set and the ignition is turned off. This alarm shall self cancel after 2 minutes.

The Parking Brake reminder shall sound an audible alarm when the parking brakes are set and an indicated speed of over two miles per hour occurs.

DUAL TRIP ODMETERS

There shall be two (2) trip odometers in the driver's information center. Each shall be capable of independent operation and reset. They shall be labeled Trip1 and Trip2 when the trip mileage is shown in the LCD panel.

SPEEDOMETER ACTIVATED IN PUMP MODE

The speedometer and odometer shall be activated while in pumping mode.

LOW FUEL LIGHT

A "Low Fuel" warning light and alarm shall be installed in the dash message center. This light shall illuminate when the apparatus fuel level reaches 25% of the fuel remaining.

TRANSMISSION OVERHEAT WARNING LIGHT

A transmission oil temperature light with alarm shall be provided on the dash message center.

LOW VOLTAGE WARNING

A low voltage indicator light shall be installed on the dash message center. An alarm and the dash indicator light shall activate when the system voltage drops below 11.8 volts.

AIR CLEANER RESTRICTION INDICATOR

An air cleaner restriction indicator shall be installed in the driver's message center. The indicator shall provide visual warning when a high air restriction condition exists for a minimum of 4 seconds.

LOW COOLANT WARNING

Low coolant warning shall be accomplished through the engine electronics to provide driver warning via the engine stop warning light.

INTERMITTENT WIPER CONTROL

A rotary combination intermittent electric wiper / washer switch shall be provided on the left hand side of the driver's dash.

CONTROL CENTER

Mounted on the doghouse there shall be a driver / officer control center. This area shall include various controls and functions that must be available to the driver and officer.

The apparatus warning light switch panel shall be mounted on the control center immediately to right of the driver. The panel will have a black anti-glare surface, and within easy reach of the driver. The panel shall include one (1) lighted master control switch to allow for preselection of the other switches and thirteen (13) lighted individual lighting control and chassis option switches.

Each switch shall have back-lit legends with a 100,000 hour lamp for illumination.

The master lighting control switch shall be wired to three (3) 30 amp circuit breakers and three (3) 40 amp relays. Three (3) 10 gauge wires are powered by this circuit and run to the roof for light bar power. The remaining switches shall be wired to 20 amp circuit breakers and relays.

PARKING BRAKE CONTROL VALVE

The parking brake control valve shall be located in the driver's dash engine control panel.

CUP HOLDERS

There shall be two (2) recess mounted cup holders mounted on top of the doghouse console.

CHASSIS ELECTRICAL SYSTEM

The apparatus "Electrical Distribution System" (EDS) shall be mounted inside the cab to prevent moisture from entering the area. It shall be mounted under the dash on the officer's side behind a diamond plate cover.

The EDS shall be fed by one power stud:

One (1) battery positive

The battery positive stud is to be controlled by the master disconnect switch mounted on the lower right dash panel. A green light shall indicate when the ignition circuit(s) are energized.

EDS MODULE

The EDS system shall be designed with locally available **plug-in** circuit breakers and **plug-in** relays. Each component position shall be labeled to indicate it's function. All electrical connections shall be insulated and secured behind the panel face to eliminate the chance of accidental electrical shorts while performing electrical system service.

The EDS shall control a minimum of thirteen (13) low voltage, analog switched, high amperage electrical loads.

Provision for a minimum of thirty-one (31) automatic reset circuit breakers is required to protect the vital circuits of the apparatus.

The EDS system shall be removable with only four (4) fasteners for major electrical service or modifications.

The EDS panel shall have one (1) lamp for illumination of the panel during service.

CHASSIS COLOR CODED WIRING

All chassis wiring shall be type "GXL" in accordance with S.A.E. J1128 and NFPA-1901. ALL wiring shall be **COLOR CODED** and continuously marked with the circuit number and function.

All wiring to be covered in nylon heat resistant "HTZL" loom rated at a minimum of 300 degrees F exceeding the heat requirements of NFPA-1901.

A battery "loop back" ground circuit shall be supplied for the EDS system to reduce the possible effects of Electromagnetic and Radio Frequency Interference.

The chassis cab, engine and transmission shall be electrically bonded to the chassis frame rails with braided ground straps.

ELECTRICAL SYSTEM CONNECTORS

All multiple conductor electrical connections shall be made with Packard electrical connectors. The Packard connectors shall become mechanically locked when mated.

All single wire terminations requiring special connectors with a ring or spade terminal shall be crimped, and wrapped with heat shrink tubing.

12VDC POWER POINT

A 12 volt, socket (cigarette lighter) type, receptacle shall be provided with a protective hinged cover.

The power point shall be wired to switched battery power with the appropriate wire size and fuse.

The power point socket shall be provided within reach of the officer.

12VDC POWER POINT

A 12 volt, socket (cigarette lighter) type, receptacle shall be provided with a protective hinged cover.

The power point shall be wired to switched battery power with the appropriate wire size and fuse.

The power point socket shall be provided within reach of the driver.

12VDC POWER CIRCUIT

A circuit protected 30 amp battery "hot" circuit, a circuit protected 30 amp battery switched circuit, and a ground circuit with the proper wire size to handle the current shall be provided. These circuits are provided for two-way radio and/or accessory wiring.

The radio / accessory power circuit shall terminate in the power panel area of the cab.

RADIO ANTENNA MOUNT WIRING

One (1) NMO mount shall be roof mounted, on the officer's side of the cab.

The antenna mount shall be located 34 inches from the front face of the cab and 18 inches from the cab side.

The unterminated coax is to be routed in the cab to the radio power circuit termination or officer's seat box if no radio power circuit is requested.

The antenna wiring shall terminate in the center of the cab on top of the engine doghouse.

PUBLIC BROADCAST RADIO

The cab shall be equipped with an AM/FM CD Stereo Radio with four ceiling mount recessed speakers. The radio shall also include a seven channel weather band.

ROAD SAFETY KIT

One (1) 2-1/2# ABC DOT Approved fire extinguisher shall be provided. The fire extinguisher shall be shipped loose with the chassis.

One (1) set of DOT approved hazard triangles shall be supplied with the chassis. They shall be stored in a plastic case and shipped loose with the chassis.

CAB CRASHWORTHINESS TEST

Dynamic tests shall be performed to evaluate the crashworthiness of the proposed vehicle cab configuration to the requirements of NFPA 1901-09 section 14.3.2.

Cab roof strength shall be tested utilizing the dynamic preload criteria from SAE J24221 paragraph 5 specifications and procedures.

Front impact strength integrity shall be tested utilizing SAE J24202 with ECE R293 Annex 3 paragraph 4 equivalent energy.

Quasi-static roof strength shall be based on SAE J2422 paragraph 6 and ECE R293, paragraph 5 specifications and procedures.

A letter of certification shall be provided upon request by the department.

EXTERIOR GRAB HANDLES

The cab shall have a bright anodized extruded aluminum 24" grab handles at each door position. The aluminum shall be bright anodized for long service. Molded rubber gaskets shall be installed under the grab handles to protect the painted surface of the cab.

LIGHTING, CAB HANDRAIL

The cab handrails shall contain integrated LED lighting. The lighting shall be integrated into the grab bar, directed toward the cab. The assembly shall illuminated the same time as the ground lights.

The LED handrail lighting shall be white in color.

CAB GRILLE

All cab exterior grilles shall be bright finished stainless steel. The front grille shall have a radiator rock guard to assist in preventing damage to the radiator core.

The cab shall have one (1) engine "hot" air exhaust and one (1) engine air cleaner intake, on each side of the cab. These openings shall be covered with a honey comb wire screen and shall have a bright polished stainless steel outer grille.

CAB MUDFLAPS

Mud flaps shall be installed behind the front tires. These mud flaps shall be a minimum of 22" wide to protect the underneath of the cab and body.

CAB GROUND LIGHTING - LED

One (1) LED, round 4" LED light shall be mounted beneath each door. These lights shall be designed to provide illumination on areas under the driver and crew riding area exits. All cab ground lights shall be switchable and shall automatically activate when any cab exit door is opened.

MIRRORS

MOTO-MIRROR 16 1/2" X 7" stainless steel heated, remote control mirror heads shall be mounted on spring loaded retractable mirror arms. Includes a 5-1/2" x 8.5" convex mirror head.

CAB SIDE WINDOWS

Two AS-2 tempered glass, fixed side windows, 26-1/2" high x 16" wide shall be furnished, one on each side behind the forward doors. All glass shall be tinted. These windows shall be installed with a one-piece triple locked rubber lacing material.

REAR WINDOW SAFETY BARS

There shall be a one inch stainless steel grab bar installed on each rear door. This bar is to be installed on the rear door frame even with the window in the down position to prevent firefighters from using the glass in the door for a handle.

UNDER CAB ENGINE MAINTENANCE LIGHTS

Two (2) engine maintenance lights shall be supplied beneath the cab. These lights shall illuminate automatically when the cab is tilted to the full tilt position.

STAINLESS CAB FENDERETTES

To reduce road splash on the cab sides, polished stainless steel fenderettes shall be installed around each the wheel opening.

EXTERIOR REAR WALL DIAMOND PLATE OVERLAY

The cab exterior rear wall shall be covered with a single sheet of bright aluminum tread plate to protect the back of the cab from scratches.

CAB TILT SYSTEM

The cab shall tilt a minimum of 45 degrees for ease of serving. Tilting shall be accomplished by means of a tilt pump connected to two (2) heavy duty lift cylinders. It shall be equipped with a positive locking mechanism (service lock) to hold the cab in the full tilt position. Release of the service lock shall be by means of a pull type cable assembly. The cylinders shall have a velocity fuse at the base to prevent the cab from falling in the event of a hydraulic hose failure. The cab shall be capable of tilting 90 degrees for major engine service, if necessary. The 90 degree cab tilt shall be accomplished by removing the cab cylinder pins, removing one bolt in the steering shaft, and removing the front bumper and treadplate.

The cab shall have a three (3) point cab locking system. To prevent undue stresses in the cab, the cab mounting shall incorporate a five (5) point load mounting system.

The front cab pivot/lock assemblies shall utilize four (4) radially loaded, bonded rubber, axial mounts. These mounts shall have a maximum radial load rating of 925 pounds each and a torsional rating of 25 lbs-in/deg. Two one (1) inch diameter cab pivot pins shall be installed at the front of the cab.

The rear cab lock shall be center point mounted to prevent normal twist of the chassis from affecting the cab mounting, cab structure and windshield areas of the cab. This rear cab lock shall be mounted on a chassis crossmember to provide a stable platform for the locking system. The cab lock shall be mounted to a baseplate that is fastened to rubber isolators to reduce road noise and provide additional movement of the cab lock. This locking system shall automatically open prior to the cab tilting and automatically relatch when the cab is lowered completely into the travel position.

Two (2) outboard frame mounted urethane "V" blocks shall be provided at the rear of the cab. These dual purpose mounts shall align the cab upon lowering as well as provide non-latching support for the cab in the down position. With this system, extreme chassis twist shall allow the cab to move independently of the rear cab supports, reducing the structural stress damage often caused by outboard dual cab locking systems.

An electric-over-hydraulic cab tilt pump shall be supplied. This pump shall have a remote control for cab tilting

operation. The control shall be "safety-yellow" in color.

CAB TILT INTERLOCK

The cab lift system shall have a cab tilt interlock. The cab tilt shall not be able to be activated unless the master battery switch is in the on position with the parking brake set.

INTERIOR FINISH

The entire interior of the cab shall be painted with spatter paint, gray in color. Gray spatter paint is selected for ease of repairs when the interior is scratched.

The cab metal finish shall be covered with one coat of base self-etching primer to fill the small surface imperfections.

Then the interior of the cab is to be blocked and a coat of sealer-primer is to be sprayed to the interior finish.

Next a sealer primer is applied and shall be sanded to a smooth finish ready for final color coat application.

Two (2) coats of finished paint are to be applied to a final thickness of 4 mills.

The following interior components shall be finished in black:

- Overhead console
- Sun visors

The interior headliner of the cab shall be gray in color.

The interior rear wall covering of the cab shall be gray in color.

The interior flooring material of the cab shall be gray in color.

The interior door panel material of the cab shall be gray in color.

The doghouse covering material in the cab shall be gray in color.

The dash housing, doghouse console; when so equipped; and the officer's glove box or console shall be black in color.

CAB EXTERIOR FINISH

The exterior doors and all fixed cab glass are to be removed from the cab prior to the paint and body process beginning.

The final finish of the cab shall be to fire apparatus standards; exhibiting excellent gloss durability and color retention properties.

PREPARATION

The removal of all contaminates and oxidation is essential to the final effect of a finish system, the cab shall be precleaned with a Wax and Grease Remover and prior to evaporation, towel dried.

To remove all oxidation and foreign materials, the cab shall be sanded with a 180 grit abrasive using an orbital type disc sander.

All weld marks and other major surface imperfections shall be filled with a polyester type body filler, prior to body filler application special attention shall be given to the areas requiring filler again sanding and cleaning.

The body fillers shall be thoroughly mixed in accordance with the manufacturer's directions.

After the final coat of filler is sanded, spray polyester shall be applied in sufficient amounts as to provide a final base and sanded with abrasive paper.

PRECLEAN

Within 45 minutes of pretreat the cab must be again washed with a Wax and Grease Remover using a "Scotch brite pad". Towel dry prior to evaporation.

Special precaution shall be taken NOT to saturate any polyester body fillers with the cleaning solvents.

PRETREAT AND PRIMERS

The pretreat and primer applications shall be made in two independent steps. A combined pre-treat/primer one product application shall not be allowed as a substitute.

The prepared substrate shall be pretreated with an acid curing 2-component Transparent Primer. This pretreat shall be designed to provide corrosion protection and to create an adhesive bond between the substrate and the surface applications.

It is critical that the body fillers not receive a saturation of solvents associated with the pretreat application. Only the pretreat over spray resulting from product application to the adjacent metal areas should be allowed to come in contact with the body fillers.

All polyester body fillers are porous, and shall absorb liquids. Solvents when absorbed not only soften but shall create swelling of the polyester filler. After sanding and later shrink the fillers shall create blemishes in the painted surfaces.

Prior to complete primer application, each area with applied body fillers be precoated with a 2-dry applications of primer (sander surfacer) of which shall be allowed to "Touch Dry" between coats. This procedure shall isolate the filled areas and protect them from subsequent product applications.

The primer (sander surfacer) shall be a poly-acrylic resin, zinc and chromate free surfacer that is designed to create a superb surface smoothness, increase the depth of color, and insure top coat gloss.

The cab after pretreat and precoat shall be primed with a 3 to 4 medium applications of a Hi-Build Tintable Surfacer.

To create a finish base that meets the rigid requirements of the fire and emergency service; the primed surface shall be dry sanded smooth thus removing all texture and surface imperfections with a 320 grit (minimum) sanding abrasive.

FINISH AND COLOR COATS

The color coat application shall consist of two to three applications of acrylic urethane color coat. After the color coat has been applied, the cabs shall be sprayed with 1.5 to 2.0 mills of clear coat finish. The clear coat finish is then sanded and buffed to remove any imperfections that can occur during the application of the color coat.

The final finish shall be free of dirt and sags and shall meet a minimum grade of 7 when compared to the "ACT" general orange peel standards by "ACT" Laboratories, Inc. Of Hillsdale, MI.

The final sanding and buffing of the clear coat shall result in a flat / glass like finish. The clear coat shall also provide a UV barrier to prevent fading and chalking.

PPG brand urethane materials will be used for the cab exterior paint.

CAB PAINT WARRANTY WARRANTY

The chassis manufacturer shall provide a limited parts and labor warranty to the original purchaser of the custom built cab & chassis for a period of sixty (60) months. The warranty period shall commence on the date the vehicle is delivered to the end user. The warranty shall include conditional items listed in the detailed warranty document which shall be provided upon request.

DRIVER'S SEATING POSITION

The seat shall be H.O. Bostrom, air ride suspension, high back seat with fore and aft slide adjustment. The seat shall have adjustments for height and ride.

A red 3-point, shoulder harness type seat belt shall be supplied for the seat.

OFFICER'S SEATING POSITION

The seat shall be H.O. Bostrom, Tanker Series Self-Contained Breathing Apparatus (SCBA) type seat with a fixed bottom cushion and a pivoting head rest. The seat shall contain a SCBA filler pad for when the bottle is not in use.

A red 3-point, shoulder harness type seat belt shall be supplied for the seat.

SCBA SEAT BRACKET

There shall be a H.O. Bostrom SecureAll™ self-contained breathing apparatus bracket mounted into the seat cavity.

CREW AREA - REAR FACING LEFT OUTBOARD SEAT POSITION

The seat shall be H.O. Bostrom, Tanker Series Self-Contained Breathing Apparatus (SCBA) type seat with a fixed bottom cushion and a pivoting head rest.

A red lap type, metal to metal quick release seat belt, with automatic seat belt retractor shall be provided for the seat.

SCBA SEAT BRACKET

There shall be a H.O. Bostrom SecureAll™ self-contained breathing apparatus bracket mounted into the seat cavity.

CREW AREA - REAR FACING RIGHT OUTBOARD SEAT POSITION

The seat shall be H.O. Bostrom, Tanker Series Self-Contained Breathing Apparatus (SCBA) type seat with a fixed bottom cushion and a pivoting head rest.

A red lap type, metal to metal quick release seat belt, with automatic seat belt retractor shall be provided for the seat.

SCBA SEAT BRACKET

There shall be a H.O. Bostrom SecureAll™ self-contained breathing apparatus bracket mounted into the seat cavity.

CREW AREA - FORWARD FACING LEFT INBOARD SEAT POSITION

The seat shall be H.O. Bostrom Tanker Series Self-Contained Breathing Apparatus (SCBA) type seat with a flip bottom cushion and a pivoting head rest.

A red 3-point, shoulder harness type seat belt shall be supplied for the seat.

SCBA SEAT BRACKET

There shall be a H.O. Bostrom SecureAll™ self-contained breathing apparatus bracket mounted into the seat cavity.

CREW AREA - FORWARD FACING RIGHT INBOARD SEAT POSITION

The seat shall be H.O. Bostrom Tanker Series Self-Contained Breathing Apparatus (SCBA) type seat with a flip bottom cushion and a pivoting head rest.

A red 3-point, shoulder harness type seat belt shall be supplied for the seat.

SCBA SEAT BRACKET

There shall be a H.O. Bostrom SecureAll™ self-contained breathing apparatus bracket mounted into the seat cavity.

FORWARD FACING SEAT RISER

The center forward facing seat(s) shall be installed on a powder coated aluminum riser. The front of the seat riser will be open without a restraint system to provide a location for storage of small lightweight gear.

The seats shall be gray in color.

VINYL MATERIAL

The chassis seats shall have vinyl material in the following applicable areas:

- Seat Base Top
- Seat Base Sides
- Seat Back Support Face
- Seat Back Support Sides

- Seat Headrests

Standard Seat Cushions

SEAT BELT WARNING LABELS

The cab shall be equipped with two (2) seat belt warning labels. These labels are to be in full view of the occupants in the seated position.

VEHICLE DATA RECORDER

Apparatus shall be equipped with a Class1 "Vehicle Data Recorder and Seat Belt Warning System" (VDR/SBW) that is connected to the power train CAN (Controller Area Network) bus consisting of transmission (TCM), engine control (ECM) and antilock brake (ABS) modules mounted on the apparatus. The VDR/SBW will function per NFPA 1901-2009 sections 4.11 (Vehicle Data Recorder) utilizing the power train's J1939 data and 14.1.3.10 (Seat Belt Warning) using the Class1 "Seat Belt Input Module" for seat occupied and belt status information.

The VDR data shall be downloadable by USB cable to a computer using either Microsoft™ or Apple™ Operating Systems using Class 1/ O.E.M. supplied reporting software.

SEAT BELT WARNING SYSTEM

There shall be a seat belt indicator system supplied in the cab. The indicator system shall indicate seat belt use for each individual seating position when the seat is occupied, the seat belt remains unfastened and the parking brake is released.

A display panel shall be supplied in the dash area. The panel shall have an audible indicators and a red light display to indicate that a seat belt has not been fastened.

SEAT BELT WARNING SYSTEM - MONITOR

Mounted in the overhead console in the driver's area the indicator system shall indicate seat belt use for each individual seating position when the seat is occupied, the seat belt remains unfastened and the parking brake is released.

FRONT BUMPER

A 12" high heavy-duty 10 gauge, polished stainless steel, wraparound, 2-rib front bumper shall be provided the full width of the cab.

BUMPER EXTENSION

The front frame extension shall be bolted directly to the main rail. The extension and main rail joint shall have a 3/8" thick side plate for reinforcement. The completed apparatus must be able to be lifted at the front bumper without structural damage to the front extension for towing of a disabled vehicle.

The front bumper face shall extend 18 inches ahead of the front face of the cab skin.

TOW HOOKS

Two (2) chromed tow hooks shall be provided and shall be attached directly to the front frame extension under the bumper. These tow hooks shall be attached with two Grade 8 bolts with hardened washers and Grade "C" distorted thread locknuts.

GRAVELSHIELD

A gravelshield shall be installed filling the area above the extension rails. This gravelshield shall be constructed of .125" thick NFPA non-skid, bright, non-skid, aluminum treadplate. The gravelshield shall be supported at the front by the top flange of the stainless steel bumper. At the rear, the gravelshield shall be supported by a steel substructure.

AIR HORNS

Dual stutter tone air horns shall be recessed into the front bumper, one each side.

AIR HORN IGNITION CONTROL

To eliminate inadvertent operation the chassis air horns shall be operable only when the battery selector and ignition switch are in the "ON" position.

AIR HORN CONTROL SWITCH

The chassis air horns shall be controlled by a lanyard with a 'Y-chain'. The lanyard chain shall be mounted to the center of the overhead console within reach of both the driver and officer and shall terminate at the cab center.

AIR HORN OPERATION

The air horn and the electric horn shall be sounded simultaneously by depressing the horn button in the steering wheel.

EQ2B ELECTRONIC SIREN

A FEDERAL EQ2B electronic 200 watt speaker with the classic chrome "Q" grille shall be mounted recessed in the cab front 3-dimensional grille.

The 200-watt siren amplifier with digital output control head and microphone shall be mounted in the cab.

MASTER WARNING LIGHT CONTROL

To eliminate inadvertent operation the mechanical siren shall be operable only when the Master Warning Light switch is in the "ON" position and the parking brake is released.

SIREN CONTROL SWITCHES

One (1) foot switch for the siren shall be provided on the left side of the driver's side cab floor and one (1) on the right side of the officer's side cab floor.

The siren control shall be mounted on top of the engine doghouse within reach of the driver and officer.

ELECTRONIC CHASSIS OPERATOR'S MANUAL

An electronic Operator's Manual w/Parts List - One Set shall be provided with the chassis.

An electronic Electrical System Manual shall be provided.

- This manual shall provide complete wiring schematics for the vehicle.

- The manual shall be provided with diagrams of the vehicle showing the wiring harness routing within the vehicle. Each of these diagrams shall include the connectors between the harnesses that provide a hyperlink to a drawing of the actual connector where pin functions can be examined.

- Schematics for each system of the vehicle shall be provided with hyperlinks to the connectors for pin designations and to the vehicle drawings for harness location within the vehicle.

An electronic Air System Manual shall be provided.

- This manual shall provide complete air system schematics for the vehicle.

- The manual shall be provided with diagrams of the vehicle showing the air tubing routing within the vehicle.

- Schematics for each system of the vehicle shall be provided with hyperlinks to the tanks and valves and to the vehicle drawings for exact location within the vehicle.

MERITOR/ROCKWELL STANDARD AXLE WARRANTY

The vehicle shall be covered by Arvin/Meritor warranty that is in effect at the time of the vehicle production.

STANDARD TRANSMISSION WARRANTY

The chassis shall have a five (5) year unlimited mileage as defined in the Allison New Product Warranty.

ENGINE WARRANTY

The engine shall have the standard 5 year warranty from the engine manufacturer that is in effect at the time of the vehicle is placed into service.

CAB STRUCTURAL WARRANTY

The cab structure shall be warranted for a period of ten (10) years or fifty thousand 50,000 miles which ever may occur first. The warranty shall include conditional items listed in the detailed warranty document which shall be provided upon request.

CAB & CHASSIS WARRANTY

The chassis manufacturer shall provide a limited parts and labor warranty to the original purchaser of the custom built cab & chassis for a period of twelve (12) months, or the first 24,000 miles, whichever occurs first. The warranty period shall commence on the date the vehicle is delivered to the end user. The warranty shall include conditional items listed in the detailed warranty document which shall be provided upon request.

CAB ICC MARKER LIGHTING

Five (5) amber Whelen OS Series LED cab face mounted clearance lights shall be supplied, mounted above the windshield. These lights are to be mounted in a chrome flange.

Two (2) amber Whelen OS Series LED side clearance lights shall be supplied, one (1) each side mounted ahead of the front door. These lights are to be mounted in a chrome flange.

An amber diamond shaped reflector shall be mounted on the lower corner of each cab front door adjacent to the door hinge.

HEADLIGHTS

Four (4) rectangular halogen headlights shall be supplied.

When the parking brake is released and the master battery switch is in the on position, the head lamps shall be illuminated to 80% brilliance.

TURN SIGNALS

Two (2) rectangular Federal Signal, model QL64Z-TURN, LED turn signal lamps shall be mounted outboard of the front headlights on each side. These lights shall be amber in color.

BACK-UP ALARM

A solid state electronic backup alarm shall be installed on the rear of the apparatus and wired to the backup light circuit.

HEADLIGHT POSITION

The headlights shall be mounted in the upper position on the front of the cab to accommodate high profile front bumper items.

LOW LEVEL WARNING LIGHTS

Two (2) Code 3 4x6, model 65, warning lights with LED light heads shall be mounted on the front of the chassis above the headlights.

These two (2) lights fulfill the requirements for Lower Zone A lower level warning devices.

Both warning light lenses shall be red in color.

FRONT INTERSECTION LIGHTS

Two (2) Code 3 4x6, model 65, warning lights with LED light heads shall be mounted one (1) on each side of the front bumper/gravelshield with a Code 3 chrome plated flange.

These two (2) lights fulfill the requirements for Lower Zone B & D lower level warning devices.

Both warning light lenses shall be red in color.

CAB SIDE SCENE LIGHTS

There shall be side scene lights installed on the side of the cab between the front and rear cab doors on the raised roof section.

The lighting position(s) shall have two (2) Fire Research Focus model LED900-Q70 surface mount light shall be installed. The light shall be mounted with four (4) screws to a flat surface. It shall be 6 3/4" high by 9" wide and have a profile of less than 1 3/4" beyond the mounting surface. Wiring shall extend from a weatherproof strain relief at the rear of the light.

The light shall have twenty-four (24) white LEDs that generate a rated 7000 lumens at 12 or 24 volts DC. The lens shall redirect the light along the vehicle and out onto the working area. The light housing shall be aluminum with a chrome colored bezel.

The scene lights shall be operated by a switch located in the driver's area of the cab.

The scene light on the side of the cab shall be operated by either the front or the rear door on the same side of the cab opening.

FORWARD FACING BROW LIGHT

One (1) brow light shall be provided and mounted centered on the leading edge of the cab roof facing forward.

There shall be One (1) Fire Research Focus FCA800-Q14 Series roof mount lamphead(s) provided. The mounting bracket shall attach to the lighthead chosen for the mounting position. Wiring shall exit from a weatherproof strain relief on the lamphead.

The lamphead shall have ten (10) ultra-bright white LEDs. It shall operate at 12/24 volts DC, draw 13/6.5 amps, and generate 14,000 lumens. The lamphead shall direct 50 percent of the light onto the action area while providing 50 percent to illuminate the working area. The lamphead angle of elevation shall be adjustable at a pivot in the mounting arm and the position locked with a round knurled locking knob. The lamphead shall incorporate heat-dissipating fins and be no more than 4" high by 11 1/2" wide. The lamphead and mounting arm shall be powder coated white. The floodlight shall be for fire service use.

The brow light shall have a white housing

One (1) 12-volt, switch(es) shall be located in the cab switch panel. The switch(es) shall control the 12-volt quartz lighting fixture(s) as selected.