1 SCOPE

The California Governor's Office of Emergency Services (Cal OES) protects lives and property, build capabilities, and support our communities for a resilient California. This specification describes general requirements for the complete construction of a Type 6 Wildland Fire Apparatus that shall be capable of operating reliably while responding to wildland fires. The apparatus shall provide for initial attack, rural access, overhaul and mop-up operations. The apparatus must be capable of operating reliably in a wide variety of weather conditions, temperatures and altitudes and shall be capable of both on highway and off highway operation.

2 APPLICABLE SPECIFICATIONS / STANDARDS / CODES

Specifications, standards and codes referenced in this document in effect on the opening of the 'Invitation For Bid', form a part of this specification.

- Federal Motor Vehicle Safety Standards (FMVSS)
- Code of Federal Regulations (CFR), Title 49, Chapter V
- California Code of Regulations (CCR), Title 13
- California Vehicle Code (CVC)
- California Health and Safety Code
- California Air Resources Board Regulations (CARB)
- Original Equipment Manufacturer (OEM) Body Builder Standards and Guidelines
- National Fire Protection Association (NFPA) 1901 latest edition as it pertains
- NFPA 1906 latest edition as it pertains
- Society of Automotive Engineers (SAE) standards where applicable
- Part 15 of the Federal Communications Commission (FCC) Rules

The final completed vehicle certification is the responsibility of the manufacturer constructing the body described herein. A plate identifying the manufacturer, tare weight, gross vehicle, date of manufacture and all other information as specified in CFR. Title 49, Part 567 section 567.4 and 567.5 as applicable shall be attached to the vehicle.

Should a conflict arise between any of these standards and this specification CAL OES will determine as to which standard or specification will be in effect. Details regarding any conflicts between the specific standards and compliance shall be finalized at the pre-construction conference or during the development process. Any test equipment required or expense incurred for the Certification Tests shall be borne by the Contractor supplying this equipment.

3 CAB & CHASSIS

3.1 GENERAL

The vehicle shall be new and equivalent in style, quality, and appointments to those offered to the general public. The vehicle shall be supplied with all equipment and accessories indicated as standard equipment in the manufacturer's published literature. The Gross Vehicle Weight Rating (GVWR) of the Cab & Chassis shall meet or exceed the requirements from the manufacturer of the Body. Optional equipment necessary to meet the requirements of this specification shall also be installed.

- Four Door Crew Cab
- Four-Wheel Drive (4x4)
- GVWR: 19,500 pounds (minimum)
- Cab to Axle: 60 inches
- Wheelbase: 182 inches (maximum)

There shall be at least a 500-pound payload capacity after all the equipment in specification 4210-4725EQ is installed and the vehicle is full of fuel, water, and four (4) passengers (per NFPA 1906, Section 12.1.2).

3.2 ENGINE

The vehicle shall be equipped with a diesel engine that meets the following minimum requirements:

- Power: 325 hp gross (minimum)
- Torque: 750 lbs.-ft. (minimum)
- Fuel Tank: 40 Gal. (minimum)
- Diesel Exhaust Fluid Tank: Largest available

The engine must meet all California Air Resources Board (CARB) emissions requirements for the State of California. The engine air intake shall be equipped with a dry element type air cleaner with NFPA compliant ember screen. An engine block heater shall be included.

3.3 COOLING

The cooling system shall provide protection from ambient temperatures ranging from 0°F to 120°F and come equipped with high temperature coolant hoses.

3.4 TRANSMISSION/DRIVELINE

A fully automatic six (6) speed transmission shall be included and include a water-to-oil transmission cooler. The transmission shall be filled with synthetic transmission fluid recommended by the transmission manufacturer. The transfer case shall be electronic shift on the fly style that does not require the driver to manually lock the hubs in four-wheel drive. ~~The vehicle shall be equipped with the manufacturer's standard power take-off (PTO) provision.~~

3.5 AXLES

- Front GAWR: 7,000 pounds (minimum)
- Rear GAWR: 13,500 pounds (minimum)

A limited-slip rear differential is required on the rear axle and the rear axle ratio shall be discussed and agreed upon at the pre-construction conference.

3.6 STEERING

The vehicle shall be equipped with the manufacturer's standard power assisted steering.

3.7 WHEELS/TIRES

The vehicle shall be equipped with the manufacturer's standard traction tires on all positions (front and rear axles). Wheels shall be aluminum and meet the requirements of the Tire and Rim Association, Inc. and the tire manufacturer for the GVWR specified. All "on ground" tires and wheels shall be identical (i.e. no cross brands or models). The wheel well to tire clearance shall allow for installation of tire chains. A Tire Pressure Monitoring System (TPMS) shall be included for all tires (excluding the spare).

3.8 FRAME

Steel frame rail strength shall be rated at least 50,000 psi yield strength and come with two (2) frame mounted front tow hooks.

3.9 BRAKES

Power assisted 4-wheel disc brakes with Anti-Lock Brake System (ABS).

3.10 ELECTRICAL

The 12-Volt system shall be designed to handle the load requirements of the vehicle equipped with the specified options. The vehicle shall come equipped with the largest available alternator(s) and be rated for at least 375 amps. At least two (2) batteries with a rating of at least 750 CCA (each) shall be installed.

3.11 CAB COMPLEMENT

The cab shall come with the following items installed:

- Seating for at least four (4) firefighters
- Vinyl or cloth seating material
- High back 4-way adjustable seat driver seat and front passenger seat
- Cab & Chassis OEM air-conditioning with integral heater, defroster and fresh air filter
- Tilt/telescoping steering wheel
- Cab sound insulation package
- Black or grey vinyl/rubber cab floor covering
- Tinted glass (rear windows)
- Power door locks with keyless entry
- Two (2) adjustable sun visors
- Multispeed windshield wipers and washers
- Entry grab handle for each door
- Keyed ignition switch shutoff
- Dome lamp with integral 3-way switch actuated by switch or by either door
- Two (2) 12-volt power outlet, cigarette style
- Fog Lamps
- AM/FM stereo system with MP3 capability
- GPS/Navigation system
- Bluetooth phone control
- Power folding side mirrors
- Rear view camera
- Manufacturers standard instrument and gauges
- Cruise control

3.12 MISCELLANEOUS

3.12.1 Skid plates

3.12.2 Nerf bars, Black

3.12.3 Mud flaps behind front wheels

3.12.4 One (1) goose neck map light shall be provided on the right side dash or console area of the chassis cab. The light shall be 12-volt LED, with an on-off switch located on the base of the light (Littlite LCR-18-LED or equivalent)

4 FIRE PUMPS

4.1 MIDSHIP PUMP REQUIREMENTS

A 500 gallon per minute Darley KHM 500 single stage, centrifugal, single suction impeller midship fire pump shall be mounted on the vehicle chassis. It shall be furnished with 3-inch suction inlet. The fire pump shall meet or exceed all applicable requirements of the NFPA booklet 1901 latest edition. Pump shall be free from objectionable pulsation and vibration under all normal operating conditions. The pump shall meet the performance indicated below:

500 gpm at 150 psi
350 gpm at 200 psi
250 gpm at 250 psi

When dry, the pump shall be capable of taking suction and discharging water with a lift of 10 feet in not more than 30 seconds through 20 feet of 3-inch suction hose.

4.2 MIDSHIP PUMP DRIVE

The pump transmission shall be engaged by a control valve in the cab that locks in the road or pump mode. The pump shift controls shall be located in the cab console within easy reach of the operator and shall include indicator lights and labeling as mandated by NFPA # 1906 latest edition.

The midship pump shall be mounted so that the vehicle drive-line angles shall not exceed the O.E.M. recommended working angles for the universal joints. All drive-lines and U-joints used for attachment to the midship pump shall be equivalent in size and quality to the O.E.M. drive-line components. All modified drive-lines shall be both statically and dynamically balanced and free from vibration. All modified drive-lines shall be both statically and dynamically balanced and free from vibration.

An electric powered pump shift shall be installed in the cab console in accordance with NFPA-1906, current edition. The compressor for the pump shift shall be installed on the ceiling of the left front body compartment.

4.3 MIDSHIP PUMP MOUNTING

The pump shall be installed in the apparatus in such a manner that other assemblies, plumbing and mounting hardware do not hinder removal of the fire pump with minimal effort and downtime. All brackets used in mounting the pump shall be constructed of a minimum ⅜-inch steel plate with SAE Grade 8 bolts. The manufacture of the mounting brackets and installation shall be done in such a fashion as to ensure the fire pump(s) may be easily removed for repairs in a timely manner. The removal of the pump shall be able to be accomplished without having to cut or distort the mounting brackets, hoses, plumbing, and wiring. The fire pump pressure/volume controls shall not interfere with removal. The liberal use of Victaulic couplings, or equal, to facilitate the easy removal of the fire pump is required.

4.4 PRIMING PUMP

Priming pump shall be constructed of heat treated hard coat anodized aluminum and shall be a no fluid, electrically driven pump that conforms to NFPA 1901. A single push-pull control shall be located on the pump panel with a “Pull to Prime – Push to Close” label.

4.5 ANODES

Two (2) large magnesium sacrificial anodes shall be mounted to the pump case, one on the suction and one on the discharge side. These anodes shall have a hole drilled in the brass hex heads to provide water leak indication when the magnesium has been depleted.

4.6 SUCTION STRAINERS

The suction fitting shall include removable die cast zinc screens that are designed to provide cathodic protection for the pump, thus reducing corrosion in the pump.

4.7 THERMAL RELIEF

A Thermal Relief Valve with both visual and audible alarms shall be provided to prevent overheating of water in pump. Pump shall be equipped with a Darley TRS 185 thermal relief valve. The system shall operate by relieving water from the pump when under pressure, if the water temperature exceeds approximately 185 degrees F. A panel mounted warning light shall be included to indicate when the

system has been activated. The high flow capacity of the system shall be capable of flowing up to 55 gpm for quick cooling. The system shall reset automatically, be rated to 6000 psig (40.8 Bar), and have stainless steel and brass construction for long life. The system shall be designed and produced by the pump manufacturer.

4.8 ~~Deleted~~

4.9 TEST PLATE

A test data plate shall be provided at the operator's pump panel which gives the rated discharges and pressures together with the speed of the engine as is determined by the manufacture's test for this particular unit. The plate shall also include delivery date, pump serial number (s), original customer, and the apparatus manufacturer's serial number.

4.10 AUXILIARY PUMP

A Darley 1-1/2AGE 24K, 24 hp, diesel powered centrifugal auxiliary pump shall be provided. Pump shall be plumbed via valves to all 1½-inch lines and hose reel(s) and shall take suction from the water tank. The pump shall include a priming device. Sacrificial anodes, with water leak indication, shall be installed in the suction and pressure side and fitted with a mechanical seal. The pump shall meet the performance indicated below:

120 gpm at 150 psi
75 gpm at 245 psi
25 gpm at 375 psi

An auxiliary pump control panel and a back lighted pressure gauge shall be provided inside the apparatus cab located in the cab console, readily accessible to the vehicle operator. A second set of controls and pressure gauges shall be located on the (Rear) exterior main pump operator's panel. Cab controls shall be ignition/off switch, start switch, ignition light, glow plug light, Vernier cable type adjustable throttle control and illuminated pressure gauge. Pump panel controls shall replicate the cab controls. A ½-inch crankcase oil drain extension, and a ½-inch radiator drain extension shall be routed below the frame to facilitate oil and coolant changes, with Aeroquip style hose, threaded fittings and drain plugs. Fuel for the auxiliary pump shall draw from the main fuel tank and shall be equipped with a 12-volt electric fuel pump activated by the ignition switch. The fuel pump shall be capable of supplying full rated fuel capacity and shall contain an anti-backflow check valve when the motor is not running.

Stainless steel spring loaded full flow one way check valves shall be installed to isolate the auxiliary and main pump pressure from each other and to ensure that the auxiliary pump doesn't lose prime. The pump suction valve shall have a stainless steel full flow check valve.

Auxiliary pump shall be equipped with an automatic operating bypass line from the pump, returning to the tank, adequate in size to ensure cooling of pump when engaged and not flowing water. This line shall be equipped with a check valve.

An air release line shall be provided to eliminate air lock condition for gravity priming of pump; control valve shall be at pump operator's panel.

Contractor shall provide a certification plate describing the actual test capacity and pressure, together with engine and pump rpm.

5 PUMP CONTROLS

5.1 PUMP PANEL

One (1) brushed 14 gauge polished stainless steel or black finished (no vinyl) pump control panels shall be fabricated and installed on the rear of the apparatus. All gauges and controls to be color-coded and identified with etched marker plates. Any controls, gauges or instruments not specifically mentioned in this section, but necessary for the proper operation of the apparatus or to meet the requirements of NFPA 1901 shall be included.

5.2 GAUGES AND CONTROLS

The following gauges and controls shall be provided on the rear pump panel:

- 2½-inch face, LED backlit, line gauges, one for each 1½-inch discharge outlet and larger (gauges shall be adjacent to the corresponding valve control)
- Foam tank LED level gauge
- Water tank LED level gauge

- The foam discharge manifold shall have a separate pump panel mounted LED backlit, pressure gauge and drain valve
- All discharge and suction valve controls
- Any additional gauges, instruments or controls required for the operation of this apparatus
- Diesel pump control panel
- Indirect cooler control valve
- Pump bypass line control valve
- Test ports
- Back pack fill valve and hose

All gauges and controls shall be identified by color coded engraved marker plates. Color coding shall be per NFPA 1906, latest edition. All discharges capable of providing foam shall be marked “Foam” by engraved marker plates.

5.3 PRESSURE GOVERNOR

The apparatus shall be equipped with a Fire Research In-Control 400 pressure governor with display, monitoring system and throttle control. This shall be mounted on pump panel. Both water temperature and oil pressure shall be equipped with a red warning light. This unit uses the J1939 CAN bus to collect engine information.

5.4 PUMP HOUR METER

A 2-inch weatherproof pump hour meter for the auxiliary pump shall be mounted on the pump panel.

6 VALVES AND PLUMBING

6.1 GENERAL

All discharge and suction valves shall be provided with fire service full flow, quarter turn ball valves with National Hose Standard Threads (NHT). All valves shall be the "Drop-Out" body design. All valves shall have adjustable ball seats and be controlled from pump operator’s panel unless otherwise noted.

All discharge valves shall be located at the rear of the apparatus. All discharges shall be furnished with the "Torque Lock" locking feature (Akron 8800 series) and terminate with a chrome or bright finished stainless 30° down spout.

Valves that are controlled by a push rod must lock in any position. The remote control linkage between the valve handle and control unit shall be manufactured of ½-inch diameter stainless steel or zinc plated steel rod with ½-inch, 20 NF threads cut on the ends. The rods shall be attached using cadmium plated rod end ball joint assemblies.

6.2 INTAKE VALVES

Intake valves shall be plumbed to the following locations:

- One (1) 1½-inch in-line valve for the tank fill line
- One (1) 2½-inch gated intake valve located behind the pump operators panel
- One (1) 2½-inch in-line suction valve installed between the water tank and auxiliary pump
- One (1) 3-inch in-line suction valve installed between the water tank and the main pump
- One (1) 3-inch suction steamer intake with screen and chrome plated long handle cap at rear pump panel

6.3 INTAKE RELIEF VALVE

An adjustable 2½-inch intake relief valve shall be provided and plumbed into the intake side of the main pump. The valve shall be preset from the factory at 125 psi. The pressure setting controls for the valve shall be accessible from or beneath pump compartment. The valve shall be installed to allow operation from any intake, and the discharge side of the relief valve shall be plumbed to NFPA #1906 (latest edition) requirements. The discharge pipe shall terminate with a 2½-inhc NST male adapter and labeled “Do Not Cap”.

6.4 DISCHARGE VALVES

Discharge valves shall be plumbed to the following locations:

- Two (2) 1-inch valves for each hose reel.
- One (1) 2-inch discharge valve at the front bumper. Plumbing between the foam discharge manifold and the discharge valve shall be 2-inch. A swivel shall be provided on the bumper allowing hose to be pulled in either direction. Connections shall be 1½-inch male NHT.
- Two (2) 2½-inch discharge valves at the rear of the apparatus with chrome plated vented caps, secured with a cable or chain.

6.5 DRAIN VALVES

A panel mounted master drain valve shall be provided so that when opened, water in all plumbing and the pump housing shall drain. Additional drains may be required to ensure that the entire system can be drained.

¾-inch drain valves shall be provided for all pump panel discharges, suctions and common discharge manifolds. A drain valve shall also be provided at the front bumper for the truck protection line. All drain valve discharges shall be routed to the bottom of the apparatus body through ¾-inch I.D. neoprene hose and dumped directly onto ground.

6.6 MIDSHIP PUMP

All 2-inch and larger piping shall be stainless steel schedule 10 pipe with Victaulic couplings used to facilitate repairs and reduce torsional stress in plumbing system. Plumbing system shall be capable of providing full flow to all discharge points. Piping smaller than 2 inches may be Aeroquip hose with threaded connections, rated at 600 PSI minimum working pressure. Class 1 Flex with Stainless Steel Victaulic Couplings also acceptable.

One (1) ½-inch pump to tank by-pass line shall be provided with a ¼ turn control valve mounted on operator's panel. (pump cooling line).

A 3-inch tank suction line with a bronze clapper type check valve installed between the pump and the 3-inch full flow valve. This line shall be flexible enough to allow for chassis twisting and flexing.

6.7 AUXILIARY PUMP

Plumbing between the water tank and pump shall be 2½-inch I.D. with a 2½-inch I.D. in-line check valve installed between the booster pump and tank. The control valve for the suction of the auxiliary pump is to be a 2½-inch I.D. ball, quick opening type. The control handle shall be located near the pump suction. The suction line shall be connected to the tank in a manner which will permit all water in the tank to be discharged (while apparatus is level). The connection shall not permit contaminants from the tank sump to enter the pump. A suction and check valve shall be provided in the tank to pump line.

7 FOAM SYSTEM

7.1 FOAM SYSTEM

A minimum 1.6 GPM foam injection system shall be provided and installed following the foam system manufacturer's instructions without exception. The system shall be capable of delivering foam solution to all discharges and reel lines. Engraved metal plates shall be installed at each discharge valve control indicating "Foam". The system shall include the following:

- Flow Meter
- Run/Standby switch
- Foam tank "EMPTY" indicator
- Foam tank "empty" float switch
- 12-volt, solenoid operated supply shut-off valve
- Line strainer
- 2-way combination, calibrate valve/drain valve
- Manual ½-inch drain valve installed in the tank sump.
- Integrated "Auto-Start" option.

All metallic plumbing connectors used in the foam system shall be manufactured from brass or stainless steel. The system shall be plumbed to allow the water tank filler line to be ahead of the foam injection port. A full flow, high pressure 400 PSI check valve shall be installed ahead of the injection port, mounted in any position to automatically prevent foam solution from flowing backwards to water pump or booster tank. A discharge manifold shall be provided and all foam discharges shall be connected to it. A ¾-inch drain shall be provided to drain this manifold. A valved drain shall be provided at the lowest point of the concentrate storage tank. The drain shall be piped to drain directly beneath the apparatus without contacting any part of the apparatus or components.

A strainer shall be provided in the foam concentrate supply line between the foam concentrate tank and the foam proportioner or the foam pump. The strainer shall be installed so that it is readily accessible for maintenance. A full flow check valve shall be provided to automatically prevent water from back flowing from the foam proportioner to the foam concentrate storage tank.

Foam system shall be calibrated by OEM prior to delivery.

7.2 TRANSFER SYSTEM

A Foam Concentrate Transfer System shall be provided for refilling foam concentrate tank from the ground. It shall have a minimum 3.5 gpm capacity, with at least an 8-foot lift. A 5 foot (length) quick-connect suction hose shall be provided, with a foam fill coupling on the left lower surface of the pump panel. An automatic tank-fill shutoff, pilot light power indicator, 12-volt thermally protected motor, and a 15 amp circuit breaker shall be provided. Pump shaft shall be stainless steel.

7.3 FOAM CONTROLS

The foam system operating controls shall be located in the cab console and clearly labeled (remote start). A foam tank level indicator shall be mounted in cab console.

8 TANKS

8.1 WATER TANK

A 300-gallon polypropylene tank shall be provided, constructed from non-corrosive, stress-relieved virgin copolymer polypropylene and be UV stabilized. Tank shall be fully removable from body without cutting or bending of components or need specialty tools to remove. Tank shall have polypropylene anti-swirl baffles and extend down from the center of the tank. The partitions shall be designed to provide maximum water flow and meet NFPA requirements.

Tank suction line shall extend from center of sump forward directly into pump. A separate tank suction line shall be provided for the auxiliary pump. The sump shall be as close to the center of the water tank as possible and include a 2-inch (minimum) diameter removable drain plug for clean out purposes. A debris screen shall be provided for the sump.

The tank shall have a combination fill and overflow tower. Overflow shall discharge to the rear of the apparatus. The fill tower shall be provided with a removable screen and hinged cover. If the fill tower is bolted to the top of the tank, stainless steel bolts and nuts must be used.

8.2 FOAM TANK

A Foam Concentrate Tank with a 20-gallon capacity shall be provided as an integral cell in the water tank. A 6-inch diameter filler shall be provided in a fill tower on the right forward top of the water tank and include a strainer. Two percent of the tank capacity shall be designed as "unfillable" to allow for liquid expansion. The foam tank to be delivered with a full tank of foam concentrate. The filler shall be equipped with a positive sealing cap. A pressure/vacuum vent shall be installed in the tank.

9 BODY REQUIREMENTS

9.1 GENERAL

All materials utilized shall be of open stock origin, commonly available through local sources for rapid and economical repair or modification of the body. The use of proprietary parts or materials in the construction of the body is unacceptable. The chassis manufacturer's break over angle shall be maintained.

The entire apparatus body will be manufactured from steel, stainless steel, Co-polypropylene (CPP), or aluminum. The choice of construction material shall be that of the contractor except where specifically stated. Steel components shall be treated or painted to prevent corrosion. Any failure of the body due to inadequate construction material and/or design shall the sole liability of the contractor. All welding of body support system will be accomplished by welders certified to the standards of the American Welding Society for the metals being used.

The entire body (including compartments) shall be designed and fabricated to prevent water from entering or pooling inside the body.

The body shall be protected from corrosion due to electrolysis by preventing direct contact between dissimilar metals. Body will be constructed in accordance with current NFPA requirements. All metal work will be free of sharp edges, objects or corners.

9.1.1 Exterior Dimensions

- Approach Angle: 20° (minimum)
- Departure Angle: 20° (minimum)
- Length: 26 feet (maximum) not including lights or ancillary equipment
- Width: 8.0 feet (maximum) not including lights, rub rail, etc.
- Height (fully loaded): 7.5 feet (maximum) including light bar

9.2 BODY MOUNTING

The body mounting system shall incorporate a MetaCone Mount (or equivalent) to connect the subframe and body to the chassis. The mounts shall be assembled with overload and rebound washers to control and limit the movement under shock loads. The mounting system shall not include pressure seals or fluids to reduce repairs and maintenance. Due to the severe loading requirements and rigors of off-road

operations the entire body assembly shall be mounted to the truck chassis using four (4) spring loaded shock assemblies that will provide 12" of body to frame diagonal flex. The subframe shall be constructed of a minimum 7-gauge steel tubing (1½ x 3 inch) that supports the body and is independent of the chassis frame.

9.3 BODY COMPARTMENTS

9.3.1 Construction

Compartments to be sweep-out design and to be water/dust proof. All compartments shall be made to the maximum practical dimensions to provide maximum storage capacity. To ensure maximum storage space, the body shall be constructed without any void spaces between the body and the compartment walls. All exterior compartments shall have polished aluminum drip moldings installed above the doors where necessary to prevent water from entering the compartments. Upper compartment shall not vent into the hose bed. The tops of all the side compartments shall come with a slip resistant walking surface meeting NFPA requirements (stainless steel or aluminum).

9.3.2 Shelves

Some compartments shall be equipped with shelves manufactured from a minimum of ⅛-inch brushed aluminum or stainless steel of comparable strength with at least a 2-inch vertical flange on all four (4) sides (see section 9.3.6 for details). An aluminum adjustable track system, vertically mounted, that are bolted in place for adjustable shelving and equipment mounting. The shelves shall have a minimum capacity rating of at least 500 pounds. Any shelf wider than 36-inches shall be reinforced along the bottom to prevent bowing.

9.3.3 Pull Out Trays

Some compartments shall be equipped with pull out trays manufactured from a minimum of ⅛-inch brushed aluminum or stainless steel of comparable strength with at least a 3-inch vertical flange on all four (4) sides (see section 9.3.6 for details). Stainless steel roller guides shall be used with stainless steel ball bearings that are rated for at least 500 pounds and lock into place when stored or when pulled out.

9.3.4 Roll-Up Doors

All compartment doors shall be Gortite aluminum roll-up doors or equivalent. Door shutters shall have a satin anodized finish. A door guard panel shall be mounted on the upper inside of the rollup assembly to prevent the shutters from being scratched by loose equipment. All compartment doors shall be keyed alike. Magnetic door ajar switches shall be included and wired to let the operator know if a door is not securely closed.

9.3.5 Tool Mounting

The back of the following compartments shall be provided with PAC TRAC tool mounting system panels:

- Left front compartment (L1)
- Right center compartment (R2)

9.3.6 Sizes

All compartment linear dimensions listed in the table below may vary in size within 2 inches, but must meet the minimum volume requirement. The volume listed below includes any area used in these compartments to hold the suction hose (i.e. the volume used for the suction hose will not need to be subtracted from the volume listed below). The final dimensions and configuration shall be discussed at the pre-construction conference. Compartments listed below are from front to back on both the left (L) and right (R) sides of the body.

Number	Size (width x height x depth)	Volume	Location	Features
L1	35 X 60 X 22 inches	26 ft.^{3}	Forward of rear wheels	2 shelves 1 pull out tray
L2	44 X 45 X 22 inches	24 ft.^{3}	Over rear wheels	1 shelf 0 pull out trays
L3	23 X 60 X 22 inches	17 ft.^{3}	Behind the rear wheels	0 shelves 1 pull out tray
R1	35 X 60 X 22 inches	26 ft.^{3}	Forward of rear wheels	2 shelves 0 pull out trays
R2	44 X 45 X 22 inches	24 ft.^{3}	Over rear wheels	0 shelves 1 pull out tray
R3	23 X 60 X 22 inches	17 ft.^{3}	Behind the rear wheels	1 shelf 1 pull out tray

9.3.7 Miscellaneous

All compartments shall come with LED lighting (see Section 10.5.2) that shall illuminate the compartments regardless of where the shelf is located. The compartment shelves and floors (or trays where applicable) shall be fitted with removable Turtle Tile type material. This material shall be resistant to heat, cold, ultra-violet radiation, mechanical impacts, chemical actions and is corrosion resistant.

9.4 IN-CAB COMPARTMENTS

A floor mounted console shall be installed between the driver and officer seat positions. The console shall be constructed in a manner to make the installed equipment and switches easy to see, reach, and operate. The console and equipment/switch mounting panels shall be black powder coated to provide a non-glare rugged finish. The console shall be equipped with individual panels for each piece of equipment installed with threaded fasteners so the panels may be removed easily for service or changing equipment installation positions. The console shall have the following equipment installed at the factory:

- Bendix King mobile radio
- Diesel Pump Operating Panel
- Mid-Ship pump shift controls and indicators
- Four (4) 12-volt power sockets, two (2) at the front of the console two (2) at the rear of the console for powering cell phones, laptop computers, chargers, etc.
- Four (4) USB sockets two (2) at the front of the console two (2) at the rear of the console
- Open Compartment light & buzzer
- Water tank mini level gauge
- Foam tank mini level gauge
- Electronic siren control
- Mechanical Siren controls

9.5 APPARATUS HOSE BED

An enclosed hose bed shall be provided over the water tank manufactured from ⅛-inch aluminum sheet, orbital sanded and left unpainted. The interior of the hose bed shall be free of projections such as nuts, sharp edges, or brackets that may damage the hose. A stainless steel 90° angle molding shall be installed over the rear opening of the hose bed to protect the body from wear. The hose bed shall be designed to store:

- 150 feet of 1½-inch preconnected hose
- 400 feet of 3-inch NH thermoplastic lined synthetic hose

Two (2) adjustable hose bed dividers made from ¼-inch aluminum and welded to a “T” shaped extruded aluminum base that allows the divider to be moved and remounted easily. The floor of the hose bed shall contain an aluminum track that provides a sturdy mounting point for the dividers. Another aluminum track shall be provided on the forward wall of the hose be for an additional mounting point. An aluminum or stainless steel tray shall be provided to hold the preconnected hose line and nozzle. If foam till towers are located in the hose bed, then a hinged access door shall be provided that allow access to the fill towers while the hose bed is full of hose.

9.6 HOSE BED COVERS

Hose bed covers that meet in the middle of the body and are hinged to open up and towards the side of the vehicle shall be made from aluminum tread plate that meet NFPA requirements for slip resistance. The hinges shall be full length stainless steel with at least a ⅜-inch pin and 1-inch joint length. The hose bed covers shall have full length handrails installed along the rear lip and one (1) additional grab handle mounted on the top of the covers. Each hose bed cover will have a mechanism to hold the hose bed cover in the open position and will be substantial enough to prevent accidental closing in extreme wind conditions. Due to the potential weight of the cover, an opening assist device may need to be included to allow one handed opening of the cover.

Each cover shall be fitted with a black vinyl end skirt with two (2) straps. The lower edge of each flap shall be secured to the body with a minimum of two evenly spaced, web straps with thumb spring web clamp buckles. Attachment on the lower edge shall be accomplished using J hooks and footman loops. Clamps shall be metal and the body shall be protected from damage from the metal clamps with aluminum or stainless steel covers. The end skirts will be weighted at the bottom end with a full width flat strip of metal sewn into the hem of the skirt. The end skirts, straps, buckles, etc. will be exposed to direct sun light and shall be protected against UV rays.

Hose bed cover shall have a 2-inch wide safety yellow delineation that contrasts with the background to mark the outside perimeter of the standing or walking surface area.

9.7 SUCTION HOSE STORAGE

Storage shall be provided for two (2) 9-foot lengths of 3-inch diameter, light weight "Kochek" hard suction hose with long handle couplings. Suction hose storage shall be determined at pre-construction.

9.8 LONG TOOL STORAGE

There shall be an enclosed pike pole and rubbish hook storage area in or adjacent to the hosebed. A latching door shall be provided for the compartment at the rear of the body.

9.9 PUMP ACCESS

The Left and Right Side Forward compartment shall have panels that will be easily removable for access to the midship pump. Panels shall be constructed of brushed stainless steel with suitable bracing behind the panels to keep the panels from flexing and vibrating. The panels shall be capable of being removed easily with common tools (i.e. no specialty tools allowed even if they come with the vehicle).

9.10 HOSE REEL

Two (2) Hannay polished aluminum hose reels with bronze swivel joints, stainless disks, heavy duty explosion proof rewind motor and combination bearing brake shall be provided. The hose reel discharge manifold shall be provided with iron pipe male thread. The hose reel shall be furnished with the hand crank option installed to accept the hand crank from the top. A momentary switch to reel in the hose shall be mounted the body near the hose reel (location of switch to be determined at pre-construction conference). The hand crank shall be supplied and stored in the nearest compartment.

Stainless hose rollers (both vertical and horizontal) shall be provided on each side of body. Each hose reel shall be designed to hold 150 feet of ¾-inch REELTEX water hose with 1-inch NPSH couplings. Each hose reel shall have one NPSH 1-inch 10-24 gpm nozzle with ball valve shutoff.

9.11 EXTERIOR

9.11.1 Wheel Wells

To fully protect the wheel well area from road debris and to aid in cleaning, a full depth wheel well liner shall be provided. Wheel well liner shall be smooth aluminum or stainless steel to prevent corrosion. The wheel well to tire clearance shall be a minimum of 6 inches in a loaded condition to allow for installation of tire chains. A polished stainless steel fender shall be furnished at each rear wheel well opening, held in place with concealed stainless steel fasteners. The fender shall protrude from the body at least 1-inch and extend up the body at least 1-inch from the wheel well.

9.11.2 Front Bumper

The front bumper shall come equipped with a hose tray capable of holding 35 feet of 1½-inch single jacket hose with a nozzle.

9.11.3 Rear Bumper

An 8-inch deep bumper/step shall be provided at the rear of the body, bolted in place and easily removable for replacement or repair. The step surfaces shall be in compliance to applicable sections of NFPA requirements for slip resistance.

9.11.4 Interface Brackets

Rear of apparatus shall have two (2) swing down interface brackets to allow for lacing of hose during structure protection operations (Cascade 14300 or equivalent).

9.11.5 Folding Steps

All areas of the vehicle that require access for operation or maintenance shall be made accessible with folding steps. Each step shall be at least 8 inches deep, meet NFPA slip resistance requirements and double as a grab handle (Cast Products SP6610-1CH-CPI or equivalent). At a minimum, there shall be two (2) steps installed in the rear of the vehicle and at least two (2) near the hose reels. Specific locations and additional steps that may be required shall be discussed at the pre-construction conference.

9.11.6 Handrails

In addition to handrails mentioned in other areas of this specification, handrails shall be installed on the body where access to high areas is needed and where steps for climbing are located. A set of handrails shall be furnished, one on each side of the rear body.

9.11.7 Safety Line

Any designated horizontal standing or walking surfaces higher than 48-inches from the ground and not protected by a railing or structure at least 12-inches high shall have at least a 1-inch wide safety yellow or orange reflective line delineation that contrasts with the background to mark the outside perimeter of the designated standing or walking surface area, excluding steps and ladders.

9.11.8 Rub Rail

Full body length 1-inch (minimum) aluminum rub rails shall be installed along both sides of the body. DOT red and white reflective striping shall be applied to rub rails.

10 LIGHTS AND ELECTRICAL

10.1 WIRING/WORKMANSHIP

The electrical system shall include all panels, electrical components, switches and relays, wiring harnesses and other electrical components. The electrical equipment installed by the manufacturer shall conform to current automotive electrical system standards including SAE J1292, the latest Federal DOT standards, and the requirements of the applicable NFPA standards.

All wiring shall be stranded copper or copper alloy conductors of a gauge rated to carry 125 percent of the maximum current for the protected circuit. Voltage drops in all wiring from the power source to the using device shall not exceed 10 percent. The wiring and wiring harness and insulation shall be in conformance to applicable SAE and NFPA standards. The wiring harness shall conform to SAE J1128 with GXL temperature properties. All exposed wiring shall be protected in a loom with a minimum 289 degree Fahrenheit rating. All wiring looms shall be properly supported and attached to body members. The electrical conductors shall be constructed in accordance with applicable SAE standards, except when good engineering practice requires special construction.

The wiring connections and terminations shall use a method that provides a positive mechanical and electrical connection and shall be installed in accordance with the device manufacturer's instructions. Electrical connections shall be with mechanical type fasteners and large rubber grommets where wiring passes through metal panels.

The wiring between the cab and body shall be joined using automotive type connectors or an enclosed in a terminal junction panel area. This system shall permit body removal with minimal impact on the electrical system. All connections shall be crimp-type with insulated shanks to resist moisture and foreign debris such as grease and road grime. Weather-resistant connectors shall be provided throughout to ensure the integrity of the electrical system.

There shall be no exposed electrical cabling, harnesses, or terminal connections located in compartments, unless they are enclosed in a junction box or covered with a removable electrical panel. The wiring shall be secured in place and protected against heat, liquid contaminants and damage. Wiring shall be uniquely identified every 4-inches by color coding or permanent marking with a circuit function code and identified on a reference chart or electrical wiring schematic per requirements of applicable NFPA 1901 standards.

The electrical circuits shall be provided with low voltage overcurrent protective devices. Such devices shall be accessible and located in required terminal connection locations or weather resistant enclosures. The overcurrent protection shall be suitable for electrical equipment and shall be automatic reset type and meet SAE standards. All electrical equipment, switches, relays, terminals, and connectors shall have a direct current rating of 125 percent of maximum current for which the circuit is protected. The system shall have electro-magnetic interference suppression provided as required in applicable SAE standards.

Electrical terminals in weather exposed areas shall have a non-conductive grease or spray applied. A corrosion preventative compound shall be applicable to all terminal plugs located outside of the cab or body. The electrical wiring shall be harnessed or be placed in a protective loom. Holes made in the roof shall be caulked with silicone. Large fender washers shall be used when fastening equipment to the underside of the cab roof. Any electrical component that is installed in an exposed area shall be mounted in a manner that shall not allow moisture to accumulate in it. A coil of wire must be provided behind an electrical appliance to allow them to be pulled away from mounting area for inspection and service work. All lights that have their sockets in a weather exposed area shall have corrosion preventative compound added to the socket terminal area.

10.2 ELECTRICAL SYSTEM PANEL

An interface panel shall be provided and mounted within the fire body at a location which will facilitate repairs to the fire body electrical wiring and isolate the body wiring from the chassis. All terminals on this panel shall be properly labeled and numbered with permanent, moisture and heat resistant material. The labels must agree with wiring schematic supplied with the apparatus. All warning lamps, compartment lights, work lights and other accessories shall be powered from 12-volt relays (Bosch or equivalent). All panel switches shall only control the relays. Class-One Multiplex electrical system may be offered as an acceptable alternative to the analog type electrical system.

10.3 GROUND

An electrical ground will be installed from the “tank/body” assembly to the truck frame. This ground will be a cable or strap equal to the O.E.M ground.

10.4 CIRCUIT BREAKERS

One (1) circuit breaker box for single phase voltage equipment shall be and installed in an outside body compartment. All circuits shall be divided and balanced with junction blocks for proper load distribution. All circuit breakers shall be labeled and shall be provided for all interior and exterior outlets indicating output amperage, voltage and phase. A main overcurrent protection device shall be provided that is either incorporated in the power source or is connected to the power source by a power supply assembly. The size of the main overcurrent protection device shall not exceed 100 percent of the nameplate amperage rating on the power source specification label or the rating of the next larger available size overcurrent protection device where so recommended by the power source manufacturer.

10.5 LIGHTS

10.5.1 General

All lighting shall meet or exceed the requirements of NFPA 1901, Section 13.10. If additional lighting is required to meet NFPA, then it is the responsibility of the manufacturer to identify and install the required lighting. All steps, running boards and walking surfaces shall be illuminated as required by NFPA-1906, current edition. All marker, clearance, turn signal, headlights, stop lights and etc., must meet FMVSS, California Vehicle Code requirements and Part 15 of the FCC rules.

10.5.2 Compartment/Hose Bed Lights

All exterior compartments/hose beds shall come with Luma Bar LED strip lighting mounted vertically and protected from damage when moving gear in and out of the compartments. Each compartment shall come with two (2) strip lights per compartment installed in the corners. The lights shall be controlled by a magnetic switch located on the compartment door that shall turn the lights on when the door(s) are opened.

10.5.3 Pump Panel Lights

Pump panel shall come with Luma Bar LED strip lighting mounted vertically on each side and protected from damage. Lights shall be controlled by a switch at the pump panel. Luma Bar LED lights shall also be installed in the pump house and activated when the pump panel door is opened.

10.5.4 Ground Lights

All ground lights shall be 40-inch AMDOR Luma Bar H2O LED lights installed mounted to the underside of the vehicle and specifically designed to withstand full water submersion. The light shall have a polycarbonate lens to eliminate breakage from impact and eliminate heat buildup. The ground lighting shall be activated when the parking brake is set. Lights shall be installed in the following locations (final locations can be discussed at the pre-construction conference):

- Cab: Two (2) lights installed under the cab near the driver and passenger doors
- Rear-Body: One (1) light installed under the body

10.5.5 Perimeter Lights

A total of four (4) Whelen PELCC perimeter enhancement light(s) with chrome bezel shall be installed in the following locations (final locations can be discussed at the pre-construction conference):

- One (1) on the left side of the body, mid-point
- One (1) on the right side of the body, mid-point
- Two (2) at the rear of the vehicle, one (1) driver's side and one (1) passenger side

The lights shall be illuminated when the vehicle is in "park" with the engine running.

10.5.6 Tail Lights

The rear tail lights shall come housed in a three (3) light housing (Whelen PLAST3V or equivalent) in accordance with Federal Regulations and include the following LED lights:

- One (1) pair of rectangular, Whelen C6BTT Red in the top location
- One (1) pair of rectangular, Whelen C6T Amber in the top location
- One (1) pair of rectangular, Whelen C6BUClear in the top location

10.5.7 Spot Light

One (1) Collins model CL-12 hand held, 12-volt spot/flood light shall be provided on the right side of the cab dash area. The light shall be controlled by a momentary three-way switch located on the hand light. The light shall be secured per requirements of the NFPA standard.

10.6 RADIO:

Details for radio requirement has moved to "Type 6 OES EQUIPMENT/PAINT/LETTERING PACKAGE Specification 4210-4725EQR1. Note: Bidder shall provide Radio Equipment and Antenna. Installation shall be done by the bidder.

10.7 ANTENNA

Four (4) antenna bases with coaxial cables shall be mounted in cab roof with termination location in the radio compartment. One (1) Hi Band antenna (Ref: Antenex-Model AB 150) shall be provided. Other antenna base to receive a weather proof screw-in type cap.

10.8 INTERCOM

A Central Supply International dash mount dual radio intercom system shall be provided. Three (3) stations, all with radio interface with locations at the driver seat, officer seat and on pump panel with waterproof housing connector and switches. A 15-foot extension coil cord for operator shall be provided. Two (2) Behind The Head (BTH) style, low impedance/Mic with on-off switches (Mil-PRF-8805/3), headsets shall be provided. Radio interface to be connected to cab radio. Interface unit mounting location to be determined at pre-construction conference.

10.9 MISCELLANEOUS ELECTRONICS

10.9.1 *Intentionally left blank*

10.9.2 Door Open Hazard

One (1) red flashing, warning light shall be provided and installed in the driver's compartment to indicate an open passenger or compartment door. The light shall be a flashing rectangular marker light with a red lens and shall be properly marked and identified. A door open/hazard warning alarm shall also be installed. The audible alarm shall activate when an open door is detected upon release of the parking brake. The alarm shall have a distinct noise to avoid conflict with other cab mounted alarms.

10.9.3 Back-Up Alarm

An ECCO SA917-PM2 (or equal) back-up alarm shall be installed and wired into the vehicles back-up light circuit.

10.9.4 Cab Buzzer

Tailboard to cab buzzer system with protected button shall be provided at the rear of the body on the left side.

11 EMERGENCY EQUIPMENT

11.1 EMERGENCY LIGHTING

An NFPA # 1906 (latest edition) compliant emergency lighting package shall be provided. All emergency lighting components shall be from the same manufacturer. White lights and headlight wig-wag shall automatically turn on or off through the setting and releasing of the parking brake. Headlights shall be provided with a wig-wag control and a cutoff switch should the feature need to be interrupted.

All warning lights shall be combination 180° warning and perimeter lights, Whelen Model #M4V2R red/clear LED. Each pair of lights shall be installed in the following locations (one (1) on the driver's side and one (1) on the passenger side):

- Lower Zone A – forward facing
- Upper Zones B & D – forward side facing
- Upper Zones B & D – rear side facing
- Lower Zones B & D – intersection lighting
- Lower Zones B & D – rear wheel fender
- Upper Zone C – rear facing
- Lower Zone C – rear facing

The warning lights shall be activated with a single warning light master switch in the cab. The perimeter white lighting shall be activated when the vehicle is in the park position and ignition in the "on" position. Any flashing white light shall be deactivated in blocking mode. Emergency lighting package controls shall conform to NFPA #1906 (latest edition) for both Calling for Right-of-Way and Blocking of Right-of-Way modes.

11.2 LIGHT BAR

One (1) Whelen Justice, 56-inch light bar shall be provided. The light bar shall be mounted on the roof of the cab, towards the front, above the windshield. The light bar activation shall be wired into the master warning switch. The lightbar shall consist of fourteen (14) LED internal flashing light heads and two (2) steady burn red LED light heads. LED light heads shall be configured as follows:

- Two (2) rear facing amber Con3
- Two (2) 45° side rear facing red Lin6
- Two (2) 45° side forward facing red Lin6
- Four (4) forward facing red Con3
- Two (2) forward facing white Con3
- Two (2) forward facing red Con3 for California steady burn

11.3 CHEVRON

At least 50% of the rear portion of the body shall have 3M reflective red and amber striping installed. The chevron style striping shall be applied at a 45-degree upward angle pointing towards the center upper portion of the rear panel.

11.4 REFLECTIVE STRIPING

Cab doors, compartment doors and pull out shelves shall have alternating red and white reflective tape applied to the lower edges.

11.5 SIREN

One (1) electronic siren shall be provided with a control head mounted on the console. A remote amplifier shall be mounted in the cab. A 200-watt speaker shall be mounted in the bumper. A Screaming Eagle Mechanical Siren (bumper mount) shall be provided with control head on the center console and foot controls on the floorboard at both the operator's and officer's location. A push button control shall be installed on the dash in the right seat position.

12 EQUIPMENT/ACCESSORIES

12.1 CHOCK BLOCKS

A set of two (2) chock blocks with brackets for mounting under running boards shall be installed. Mounting location to be determined at the Pre-Construction Conference.

12.2 REAR MUDFLAPS

Mud flaps shall be mounted behind the front and rear wheels in conformance with the California Motor Vehicle Code. The flaps shall be plain black (no logos or advertising) and be mounted at a distance back of the wheels to preclude flaps from being carried into the tires when backing into brush or coming in

contact with the tailpipe. The mud flaps shall be securely fastened with full width stainless steel strips, bolts and lock nuts.

12.3 REAR TOW EYES

There shall be two (2) tow eyes furnished under the rear of the body and attached directly to the chassis frame rails. Tow eyes are to be constructed of ⅜-inch plate steel with a 4-inch hole, large enough for passing through a tow chain end hook. The tow plates shall be painted black.

12.4 DRIVELINE HOOPS

Bolt on driveline/driveshaft safety hoops shall be provided on the forward portion of all multi-piece drivelines. The hoops shall be from a minimum of ⅛-inch steel flat stock secured to tabs that are welded to the lower body sills. The hoops shall be bolted to the mounting tabs with a minimum of two (2) grade 8 bolts, washers and self-locking nuts on each side. The driveline hoops shall be designed to prevent a dislodged or broken driveshaft from impacting the ground or the passenger compartment floor.

12.5 RECEIVER HITCH

One 2 x 2 inch trailer receiver hitch shall be mounted to the back of the vehicle to use for both trailering as well as the attachment of a hose roller.

12.6 LABELING

12.6.1 Fluid Data

One (1) fluid data plaque containing required information shall be provided based on the applicable components for this vehicle, compliant with NFPA Standards:

- Engine oil
- Engine coolant
- Chassis transmission fluid
- Drive axle lubricant
- Power steering fluid
- Pump transmission lubrication fluid
- Other NFPA applicable fluid levels or data as required

Location shall be in the driver's compartment or on driver's door.

12.6.2 Vehicle Data

A highly visible label indicating the overall height, length, and weight of the vehicle shall be installed in the cab dash area.

12.6.3 No Ride

At least one (1) "NO RIDERS" label shall be applied on the vehicle at the rear step area or other applicable areas. The label shall warn personnel that riding in or on these areas, while the vehicle is in motion is prohibited.

12.6.4 Helmet Warning

One (1) label shall be installed in the cab, visible from each seating position. The label shall read "CAUTION: DO NOT WEAR HELMET WHILE SEATED." Helmets must be properly stowed while the vehicle is in motion according to the current edition of NFPA 1901.

13 PAINT/LABELING

13.1 PAINT FINISH

All visible exterior surface areas shall be free of grind marks, dents, peen marks, paint sag, and/or unsightly workmanship. Interior cabinet areas, if painted, are to be well fitted and painted to the same quality of surface finish as the exterior surface standard. When completed, all exterior painted surfaces of the entire apparatus shall be the single color specified in the purchase order, except the cab top which shall be white. This includes repainting surfaces (e. g. cab, chassis) that may have already received factory, OEM or pre-delivery painting. All ferrous metal components shall be primed and painted before assembly. Black paint is acceptable on undercarriage and frame rails as long as it is of the same type, quality and coverage as the body exterior paint.

All wiring, hoses, wire looms and gauge backs, shall be left unpainted for identification purposes; no exceptions. Stainless steel and aluminum components shall not be painted.

13.2 COMPARTMENTS

The interior of all body compartments that are not made from stainless steel or aluminum (see Section 9.2) shall be finished with grey Rhino Liner (or equivalent). All exterior compartment doors and shelves

shall have 3M reflective tape (color to be determined at the pre-construction conference) on visible edges when the compartment doors are open (front and sides).

13.3 UNDERCOATING

The entire underside of the body is to be cleaned and properly prepared for application of a sprayed on automotive type undercoating for added corrosion resistance. Undercoating is to be a solvent based, rubberized coating, black in color.

13.4 CHEVRON

At least 50% of the rear portion of the body shall have 3M reflective red and amber striping installed. The chevron style striping shall be applied at a 45-degree upward angle pointing towards the center upper portion of the rear panel.

13.5 RUB RAILS

Rub rails shall have standard DOT alternating red/white reflective stripe.

13.6 LABELS

All labels/plates as required by NFPA #1906 (latest edition) shall be provided.

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