United States Department of Agriculture

Type 6 Fire Engine — Model 643U Apparatus Body Only Specification

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Record of Revisions

Date	Revision summary
April 2009	• Initial Release
August 2009	• Revision
March 2010	• Revision
February 2011	• Revision
August 2011	• Revision
May 2013	• Added Table of Contents • Added Record of Revisions • Clarified radio pre-wire requirements • Deleted green aviation light from light bar • Clarified that front bumper bolt-on brush guards are not acceptable • Deleted mobile attack bracket requirement • Refined chassis component (skid plate) requirements • Clarified grab handle requirements • Added requirement for flammable material storage warning label • Increased number of shelves from eight to nine • Added shelf to passenger side forward compartment • Deleted vent from passenger's side lower aft compartment • Added vent to door face and rear wall of driver's side aft compartment • Revised auxiliary fire pump specifications • Revised optional pump specifications • Revised pump panel requirements • Added heading for “Valves, Controls, Gauges & Plumbing Requirements” • Changed discharge pressure gauge from 600 P.S.I. to 400 P.S.I. • Clarified that foam system cannot be mounted in a storage compartment • Revised standard vehicle markings • Revised wheel chock requirements and deleted requirement for lanyard • Deleted requirement for swivel hooks • Revised warranty to ten years • Added standard vehicle marking drawing

Date	Revision summary
August 2015	• Updated Format • Added specification for inline check valve on foam system • Added Brand Name or Equivalent direction • Updated Lightbar Size and Brand • Changed lower zone C lights from amber to red • Deleted amp meter • Added hour meter • Updated Pump Water Level Gauge
February 2016	• Updated Format • Minor Editing • Modified Junction Box wording to require no interference with seating location leg room • Modified location of master body disconnect switch • Added third rear step • Changed road kit fire extinguisher to 5 pounds • Added diamond plate requirement to the outside/rear of the driver's side upper module • Added additional hose reel push button switch • Added hose reel nozzle brackets • Added requirement for bulkhead perimeter lighting to be installed below the hose reel nozzle brackets • Modified placement of the left and right-side hose compartment • Revised lightbar standard and clarified Traffic Advisor • Updated auxiliary pump
May 2017	• Revised skid plate • Revised front bumper requirement • Added in-service weight requirement • Updated tank to pump and intake line size • Added protective housing for foam system • Added electrical requirements for foam system • Added rear view camera • Added USB charging ports • Amended chock block mounting location • Updated vehicle marking diagram and locations

Date	Revision summary
	• Added front license plate bracket • Amended dunnage compartment • Amended and added hose reel requirement • Amended chassis component protection • Amended Chassis Air Intake Ember Guard • Amended cup holders • Added in cab water level display • Deleted passenger & driver side pre-connect compartments • Amended door latches and hardware • Amended junction box • Amended back up alarm • Amended antenna mounting bases • Amended entire chapter for Traffic Warning Systems • Deleted apparatus fluid types and label • Amended exhaust system • Amended compartment venting • Amended rear cab protection • Amended hose rollers • Amended discharge pressure gauge • Amended compartment lighting • Amended rear traffic advisor • Amended gear storage compartment • Amended ice chest storage • Amended spare tire storage • Changed/amended chainsaw storage to misc. storage • Changed paint from FED-STD to No. 14260 of SAE AMS- STD-595 Rev. A (Forest Service Green) • Amended foam system requirements
February 2018	• Revised pump cooler/pump bypass requirements • Added tire pressure monitoring system • Added rearview backup camera system • Revised brand names or equivalents statement • Revised traffic warning system main item
October 2020	• Revised emergency lighting requirements

Date	Revision summary
	• Revised rear taillight and turn signal requirements • Added front and rear tow hooks
January 2022	• Revised vehicle markings • Added operator over-ride switch to back-up alarm • Revised wheel chock • Revised apparatus body material • Revised apparatus body finish • Revised body frame construction • Revised body mounting • Revised vertical surfaces • Revised rear cab protection • Revised junction box • Changed “perimeter lighting” to “ground lighting” • Revised auxiliary off road driving light • Deleted tubular exhaust system protection • Deleted chassis component protection • Revised compartmentation • Revised auxiliary pump • Deleted standard vehicle marking diagram • Added door decal
October 2022	• Revised tire pressure monitor system (TPMS)
March 2023	• Revised back up alarm • Changed NFPA 1906 to NFPA 1900
April 2024	• Added winch • Revised front bumper to accept winch capability • Revised auxiliary offroad driving lights
March 2026	• Revised Junction Box • Revised Auxiliary switch labeling • Revised cab console • Revised switch panel • Revised compartment dimensions • Revised low pressure feature • Revised Pump capacities

Date	Revision summary
[Future revisions]	• Added requirements for apparatus drawings • This space is reserved for future revisions.

1 — General

1.1 General Statement

1.1.1 The utility body described in this specification shall be mounted on Government furnished cab and chassis. The apparatus manufacturer shall be liable for all loss and damage to Government furnished cab and chassis until completion and final acceptance of work and returned to the Government.

1.2 In-Service Weight

1.2.1 The in-service weight shall not exceed the OEM chassis front axle rating and 90% of the rear gross axle weight rating and suspension ratings when: fully loaded with water, foam and fuel, with 250 pounds per seat, and 1300 pounds of equipment evenly distributed in the storage compartments.

1.3 NFPA 1900 Requirements

1.3.1 The completed apparatus described in this specification shall be compliant with the requirements of National Fire Protection Association (NFPA)1900, latest edition, except where noted.

1.4 Tilt Test

1.4.1 The apparatus shall be tilted to 30° minimum before lifting a tire or tire set when tested at the estimated in-service weight in accordance with NFPA 1900.

1.5 Apparatus Body Material

1.5.1 The apparatus body shall be designed and constructed of materials consistent with current fire apparatus engineering technology and design standards.

1.6 Auxiliary Pump

1.6.1 The auxiliary pump for this apparatus shall be specified by the Government.

1.7 Brand Name or Equivalent Products

1.7.1 Products equivalent to the brand name components specified herein may be approved by the Government. Equivalent products shall not be used unless approved in writing by the Government prior to contract award and documented in the resultant contract. After the contract award, approvals for equivalent products may be considered, and if approved, shall be documented in writing by the Government.

2 — Chassis Electrical Requirements

2.1 Chassis Electrical Additional Equipment and Modifications

2.1.1 The apparatus chassis shall be equipped with a heavy-duty 12-volt direct current (VDC) negative ground electrical system. The electrical system shall include all parts, components, switches, relays, wiring, and other devices required to assure complete, consistent and proper operation of the completed apparatus. Wiring shall be routed and/or protected to eliminate exposure to moving parts or debris.

2.1.2 The electrical system will be fabricated in modules as is the apparatus. The body and chassis will be individually wired as independent modules and connected as a completed unit at the final assembly via bulkhead type waterproof electrical connectors located in the body floor adjacent to the electrical compartment. All GXL/SXL wiring for the apparatus body will be within a temperature resistant harness rated at a minimum of 280 degrees Fahrenheit. All wires in each harness must be color and function coded. Wiring will be run along structural rails and tied in a neat and orderly manner. Wiring shall be routed and/or protected to eliminate exposure to moving parts or debris. Wiring passing through compartments shall be protected from tears, abrasions, and cuts caused by loose item moving in the compartment space.

2.1.3 All lights are required to comply with Federal Government Codes for vehicles of this size and design shall be provided and installed. These lights shall include headlamps and front turn signals with hazard switch, cab marker and clearance lights, back up lights, stop-turn-tail and license plate lights.

2.1.4 All switches for the warning lights and other electrical equipment shall be mounted on a separate switch panel located in the cab on a master electrical console mounted between the two front seats. The switches shall be functionally laid out, properly identified, and shall be located within easy reach of both the driver and the officer. The warning light system shall have a “master” switch, which shall allow for the pre-selection of all warning lights. All switches shall be of a heavy-duty design.

2.1.5 The following additional electrical equipment shall be installed on, and modifications performed to, the specified cab and chassis by the apparatus builder:

2.2 Multiplex System

2.2.1 A multiplexed solid-state management system for controlling the electrical system devices shall be provided. The system shall be fully programmable, and capable of performing load management functions, system monitoring and reporting. All electrical circuits and wiring shall be rated at 125% of the maximum load being imposed.

2.3 Master Body Disconnect Switch

2.3.1 One master body disconnect switch shall be provided in the cab. The switch shall be rated for 175 amps continuous duty and 800 amps intermittent duty. The switch shall be labeled “ON/OFF” and shall be located driver's side of the center console's vertical surface near the

floorboard. It shall be positioned not to impact the driver's seat or operation of the vehicle. The exposed terminals shall be protected from damage and inadvertent contact. When in the “OFF” position, all electrical power to the apparatus fire package shall be off. Power to the chassis shall remain separate from this switch. A Cole Hersee™, Model #M-2484-16, with Model #82065 switch plate “ON/OFF” label meets this requirement.

2.4 Battery “On” Indicator Light

2.4.1 One “Battery On” indicator light, with a green lens, shall be provided on the cab center console, located forward on the left side. This light shall illuminate when the battery switch is turned to the “ON” position and the brightness shall dim automatically via multiplexing system when the chassis headlights are turned on.

2.5 Junction Connection and Location

2.5.1 An electrical junction for all apparatus modules, connections, relays, circuit breakers, etc. shall be located in the cab console. All connection points shall be labeled according to function. Wire length within the console shall be sufficient to allow a minimum of two inches of slack to allow for secure connections and ease of service. All wiring shall be installed in an organized fashion.

2.6 Bulkhead Connections

2.6.1 All apparatus body wiring either entering or exiting the cab shall be in a harness configuration and pass through a centralized location as close to the interior electrical junction as possible. The harness(s) shall terminate at a hermetic bulkhead connector(s), designed to facilitate in the separation of the cab/chassis/apparatus body.

2.7 Ground Lighting

2.7.1 Ten 4-inch clear LED lights shall be provided around the vehicle's perimeter. The lights shall be activated when either the “Ground Lights” switch is activated on the center console, when a cab door is open, or when the vehicle is placed in “blocking mode.” The vehicle is in blocking mode when the vehicle transmission is in “park” with the parking brake set and the emergency master switch turned on with the forward-facing takedown lights off. The Ground lighting “OFF” delay shall be synchronized with the chassis exterior courtesy lighting delay.

2.7.2 Ground light locations shall be as follows:

2.7.2.1 Two lights shall be provided under the apparatus front bumper.

2.7.2.2 Two lights shall be provided facing forward on bulkhead of body, one on each side, installed below the hose reel nozzle mounting brackets.

2.7.2.3 Four lights shall be provided under the apparatus body, one forward and one aft of the rear wheel wells, both sides of the body. The lights shall be housed within an enclosure sufficient to protect from damage within the compartments.

2.7.2.4 Two lights shall be provided under the tail board, protected from impact and debris.

2.7.2.5 The lights shall be wired to the “Ground Lights” switch located in the cab center console.

2.8 Back Up Alarm

2.8.1 One solid state back up alarm shall be provided at the rear of the apparatus protected from impact and debris. The projector shall be mounted in such a manner that debris and dirt does not collect. The backup alarm shall be wired to the reverse circuit of the transmission and shall provide an audible alarm to the rear of the apparatus when reverse gear is selected. The alarm shall have a volume of 87 to 112 decibels while in operation. The alarm shall have a disconnect plug for easy replacement.

2.9 Antenna

2.9.1 Two antenna bases shall be supplied and mounted on the cab roof as specified. The antenna cable shall be routed to the cab interior, terminating at location of radio mounting bracket.

2.10 Radio Pre-Wire

2.10.1 The chassis cab interior shall be wired with battery power, battery ground, switched power, and radio rebroadcast wires to the siren or PA, and labeled to simplify USFS radio installation. The wiring shall allow the radio to be wired “hot”, so the radio is powered with the master body disconnect switch turned off. The radio shall occupy the second forward, angled, position in the cab center console. Exposed positive terminals shall be covered by a protective boot or otherwise protected from inadvertent contact.

2.11 Rear View Backup Camera

2.11.1 If not provided with the chassis, a rear-view backup camera and display shall be provided. The monitor shall have a minimum display measurement of 6 inches diagonally and be either: 1.) factory installed in-dash with a combination AM/FM/WX radio, or 2.) aftermarket installation separate from the AM/FM/WX radio; professionally installed; mounted in a location approved in writing by the Government. The monitor display shall be shock and vibration resistant; have a high-quality backlit display; and mounting shall not allow vibration. The backup camera shall be high durability and able to withstand harsh vibration; IP69K rated; and able to withstand 7Gs of force. The camera shall be shipped loose for installation by the apparatus builder. Mounting on top of the dash or in any location that reduces the driver’s field of vision shall not be allowed.

2.12 Tire Pressure Monitoring System (TPMS)

2.12.1 If not provided by the chassis manufacturer, a tire pressure monitoring system shall be installed. Aftermarket tire pressure monitoring systems shall be approved by the government prior to installation. Considerations for the approval of aftermarket solutions will be quality, durability, warranty, repair service, and savings to the Government.

3 — Traffic Warning Systems

3.1 Traffic Warning System

3.1.1 The following traffic warning systems shall be provided and installed on the completed apparatus by the apparatus builder:

3.2 Electronic Siren

3.2.1 The manufacturer shall supply and install one electronic siren (Tomar brand, model 948L-SIREN-R, or equivalent) and digital control panel with 6 auxiliary buttons, 4 position slide switch, 6 position rotary speaker tone selector, traffic director control button, manual siren button, and airhorn button in the cab center console. The control panel shall be flush mounted. The location of the controller shall be convenient to both the driver and the officer. The siren shall have four basic siren tones: manual, wail, yelp, and hi-lo. The “emergency master” switch shall power the controller.

3.2.2 The manufacturer shall program and label the electronic siren and digital control panel’s auxiliary buttons as follows:

- Auxiliary Switch “1” – Left Scene
- Auxiliary Switch “2” – Right Scene
- Auxiliary Switch “3” – Front Scene
- Auxiliary Switch “4” – Rear Scene
- Auxiliary Switch “5” – Blank
- Auxiliary Switch “6” – Blank

3.3 Speaker

3.3.1 The manufacturer shall supply and install one 100-W siren speaker (Tomar brand, model SPK-100 speaker, or equivalent) mounted behind the driver’s side of the front bumper. The manufacturer shall wire the speaker to the specified electronic siren controller. The manufacturer shall wire the lights to the Tomar brand, model 948L-SIREN-R siren controller, or equivalent located on the cab center console.

3.4 Forward Upper Zone A/B/D Light Bar

3.4.1 The manufacturer shall supply and install one light-emitting diode (LED) lightbar (Tomar brand, model 970-581-0601-6, or equivalent) on the cab roof, facing forward. The lightbar

shall be 58 inches wide. Lightbar shall consist of ten dual-color flashing LED modules and two single color, steady burning, red LED modules and two front and two rear flood lights. Lightbar shall be programmed to specifications provided by the Government.

3.4.2 The light bar shall be mounted to the cab protection headboard and wired to the siren controller slide switch (Tomar brand, model 948L- SIREN-R, or equivalent) in the cab center console (Figure 1). The two forward facing “takedown” modules shall be interlocked with the application of the emergency brake, placing the apparatus in blocking mode and disabling the modules as such. The manufacturer shall mount the lightbar to the rear cab headboard, facing forward and wire it to the “Lightbar” switch in the cab center console.

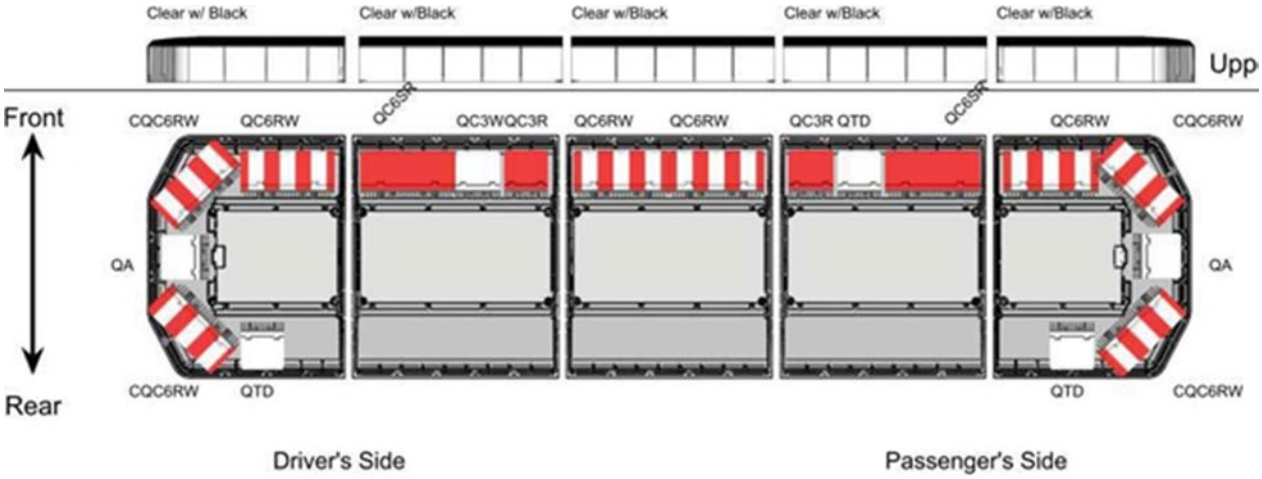

Figure 1 — LED Lighting Locations and Flashing/Steady Configuration

3.5 Forward Lower Zone A Warning Lights

3.5.1 The manufacturer shall supply and install two dual color LED warning lights (Tomar brand, models R37D-RW-01 (left) and R37D-W- RW-02 (right), or equivalent) with mounting flanges on the front of the apparatus, forward-facing, one per side on the brush guard. The lights shall be waterproof using a vibration-welding sealing process. The lights shall have TIR collimator optics to prevent stray warning light. The lights shall flash red and white at 75 flashes per minute (FPM) in a flicker flash pattern. The lights shall flash in opposite phase of each other when blocking the roadway. The manufacturer shall wire the lights to the siren controller (Tomar brand, model 948L-SIREN-R, or equivalent) located on the cab center console.

3.6 Forward Zone B/D Warning Lights

3.6.1 The manufacturer shall supply and install two dual color LED warning lights (Tomar brand, model RSDV13-RW-01, or equivalent) with mounting flanges on the front corners of the apparatus chassis, side facing, one per side, as low and as far forward as possible on the sides of the hood. The warning lights shall consist of twenty-four LEDs, twelve red LEDs, twelve white LEDs, and with clear Lexan lenses. The warning light shall flash red at 75

FPM. The warning light shall have the ability to override to steady burn white for use as an additional scene light. The lights shall be waterproof using a vibration-welding sealing process. The lights shall have TIR collimator optics to prevent stray warning light. The manufacturer shall wire the lights to the Tomar brand, model 948L-SIREN-R siren, or equivalent controller located on the cab center console.

3.7 Aft Zone C Warning Lights

3.7.1 The manufacturer shall supply and install two 3-inch by 7-inch dual color LED warning/back-up lights on the rear of the apparatus, rear-facing, one per side on the lower rear of the apparatus above the rear step in the bottom position of the common housing with the DOT lights. The lights shall be waterproof using a vibration-welding sealing process. The lights shall have TIR collimator optics to prevent stray warning light. The lights shall flash red and white at 75 flashes per minute (FPM) in a simultaneous flash pattern. The warning light shall have the ability to override to steady burn white for use as a back-up light. The manufacturer shall wire the lights to the Tomar brand, model 948L-SIREN-R, or equivalent siren controller located on the cab center console.

3.8 Headlight Flasher

3.8.1 The manufacturer shall supply and install one solid-state headlight flasher (Tomar brand, model HF-1 flasher, or equivalent) wired for daytime operation. The flasher shall be a multipurpose type with a high beam activated cut out option. The manufacturer shall wire the flasher to the siren controller (Tomar brand, model 948L-SIREN-R, or equivalent) “Wig Wag” switch located on the cab center console, through the parking brake valve so that it is disabled when the parking brake is applied.

4 — Chassis Additions and Modifications

4.1 Modifications Required

4.1.1 The following additional equipment shall be installed on, and modifications performed to, the specified cab and chassis by the apparatus manufacturer.

4.2 Apparatus Fluid Types and Quantities

4.2.1 A document showing the recommended fluid types and quantities for the apparatus chassis and associated components, shall be provided.

4.2.2 This document shall list the recommended fluid types and quantities for the following components:

- Chassis Engine Lubricant
- Chassis Engine Coolant
- Chassis Power Steering Fluid
- Chassis Transmission Fluid

- Chassis Transfer Case Lubricant
- Chassis Drive Axle Lubricant
- Pump Gearbox Lubricant
- Chassis Brake Fluid
- Transfer Case Fluid
- Front Chassis Drive Axle Lubricant

4.3 Seating Capacity

4.3.1 A warning label listing the seating capacity of the completed apparatus shall be provided in the apparatus cab interior. This label shall be located so that it is visible from all seating positions.

4.3.2 This apparatus shall have a seating capacity of two personnel in front and three personnel in the rear for a total seating capacity of five.

4.4 Seating

4.4.1 The center portion of the 40/20/40 split bench seat shall be removed to accommodate the installation of the console.

4.5 Seat Belt Warning

4.5.1 A warning label, stating: “DANGER- Personnel Must Be Seated and Seat Belts Must Be Fastened While Vehicle is in Motion Or DEATH OR SERIOUS INJURY MAY RESULT,” shall be provided in the apparatus cab interior. This label shall be located so that it is visible from all seating positions.

4.6 Vehicle Height/Weight/Length Warning

4.6.1 A warning label listing the overall height, length, and gross vehicle weight rating (GVWR) of the completed apparatus shall be provided in the apparatus cab interior. This label shall be located so that it is visible from the driver's seating position.

4.7 Final Stage Manufacturer Vehicle Certification

4.7.1 A Final Stage Manufacturer vehicle certification label shall be provided and installed in the apparatus cab driver's door jamb.

4.8 Noise Hazard Warning

4.8.1 A warning label, stating: “WARNING: Noise Hazards Occur During Siren Operation,” shall be provided and installed in the apparatus cab interior. This label shall be located so that it is visible from all seating positions.

4.9 Air Filter Ember Protection Screen Warning

4.9.1 A warning label stating, “This apparatus is equipped with an air filter ember protection screen; routine inspection is required” shall be provided and installed in the apparatus cab interior. This label shall be located so that it is visible from the driver's seating position.

4.10 “Do Not Move Apparatus” Warning

4.10.1 One surface mounted red LED light shall be provided in the center cab console, at the top, or most forward position. The light shall flash whenever side compartment doors are open, and the parking brake is released. The light shall be wired directly into the door ajar switch and hazard circuit. The hazard warning light shall be marked with a label stating, “DO NOT MOVE APPARATUS WHEN LIGHT IS ON.”

4.11 Cab Console

4.11.1 The cab shall be equipped with an angled front, form-fitted control console located between the front driver's and officer's seats. This console shall be sized to accommodate the installation of a siren controller for the control of the emergency and general illumination lighting, siren controller, traffic advisor, and customer-mounted radios. Panel light brightness shall dim automatically via the multiplexing system when the chassis headlights are turned on. The cab console shall be fabricated from steel and painted with a powder-coated black finish.

4.11.2 The following shall be positioned from forward to aft on the center console as follows:

- One blank faceplate and pre-wiring for Government-mounted radio
- Three microphone clip brackets (shipped loose)
- One switch panel with six switches as described in 4.12.1
- One electronic siren and lighting controller
- two cup holders
- One 2-position 12-volt power outlet
- One 6-inch lockable storage compartment
- Four USB charging ports
- One FRC® Tank Vision Pro 300 Remote Mini Cab Display, or equivalent
- One Map pocket on the side of console large enough to accommodate a three-ring binder but not so large as to interfere with the chassis supplied power points
- Open compartment warning light
- Battery On (Body Master) light

4.12 Switch Panel

4.12.1 The switch panel shall contain a total of four switches with pilot lights, and function labeled, and configured from left to right as follows:

- EMERGENCY MASTER
- GROUND LIGHTS
- WHITE LIGHTS

- AMBER LIGHTS
- CABIN LIGHTS
- HIGH IDLE

4.13 Front Bumper Brush Guard

4.13.1 A heavy-duty black powder coated finish bumper and brush guard assembly shall be provided and installed on the front of the apparatus. The complete assembly shall follow the chassis body lines and encompass the perimeter of the chassis front. The complete assembly shall be of such design that the guard will not vibrate, and shall provide solid mounting area for warning lights, speakers, or other specified equipment. The bumper shall have provisions for a winch. The unit shall conform to OEM chassis manufacturer's recommendations for not blocking air intake areas or restricting proper airflow through the radiator and engine compartments. Brush guards bolted onto OEM bumper are not acceptable.

4.14 Winch

4.14.1 An electric winch capable of a minimum of 16,500 lb rating and synthetic rope shall be included and mounted to the bumper. The manufacturer shall install the winch according to the recommendations of the winch manufacturer.

4.14.2 The completed apparatus shall be equipped with a recovery kit containing the following items that are rated for a minimum of 1.5 times the GVWR of the apparatus:

- Two synthetic soft shackles
- Synthetic tree protector/saver
- One synthetic recovery strap or rope
- Snatch Recovery Ring
- Winch line dampener
- Gear bag to contain all of the above

4.15 Auxiliary Offroad Driving Lights

4.15.1 LED off-road driving lights shall be installed on the front bumper. The lights shall be switched in the cab console and include a warning label that says "Auxiliary driving light. For off road use only."

4.16 Rear Bumper

4.16.1 The rear bumper shall be a minimum of 3 inches tall by 8 inches deep and extend across the width of the apparatus body. The bumper shall be fabricated from heavy duty steel tubing and shall be painted black. The top of the bumper shall be a 4F stainless steel computer numerical control (CNC) punched and perforated skid resistant surface or NFPA compliant skid resistant tread plate surface. The bumper shall protect the apparatus body.

4.17 Mud Flaps

4.17.1 One pair of flexible rubber mud flaps shall be provided on both sides of the apparatus body behind the rear wheels. The mud flaps shall not bear company logo.

4.17.2 The mud flaps shall extend down far enough to be effective but shall not allow the flaps to become entangled with the rear tires when the apparatus is backing up.

4.18 Exhaust System

4.18.1 The exhaust system shall be modified for proper clearance to extend past the rear compartments. The exhaust system shall be mounted in a horizontal configuration under the passenger's side of the cab.

4.19 Fuel Hose and Electrical Harness Protection

4.19.1 If applicable, any fuel lines or electrical harnesses below the chassis frame rails shall be protected with a fireproof sleeve designed specifically for such purpose.

4.20 Chassis Air Intake Ember Guard

4.20.1 The chassis air intake shall be protected by an ember guard of 18 mesh, 0.017-inch wire diameter, and a maximum mesh opening of 0.039 inches. The ember guard shall be sized to fit and located at the intake opening. The screen shall be readily accessible for inspection and maintenance. The ember guard shall maintain a minimum ½ inch separation from the air filter.

4.21 Cabin Air Ember Guard

4.21.1 The cabin air filter shall be protected by an ember guard with a maximum mesh opening of 0.039 inches. The screen shall be located at the point of intake and easily accessible for inspection and maintenance.

4.22 Front Tow Hooks

4.22.1 Two heavy-duty tow hooks shall be provided at the front of the vehicle, one each side. The tow hooks shall be mounted to the chassis frame. The tow hooks shall be accessible after the front bumper brush guard installation.

4.23 Rear Tow Hooks

4.23.1 Two heavy-duty tow hooks shall be provided at the rear of the vehicle, one each side, below the rear bumper. The tow hooks shall be mounted to the chassis frame.

5 — Apparatus Body Description

5.1 General Body Construction

5.1.1 The body shall be designed for fire/rescue service operations only and shall be constructed to withstand off-road use. The body must be of sufficient design to be capable of withstanding the twisting and abnormal flexing, stresses and other occupational hazards caused by traveling on unimproved mountainous and rangeland roads. No commercially designed bodies intended for use in other vocations or applications are acceptable in quality, construction, design, or longevity.

5.2 Body Materials

5.2.1 The apparatus body shall be designed and constructed of materials consistent with current fire apparatus engineering technology and design standards.

5.2.2 All metal work shall be free of sharp edges, objects, or corners. No exceptions shall be allowed to this requirement.

5.2.3 The body design shall be fully tested with proven engineering and test techniques such as finite element analysis, stress coating, and strain gauging tests. Engineering and test techniques shall have been performed with special attention given to fatigue life and structural integrity of compartments and body support system.

5.3 Installation of Hardware

5.3.1 The installation of hardware parts such as hinges, catches, handles, or knobs shall be accomplished to avoid damaging the hardware or the mounting surface. After fabrication, all parts shall be cleaned of the following: smudges; loose, spattered, or excess welding; metal chips or fillings; or any other foreign material which might detract from the intended operation, function, or appearance of the apparatus or its equipment. This would include any particles which could loosen or become dislodged during the normal expected life of the equipment. Whenever possible, this cleaning shall take place before the parts are assembled.

5.4 Threaded Parts

5.4.1 Threaded parts or devices shall show no evidence of cross-threading, mutilation, or detrimental burrs. All screw type and rivet fasteners shall be tight to allow no relative movement between the attached parts. All bolts and screws shall not exceed the SAE torque standard established for the grade, screw, and thread type.

5.5 Apparatus Body

5.5.1 The entire apparatus body shall be an independent structure and shall be removable in its entirety without the disassembly of any compartments, flooring, or other structural components.

5.5.2 The body shall be designed to be approximately as wide as the outside wheel track on the rear axle. This will allow the apparatus to maneuver more easily in off-road environments. The body shall be approximately 95 inches wide from side to side at the rear of the apparatus.

5.5.3 Each compartment shall have ¾-inch drain located in the rear of the compartment fitted with an easily removable rubber grommet closure.

5.5.4 The top of the apparatus shall have a nonskid surface across the top of both side compartments and the doors over the pump area. Additionally, it shall support, without distortion, a walking person weighing up to 300 pounds.

5.6 Body Mounting

5.6.1 A spring loaded or rubber body mounting system shall be used to mount the body to the chassis. This system shall be designed to allow independent movement between the body frame and the chassis frame protecting the module from the stresses and twisting rendered by the flexing of the chassis frame. As such, the body frame shall not rest on the chassis frame at any point. The mounts shall be pre-engineered for their intended use.

5.6.2 All of the mounting hardware (nuts, bolts, washers) required for complete body installation shall be Grade 8 for sizes ½-inch and smaller, and Grade 5 for sizes larger than ½-inch. All nuts shall be self-locking style. All mounting brackets shall be painted black.

5.7 Vertical Surfaces

5.7.1 The entire vertical surfaces at the front and rear bulkhead of the body shall be covered with a tread plate for appearance, wear, and enhanced visibility at night. The tread plate shall be designed so that joints are minimized and shall cover the entire vertical surface area. The tread plate shall also incorporate protection of the outboard corners and serve as corner scuff guards.

5.8 Grab Handles

5.8.1 Three NFPA-compliant chrome-plated grab handles shall be provided and located at the rear of the body: one mounted vertically on the rear-facing surface of the upper compartment, driver's side, outboard edge, and two 24-inch-long handles mounted horizontally on top of each of the upper compartments, parallel to the outboard edges of the body.

5.9 Rear Steps

5.9.1 Three NFPA-compliant fold-down steps shall be provided and installed at the rear of the apparatus on the left side of the body. The steps shall be fabricated from heavy duty cast aluminum with spring assisted folded hinges. The top of the steps shall be an integral diamond point skid resistant surface that allows water to flow off the step without ice

formation in cold weather use. The steps shall be offset bilaterally from each other approximately 12 inches to facilitate ease of climbing. The vertical distance from the bumper to the first step, between the three steps and from the top step to the top of the apparatus shall not exceed 14 inches.

5.9.2 One warning plate shall be affixed to the rear of the apparatus body in a conspicuous location. The warning plate shall read “WARNING: DO NOT RIDE ON REAR STEP WHILE VEHICLE IS IN MOTION. DEATH OR SERIOUS INJURY MAY RESULT.”

5.10 Compartmentation

5.10.1 All compartment interiors shall be free of exposed electrical harnesses or plumbing components. All compartments shall be as large as possible, as determined by the design of the apparatus.

5.11 Compartment Configuration

5.11.1 Compartments shall be configured as designated below:

5.12 Driver's Side Compartments

5.12.1 The driver's side lower module of the apparatus body shall have approximate overall dimensions as specified. It shall consist of three compartments, each with specified approximate clear depth behind the door when the door is shut. Each compartment shall have a “flow through” vent provided to supply air flow and minimize moisture unless designated as fuel storage.

Description	Nominal Dimension
Lower module dimension ± 0.25 inches	108 inches wide by 20 inches deep
Clear depth ± 0.25 inches	18 inches

5.12.2 The three compartments are as follows:

5.12.2.1 One rescue style compartment shall be provided forward of the rear wheels, with approximate inside dimensions as specified. The door shall be vertically hinged and shall have an approximate clear door opening as specified.

Description	Nominal Dimension
Compartment dimension ± 0.25 inches	35 ½ inches wide by 39 inches high by 20 inches deep
Clear door opening ± 0.25 inches	26 inches wide by 36 inches high

5.12.2.2 One compartment shall be provided center above the rear wheels, with approximate inside dimensions as specified. The door shall be a horizontally hinged, drop-down door, and have an approximate clear door opening as specified.

Description	Nominal Dimension
Compartment dimension ± 0.25 inches	47 inches wide by 19 inches high by 20 inches deep
Clear door opening ± 0.25 inches	43 inches wide by 14 inches high

5.12.2.3 One compartment shall be provided aft of the rear wheels, with approximate inside dimensions as specified. The door shall be vertically hinged and shall have an approximate clear door opening as specified.

Description	Nominal Dimension
Compartment dimension ± 0.25 inches	23 ½ inches wide by 39 inches high by 20 inches deep
Clear door opening ± 0.25 inches	20 inches wide by 36 inches high

5.12.3 The driver's side upper module of the apparatus body shall have approximate overall dimensions as specified. It shall consist of two separately sealed compartments and shall be installed above the center and aft compartments of the lower module. The fit and trim of the upper module shall be integral with the lower compartments in both aesthetics and function. The body module shall have two doors, horizontally hinged, and of overhead lift-up design. The forward compartment shall be designed for hose storage, with approximate minimum clear door opening as specified. The aft compartment shall be individually vented and designed for drip torch storage. There shall be a raised stainless-steel or aluminum bottom tray with integral brackets for holding two drip torches and shall extend the full length of the compartment. The tray shall have a drain tube with a drip loop to prevent vapor ignition. The aft door shall have an approximate minimum clear door opening as specified. This body module may be a separate assembly or may be integrated with the lower compartments. Diamond plate will be installed on the outside, rear face of this compartment.

Description	Nominal Dimension
Upper Module Dimension ± 0.25 inches	80 inches wide by 20 inches high by 20 inches deep
Forward Compartment Clear Door Opening ± 0.25	48 inches wide by 16 inches high
Aft Compartment Clear Door Opening	22 inches wide by 16 inches high

5.13 Passenger's Side Compartments

5.13.1 The passenger's side lower module of the apparatus body shall have approximate overall dimensions as specified. It shall consist of three compartments, each with specified approximate clear depth behind the door when the door is shut. Each compartment shall have a “flow through” vent provided to supply air flow and minimize moisture.

Description	Nominal Dimension
Lower Module Dimension ± 0.25 inches	108 inches wide by 20 inches deep
Clear Depth ± 0.25 inches	18 inches

5.13.2 The three compartments are as follows:

5.13.2.1 One rescue style compartment shall be provided forward of the rear wheels, with approximate inside dimensions as specified. The door shall be vertically hinged and shall have an approximate clear door opening as specified.

Description	Nominal Dimension
Compartment dimension ± 0.25 inches	35 ½ inches wide by 39 inches high by 20 inches deep
Clear door opening ± 0.25 inches	26 inches wide by 36 inches high

5.13.2.2 One compartment shall be provided above the rear wheels, with approximate inside dimensions as specified. The passenger's side door shall be a horizontally hinged, drop-down door, and have an approximate clear door opening as specified.

Description	Nominal Dimension
Compartment Dimension ± 0.25 inches	72 inches wide by 22 inches high by 20 inches deep
Clear Door Opening ± 0.25 inches	66 inches wide by 18 inches high

5.13.2.3 One compartment shall be provided aft of the rear wheels, below the upper horizontal compartment, with approximate inside dimensions as specified. The door shall be vertically hinged and shall have a clear door opening as specified.

Description	Nominal Dimension
Compartment Dimension ± 0.25 inches	26 inches wide by 17 inches high by 20 inches deep

5.13.3 The passenger's side upper module of the apparatus body shall have approximate overall dimensions as specified. It shall consist of one compartment installed above the center and aft compartments of the lower module. The fit and trim of the upper module shall be integral with the lower compartments in both aesthetics and function. Two horizontally hinged,

overhead lift- up compartment doors shall be located on the passenger's side. Each shall have an approximate minimum clear door opening as specified. This body module may be a separate assembly or may be integrated with the lower compartments.

Description	Nominal Dimension
Upper Module Dimension ± 0.25 inches	80 inches wide by 20 inches high by 20 inches deep
Passenger Side Door Opening ± 0.25 inches	35 inches wide by 16 inches high

5.14 Storage of Flammable Materials Warning

5.14.1 A warning label, stating: “DANGER – Do Not Store Flammable Liquid or Combustible Material in this Compartment,” shall be provided on the exterior surface of the passenger side lower aft compartment door.

5.15 Compartment Doors

5.15.1 All compartment doors shall be integral in design and recessed into the apparatus body side, sized to provide easy access to all interior areas of the compartment. All doors shall be consistent in fit and finish with the apparatus body. All doors shall be weatherproof and maintain contact with all points of the weather stripping. Weather stripping shall be bulb type, attached to the opening flange of the compartment opening. A drip rail shall be provided to channel rain away from the lower horizontal hinged compartment.

5.15.2 Red/white reflector DOT striping shall be installed on the interior surface of all vertically hinged doors.

5.16 Door Latches and Hardware

5.16.1 Unless where noted, all compartment door latch assemblies shall be installed with threaded fasteners, shall not be welded, and shall be easily removable for servicing or replacement. All latches shall be of a slam-type design, with a single-point latching operation. Matching striker bolts shall be utilized with all latch assemblies. All striker bolts shall have slotted mounting holes and shall be attached with bolts to captive steel plates in the body structure for strength and ease of adjustment. Welded striker bolts or plates shall not be acceptable.

5.16.2 All hardware shall be corrosion resistant and suitable for its intended use. All nuts and bolts shall be stainless steel. Stainless steel nuts shall be the self-locking type. All latch assemblies shall be keyed alike to 1250. All compartment locks for a given engine shall be either vertical or horizontal when locked so that it is visually apparent whether a compartment is locked or unlocked. Ten spare keys shall be provided.

5.16.3 Black rubber fenders shall be mount around the wheel opening to protect body sides from road debris thrown by the rear tires.

5.17 Door Hold Open Devices

5.17.1 All vertically hinged, outward-opening compartment doors shall be provided with an over center door check to hold the door in the desired position. The door check shall be attached to the top of the door and fastened to a stainless-steel plate bolted into the body and door.

5.17.2 All vertically hinged, outward opening compartment doors shall be capable of being closed with one hand, allowing a free hand to hold equipment or supplies.

5.17.3 All horizontally hinged, drop-down, outward-opening compartment doors shall open to a 90-degree angle. They shall be supported by a minimum of 3/32-inch aircraft-type stainless steel cable with stainless steel fork ends. The fork ends shall be attached at each end to a stainless bracket so that the cable can hinge as the door is closed.

5.17.4 All horizontally hinged, overhead lift-up, outward opening compartment doors shall be provided with two extending, gas cylinder type hold open devices, one mounted vertically on each side of the compartment door opening. The pressure rating of the gas cylinders shall be carefully matched to the size and weight of the compartment door and shall hold the compartment door securely open to a greater than 90-degree angle without additional support. The gas cylinder hold openers shall dampen the upward movement of the compartment door while opening and shall permit the closing of the compartment door without the need to release any type of manual locking devices.

5.17.5 All horizontally hinged, overhead lift-up compartment doors shall be capable of being closed with one hand, allowing a free hand to hold equipment or supplies.

5.18 Adjustable Shelf Channels

5.18.1 Vertically mounted aluminum Unistrut™ or composite channels shall be provided and installed in all enclosed body compartments, except passenger's side lower rear compartment, for the current or future installation of infinitely adjustable shelving, slide out trays or equipment brackets.

5.19 Compartment Shelves

5.19.1 Eight adjustable shelves shall be provided and installed in the completed body compartments. The shelves shall be 15 inches in depth and be constructed of fiberglass or aluminum and be capable of supporting 250 pounds of live load without being damaged or permanently distorted.

5.19.2 The shelf locations shall be as follows:

5.19.2.1 Two in the driver's side compartment forward of the rear wheels.

5.19.2.2 One in the driver's side center compartment. This shelf shall have a reduced height leading edge to facilitate equipment access in a raised position. This shelf shall remain fully adjustable in height.

5.19.2.3 Four in the driver's side aft compartment.

5.19.2.4 One in the passenger's side compartment forward of the rear wheels.

5.19.2.5 One in the passenger's side upper rear compartment above the rear wheels. The shelf shall run the entire length of the apparatus body transecting compartment #6, approximately 6½ inches from the top of the compartment. The shelf shall be designed for the storage of hard suction hose sections approximately 8 feet in length and up to 2½-inch in outside diameter.

5.20 Compartment Venting

5.20.1 Each compartment shall be provided with venting to aid air circulation and evacuate fumes from fuel storage in the compartment. If vents are placed on doors, these vents shall compliment fit and finish of the body and not impede door function.

5.20.2 All compartments shall be vented except for the right rear lower compartment.

5.20.3 All vents shall be capable of being capped to close the vents.

5.20.4 Red/white placards noting fuel storage shall be provided for all vented compartments and shipped loose for end user installation.

5.21 Compartment Floor Mats

5.21.1 All enclosed side body compartments shall have floor mats installed in them, custom cut to fit the compartment floors. The floor mats shall be black in color and shall be easily removable to allow the compartment to be cleaned. The floor mats shall be designed to provide ventilation to the equipment stored in the compartment, and to protect the stored equipment from direct contact with the metal compartment floor surfaces. Turtle Tile brand floor mats meet this requirement.

5.22 Compartment Door Threshold Protection

5.22.1 All enclosed compartment door thresholds shall be protected with interior horizontal polished stainless-steel scuff guards or rubber door gaskets to provide protection against damage.

5.23 Pump Area Doors

5.23.1 Two doors shall be provided over the pump area. The doors shall open from the center and have stainless steel hinges on the outboard sides. The doors shall be fabricated of three

sixteenths inch aluminum polished tread plate or CNC punched aluminum with an aluminum 2-inch by 2-inch by three-sixteenths inch square tube support frame. There shall be positive locking pins permanently attached fore and aft to the structure to maintain closure when the truck is in motion. The hinged doors shall have a hand railing on the rear edge to aid in climbing and walking on top of the apparatus body. The doors shall provide shielding for the pump manifold system, and service as a walkway. The doors shall be able to be removed with simple hand tools to facilitate maintenance.

5.24 Rear Cab Protection

5.24.1 One cab protection rack shall be fabricated and installed at the forward end of the apparatus body, directly behind the cab. The cab protection rack shall reduce the effects of an apparatus roll over. The top of the rack shall conform to the shape of the chassis cab. The rack shall be powder coated black.

5.24.2 Gusseted, heavy-duty brackets shall be provided on the leading edge for mounting of the light bar. These heavy-duty brackets shall be removable for cab removal.

6 — Pump and Plumbing

6.1 Accessories Provided

6.1.1 The following pump, plumbing, controls, gauges, and accessories shall be provided as indicated below. The plumbing requirements outlined below shall be considered a minimum standard and shall be followed by the apparatus manufacturer without exception.

6.2 Auxiliary Pump

6.2.1 A Darley™ 1.5 AGE or WATERAX™ BB-4® fire pump, powered by a Kubota™ Model DH902 24.8 horsepower, four-cycle, water-cooled diesel engine, or equivalent shall be provided and fixed mounted in the rear compartment. The pump shall be equipped with a 12-volt gear driven electric starter that is controlled from the pump operator's panel and a USFS qualified spark arrester shall be properly installed. The muffler-pipe assembly shall be sufficiently supported from underneath to withstand excessive vibration and if inadvertently used as a step.

6.2.2 The pump engine shall be equipped with an automatic water pressure and oil pressure override system for engine startup. The pump engine shall also be equipped with a low water pressure and low oil pressure shutdown system. This system shall automatically stop the engine if pump discharge pressure drops below approximately 20 pounds per square inch (psi) or the oil pressure drops too low. The low pressure feature shall activate via a electronic timer, it shall initially on start up, delay approximately 30 seconds to allow for drafting water. After shutdown it shall reset in approximately 30 seconds.

6.2.3 The pump engine shall be covered for protection. A warning plate shall be permanently affixed to the top of the pump engine cover that shall read, “WARNING: NOT A STEP.”

6.3 Pump Specifications

6.3.1 As installed on the apparatus, the pump shall be capable of delivering 50 gallons per minute minimum (GPM) at 250 psi output pressure from the apparatus water tank and also from a 5-foot lift through 24 feet of 2-inch suction hose with a strainer.

6.3.2 In addition, the pump manufacturer shall certify that the pump can deliver the following capacities as measured at the pump head and at net pump pressure from draft under test conditions listed:

6.3.3 Capacities:

- 105 GPM at 150 psi net pump pressure
- 50 GPM at 250 psi net pump pressure
- 40 GPM at 300 psi net pump pressure

6.3.4 Pump performance shall be tested under the following conditions:

6.3.4.1 An elevation of not more than 2,000 feet above sea level

6.3.4.2 Through a single intake with 20 feet of 3-inch suction hose equipped with a suction hose strainer

6.3.4.3 With a lift of 5 feet

6.3.4.4 At 29.9 inches of mercury atmospheric pressure (corrected to sea level)

6.3.4.5 At a water temperature of 60 degrees Fahrenheit

6.4 Pump Option - Auxiliary Pump (Gasoline Engine-Powered Pump)

6.4.1 A Briggs and Stratton™ Vanguard®, or equivalent, 23 horsepower, 2-cylinder, four- cycle, air cooled gasoline engine-powered fire pump shall be provided and fixed mounted in the rear compartment. The pump shall be equipped with a 12-volt gear driven electric starter that is controlled from the pump operator's panel, and a USFS qualified spark arrester. The muffler-pipe assembly shall be sufficiently supported from underneath to withstand excessive vibration and if inadvertently used as a step. A WATERAX™ BB-4® or a Darley™ 1.5 AGE 23V-HP pump meets the requirements of this specification.

6.5 Pump Specifications (Gasoline-Powered Pump)

6.5.1 As installed on the apparatus, the pump shall be capable of delivering 50 gallons per minute minimum at 250 pounds per square inch output pressure from a 5-foot lift through 24 feet of 2-inch suction hose with a strainer and also from the apparatus water tank.

6.5.2 In addition, the pump manufacturer shall certify that the pump can deliver the following capacities as measured at the pump head and at net pump pressure from draft under test conditions listed:

6.5.3 Capacities:

- 90 GPM at 150 psi net pump pressure
- 50 GPM at 250 psi net pump pressure
- 40 GPM at 300 psi net pump pressure
- 15 GPM at 375 psi net pump pressure

6.5.4 Pump performance shall be tested under the following conditions:

6.5.4.1 An elevation of not more than 2000 feet above sea level

6.5.4.2 Through a single intake with 10 feet of 3-inch suction hose equipped with a suction hose strainer

6.5.4.3 With a lift of 5 feet

6.5.4.4 At 29.9 inches of mercury atmospheric pressure (corrected to sea level)

6.5.4.5 At a water temperature of 60 degrees Fahrenheit

6.6 Fuel Cell

6.6.1 If a gasoline-powered fire pump is installed on a diesel-powered chassis a pump fuel cell shall be provided. The fuel cell shall be manufactured from corrosion resistant metal. The cell shall be mounted near the pump engine and insulated from direct contact with the apparatus body. The fuel tank volume shall be 4 – 6 gallons and shall be easily accessed for filling. The fuel tank shall meet applicable EPA, DOT and CARB standards.

6.7 Rear Mounted Pump Operator's Panel

6.7.1 A brushed stainless steel pump operator's control panel shall be located at the rear of the apparatus body. It shall contain all controls necessary to operate the pump and foam systems. The panel shall be appropriately sized with the controls positioned in a methodical, user-friendly format. The panel shall be fully enclosed and have a hinged front for access. The edges of the panel shall be smooth radius to prevent the snagging of clothing or injury. The panel shall have an extended top to assist in weather protection and to house the panel lights. Exposed positive terminals shall be covered by a protective boot or otherwise protected from inadvertent contact.

6.7.2 Controls shall be provided on the operator's panel as follows:

- Pump engine ignition/start/stop controls
- Throttle control

- Primer control
- Intake pressure gauge
- Discharge pressure gauge
- Foam system controls
- Pump bypass (No. 17) valve
- Pump and plumbing drain valves/controls
- Test gauge ports
- Hour meter
- Operator's panel light switch

6.7.3 Diesel pump engine only:

- Tachometer
- Pump engine oil pressure gauge
- Coolant temperature gauge

6.7.4 Gasoline pump engine only:

- Low oil pressure warning light
- Low oil pressure override switch
- Lower water pressure override switch (protected toggle type)

6.8 Plumbing Components

6.8.1 All pump compartment components, including wiring, gauges, pump panel rear surfaces, high pressure hoses, and small diameter tubing, shall be left unpainted for rapid identification and ease of repair.

6.9 Pump Panel and Plumbing Lights

6.9.1 Two white downward facing LED scene lights shall be provided to illuminate the rear pump operator's panel. One white LED scene light shall be provided to illuminate the valve area. This light shall be located within the vicinity of the control valves adjacent to the pump operator's panel. These lights shall be controlled by a manual switch on the pump operator's panel. Whelen™ brand 500 Series white LED lights meet this requirement.

7 — Valves, Controls, Gauges and Plumbing Requirements

7.1 Discharge and Intake Plumbing

7.1.1 The discharge and intake valves specified shall be either of a direct-actuated quarter turn design or shall be provided with control rods that are directly connected from the valve handle to the rear mounted pump panel.

7.1.2 All discharges and intakes shall have brass chrome rocker lug style bleed caps with chains.

7.1.3 All valves shall be Akron™ 8800 series swing-out style or equivalent. All valves shall be designed to operate under normal conditions up to 500 pounds per square inch and shall have dual seats to work in both pressure and vacuum environments.

7.1.4 All valves and controls shall be easily accessible for service, repair or replacement. All valves shall be labeled “OPEN” or “CLOSED” unless the valve handle is parallel to the run of pipe when open and perpendicular to the run of pipe when closed.

7.1.5 Where vibration or chassis flexing may damage or loosen piping, the piping shall be equipped with mechanical groove coupling (Victaulic™ couplings or equivalent).

7.1.6 The main suction and discharge plumbing shall be welded stainless steel pipe or high-pressure flexible hose with appropriate fittings designed to withstand the normal operating pressures of the pump. All high-pressure hose shall be installed with a swivel or mechanical groove coupling (Victaulic™ or equivalent) on at least one end of the hose. Pump-to-plumbing vibration isolation shall be provided by using either flexible hose connections or two mechanical groove couplings (e.g. Victaulic™ couplings) on the intake and discharge of the pump. The nominal sizes of all the plumbing supplying the pump and discharges shall be as follows:

- Main suction — 2 1/2-inch NH
- Discharges — 1½-inch NH
- Hose reel — 1-inch NPSH

7.1.7 A master drain valve, labeled #11 Master Drain, shall be plumbed to the pump, suction plumbing and discharge plumbing as required to fully drain the piping and pump and prevent damage from freezing. The drain valve and associated plumbing shall be designed to withstand pressures of 400 pounds per square inch.

7.2 Truck Identification and Pump Performance Plate

7.2.1 A durable truck identification plate, fabricated from corrosion resistant metal, shall be provided and installed on the pump operator's panel. The plate shall state the name and address of the apparatus manufacturer, the serial number of the unit and the pump performance test results. The plate shall provide flow performance information at 5-foot lift with 24 feet of suction hose with suction strainer at the following pressures:

- 105 GPM rating at 150 psi
- 50 GPM rating at 250 psi
- 40 GPM rating at 300 psi

7.3 Pump Operating Instruction Plate

7.3.1 An identification plate shall be provided on the pump operator's panel with which indicates valve position (“O” = open, “X” = close) for the following operations:

- Tank to Fire
- Suction to Fire
- Suction to Tank
- Drain Plumbing
- Drain Tank and Plumbing Prime

7.4 Test Gauge Connections

7.4.1 The plumbing system shall be provided with two test ports on the pump panel exterior. One plumbed to the intake side and one plumbed to the discharge side of the water pump. These test ports shall be installed to provide a means for connecting certified test gauges when testing the pump's performance.

7.5 Winterization Port

7.5.1 A capped air inlet shall be provided at the pump panel, allowing pressurization of the plumbing system for efficient winterization.

7.6 Pump Panel Labeling

7.6.1 All controls, discharges, intakes, ports, drains, and other pump panel components that are not provided with a pre-printed legend or trim plate shall be labeled as required for ease of operation. Valves shall be labeled as outlined under “Valve Numbering System” in National Wildfire Coordinating Group (NWCG) “Water Handling Equipment Guide,” latest edition. This labeling shall be accomplished using identification tags. The tags shall be adhesive and shall be installed on the pump control panel with chrome plated bezels. The tags shall be placed adjacent to the components in such a way as to clearly distinguish the item that they are identifying.

7.7 Discharge Pressure Gauge

7.7.1 One 4 1/2-inch diameter 0-600 pounds per square inch glycerin-filled discharge pressure gauge shall be provided on the operator's panel, located in a vertical pattern on the right side of the operator's panel above the intake pressure gauge. The glycerin in the bourdon tube shall be retained by a flexible rubber plug. A Class 1® brand gauge meets this requirement. The gauge shall be equipped with a drain cock (vent) at the gauge connection and shall be illuminated by the standard panel lighting.

7.8 Intake Pressure Gauge

7.8.1 One 4 1/2-inch diameter 30-0-150 pounds per square inch glycerin-filled intake pressure gauge shall be provided on the operator's panel, located in a vertical pattern on the right side of the operator's panel below the discharge pressure gauge. The glycerin in the bourdon tube shall be retained by a flexible rubber plug. A Class 1® brand gauge meets this requirement. The gauge shall be equipped with a drain cock (vent) at the gauge connection and shall be illuminated by the standard panel lighting.

7.9 Pump Cooler/By-Pass

7.9.1 A pump cooler/by-pass line shall be installed to the water tank fill tower to cool the pump when it is engaged and not discharging water.

7.9.2 The pump cooler/bypass line shall be tapped from the pump discharge plumbing before the full-flow check valve. The tap shall be one-half inch NPT and connect to a one-half inch NPT, horizontally mounted, cast bronze “Y” strainer. The “Y” strainer shall be rated at 500 pounds per square inch at 150 degrees Fahrenheit and have a 20-mesh screen. The “Y” strainer outlets shall consist of a one-half inch NPT face outlet and a three- eighths inch NPT blowdown (cleanout) outlet. A three-eighths inch quarter-turn NPT valve shall be directly connected to the blowdown (cleanout) outlet. A three-eighths inch flexible, braided pigtail shall be installed to direct water flow to the ground during cleanout. A metal tag shall be attached to the “Y” strainer clean out valve stating “#12 - PUMP COOLER “Y” STRAINER CLEAN OUT.”

7.9.3 The one-half inch NPT face outlet of the strainer shall be connected to a one-quarter inch NPT check valve. After the one-quarter inch check valve, the line shall be reduced to a one-quarter inch inside diameter line and run to the pump operator’s control panel. A one-quarter inch, quarter-turn valve shall be mounted on the pump operator’s control panel. The valve shall be labeled, “#17 – PUMP BYPASS” and have labels to designate the “OPEN” and “CLOSED” positions. The valve handle position for the #17 valve shall be vertical when open and horizontal when closed. The one-quarter inch inside diameter line shall run from the rear panel mounted valve (#17) to the top of the tank and discharge into the tank with a bulkhead fitting mounted halfway up the fill tower. The inlet side of the bulkhead fitting shall have a 90-degree elbow pointing downward to accept the incoming one-quarter inch pump line. The outlet side of the bulkhead fitting shall terminate with a 90-degree elbow directing flow downwards into the tank.

7.9.4 Water flow in the pump cooler/by-pass line shall be between 4.5 GPM and 5.5 GPM at 400 P.S.I. pump pressure. If flow exceeds these limits, an orifice restriction may be installed to reduce flow, provided the orifice can be easily removed for cleaning.

7.9.5 A warning label shall be affixed near the #17 valve that states “Pump Damage and Serious Injury May Occur if the Pump is Operated with the #17 Valve Closed” ().

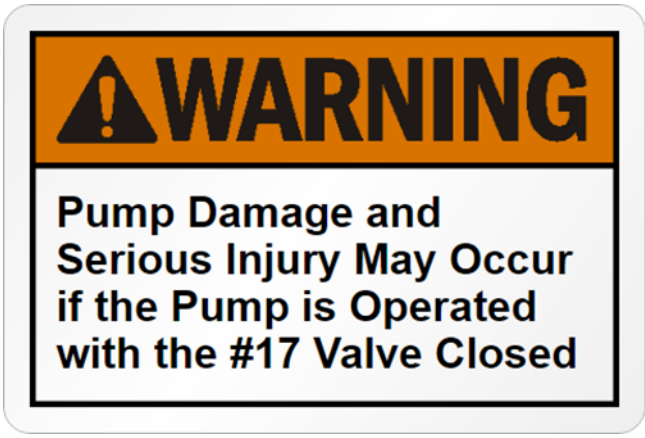

Figure 2 — Warning Label

7.10 Water Tank Level Electronic Gauge

7.10.1 One Fire Research™ (FRC) brand, Model TankVision™ Pro 300, or equivalent, tank level gauge shall be provided on the pump operator's panel to monitor the water tank liquid level. The gauge shall indicate the water tank liquid level on an LED bar graph display.

7.11 Priming Pump

7.11.1 One positive displacement, oil less, rotary vane, electric motor-driven priming pump, conforming to the NFPA requirements, shall be provided and installed on the cross member, above the lower edge of the frame rails, aft of the cab body. The primer pump body shall be fabricated from heat-treated anodized aluminum for wear and corrosion resistance. The priming pump shall be capable of producing a minimum of 17 inches of mercury at 2,000 feet above sea level.

7.11.2 The primer pump electric motor shall be of a 12-volt direct current totally enclosed design. The priming pump shall not require lubrication from an external source. The priming pump shall be operated by a single push-pull control valve mounted on the pump operator's panel. The control valve shall be of all bronze construction and labeled #6 Primer.

7.11.3 The primer shall be connected to the priming port provided on the top of the pump inlet.

7.12 Stainless Intake Strainer

7.12.1 The pump intake shall be equipped with a stainless-steel Y strainer with three-sixteenths inch mesh to filter out foreign material and keep debris from entering the pump. The strainer will be removable and have a screw-out plug to allow easy cleaning of the filter element in the field. The plumbing shall have two mechanical groove couplings (Victaulic™ or equivalent) between the strainer and the pump for ease of service on the pump.

7.13 Discharge Locations

7.13.1 One 1½-inch water-only discharge, labeled “#19 Water Only,” shall be provided at the rear of the apparatus. The plumbing design shall prevent the backflow of foam contaminated water into the #19 water-only discharge. The discharge shall be plumbed with stainless steel pipe and/or 1½-inch flexible high-pressure hose and shall terminate with 1½-inch NH threads. The discharge valve shall be controlled at the valve with a TS style handle.

7.13.2 One 1½-inch discharge, labeled “#3 Discharge,” plumbed to the on-board foam system, shall be provided at the rear of the apparatus. The discharge shall be plumbed with stainless steel pipe or 1½-inch flexible high-pressure hose and shall terminate with 1½- inch NH threads. The discharge valve shall be controlled at the valve with a TS style handle.

7.13.3 All discharges shall be equipped with a check valve. The foam system check valve meets this requirement for the foamed discharges.

7.14 Intake Location

7.14.1 One intake, labeled “#8 Overboard Suction” shall be provided. A removable screen shall be installed in the intake to prevent debris from entering the pump. The apparatus shall be equipped with a 2 1/2-inch intake plumbed with 2 1/2-inch piping to the intake side of the pump.

7.15 Tank Fill

7.15.1 One 1½-inch tank refill line, labeled “#2 Pump to Tank,” with a 1½-inch quarter turn inline valve, shall be provided to allow the water tank to be refilled through the pump.

7.16 Tank to Pump Line

7.16.1 One tank to pump line, labeled “#1 Tank to Pump,” with inline valve, shall be installed between the water tank outlet and the pump inlet, as close as possible to the water tank outlet. The valve shall have a T-handle control at the rear of the apparatus. The tank to pump line and valve shall be 2 1/2-inch.

7.17 Booster Hose Reels

7.17.1 Two booster hose reels (Hannay™ brand, Model #SBEPF-24-23-24, or equivalent), with a 70-amp circuit breaker, and a capacity of 100 feet of 1- inch booster hose, or 150 feet of ¾-inch booster hose, shall be provided and installed at forward of the apparatus body, one on each side. The hose reel frame and drum shall be fabricated of polished aluminum and powder coated black, with the sprocket being chrome plated to minimize maintenance. The hose reel inlet connection shall be a 1-inch inline quarter-turn valve and 1-inch flexible wire-reinforced hose. The hose reel outlet connection shall be 1-inch NPSH thread. The control valve shall be located on the rear-mounted pump operator's panel.

7.17.2 The reel shall be provided with a ⅔ horsepower, 12-volt electric motor for rewinding the hose on to the reel. This motor shall be controlled with four push button switches, one

located on each side of the apparatus body, in the upper pillar post between the first and second compartments; one on the center cab console; and one on the protective housing over the hose reel motor solenoid. The booster reel shall have provisions for manual rewind. The pinion shaft for the manual rewind gear shall have an adjustable tension brake, controlled at the reel. A cover shall be installed to protect the solenoid. Cole Hersee™ brand, model M-612 push button switches, or equivalent shall be installed.

7.17.3 Two roller assemblies (Hannay™ brand, model FH3 roller assembly, or equivalent) shall be provided.

7.17.4 Two hose reel nozzle brackets will be installed on the forward apparatus body, one on each side. One will be installed on the driver's side and one will be installed on the passenger's side.

7.18 Foam Proportioning System

7.18.1 The pump system shall be provided with a brand Odin® Darley, model Fast Foam 150 foam proportioning system, or equivalent, plumbed to the specified discharges. This product shall be an automatic foam proportioning system with a non-electronic, pilot operated relief valve controlled, direct concentrate injection system. Concentrate injection shall occur on the discharge, or pressure, side of the water pump. The system shall reliably and accurately meter Class A fire suppressant foam concentrates. These foam concentrates are typically proportioned at ratios of 0.2% - 0.5% of foam concentrate in solution. The proportional injection system shall ensure that only the specified amount of foam concentrate is used. The system shall be simple to operate and shall have a maximum pressure loss of 7 psi at 125 GPM. A stainless-steel Victaulic™ foam manifold or mainline check valve that meets manufacturer specifications must be installed to prevent foam solution from returning to the pump, suction water source, or engine water tank.

7.18.2 The proportioner shall maintain accurate foam concentrate proportioning and injection rates over water discharge flows of 5 to 125 GPM and shall maintain accurate proportioning and injection rates throughout a range of 0 to 400 psi. The system shall provide flexibility in operation by maintaining a constant concentration of foam solution over a variable range of water stream flow rates and pressures. The proportioning rate shall be adjustable from 0.1% to 1.0% of the corresponding water discharge flow within the accuracy parameters recommended by NFPA Standard 1900 (latest edition).

7.18.3 The system shall be compatible with nozzle aspirating systems, where nozzle flow volumes must be adjustable on demand, while maintaining a constant percent foam solution.

7.18.4 Foam concentrate shall be provided from the onboard foam concentrate storage tank.

7.18.5 The foam system shall be mounted in a protective housing and shall not be mounted in any of the driver or passenger side storage compartments.

7.18.6 Electrical wiring shall be supplied from the main apparatus electrical system to the foam pump base system. Power shall be supplied directly from the apparatus battery without any connections to other high-power devices, such as primer pumps, hose reels, auxiliary starters, light bars, etc. with its own disconnect switch, or a switch or contactor actuated by the battery disconnect switch, power take-off (PTO) or other device. Use proper wire size to be able to supply the foam system with the proper voltage and amperage required.

7.19 Pump Performance Test and Certification

7.19.1 Upon completion, the apparatus shall undergo a complete pumping test that conforms to the requirements of NFPA Standard 1900 (latest edition) for the size and type of pump provided. The test shall consist of a continuous one-half hour test pumping at rated capacity and rated net pump pressure, a vacuum test of the primer system and plumbing, a tank discharge flow test, a pressure test of the apparatus piping, and a water tank usable water volume test. The chassis engine and transmission, the pump, and other components of the apparatus shall show no undue heating, leaks, or other defect. The results of the test shall be documented to establish the performance of the apparatus and to further ensure that the unit will perform satisfactorily when placed into service. The test results shall be certified in writing, with the certification provided to the purchaser for their records at the time of delivery of the completed apparatus.

7.19.2 As installed in the engine, the pump shall be capable of delivering 50 gpm minimum flow at 250 psi output pressure from the apparatus water tank when installed on the apparatus and from a 5-foot lift through 24 feet of suction hose with a strainer. This shall be measured through both the #19 and #3 rear discharges.

8 — Water Tank

8.1 Construction

8.1.1 The water tank shall be fabricated from polypropylene or glass-reinforced (GRP) composite. The tank may be a removable assembly or it may be an integral part of the body.

8.1.2 Full baffling is required in accordance with NFPA 1900 (latest edition) requirements. The baffles shall be designed for maximum airflow throughout the tank. The baffles shall be internally connected to the top, sides, end, and bottom. The tank shall have a manual fill tower with a basket strainer for both the water tank and foam tank.

8.1.3 The tank shall have a vent overflow system that shall extend through the tank and exit under the vehicle at least 12 inches behind the centerline of the rear axle. The tank sump shall include provisions to prevent water swirling. There shall be piping inside the tank with a suction tube to the sump. The suction tube shall extend down through the anti-swirl plate and baffles. All fittings in the tank shall be heavy duty polypropylene or stainless steel. Tank inlets shall have flow deflectors inside the tank.

8.1.4 A ¾-inch minimum quarter turn drain valve shall be located at the tank sump for drainage and labeled “Tank Drain.”

8.2 Clean Out Plug

8.2.1 The bottom of the tank sump shall be equipped with a 3-inch NPTF clean out fitting, equipped with a 3-inch NPTF PVC pipe plug.

8.3 Tank Capacity

8.3.1 The water tank shall have a usable capacity of 300 gallons.

8.4 Foam Tank

8.4.1 One 12-gallon capacity foam concentrate storage tank shall be provided and plumbed to the onboard foam system. The tank shall be fabricated from polypropylene or GRP composite and shall be designed and fabricated as an integral part of the main water tank. The foam tank shall have a separate fill tower and screen, constructed in the same manner as the water tank fill tower.

8.4.2 The foam tank shall have a vertical translucent panel sight gauge that can be viewed by the operator while standing at the pump panel.

8.5 Gear Storage Compartment

8.5.1 A storage compartment fabricated from ½-inch protection series III polypropylene shall be a component of the water tank assembly, located at the front of the apparatus. The storage compartment shall maximize available space above the water tank, between the hose reels, and forward of the pump and plumbing. A drain shall be provided in the bottom of the compartment that vents through to the ground. The compartment shall have a polypropylene overlapping style lid with polished latches. The storage compartment shall be adequately sealed to prevent water intrusion. The lid shall be equipped with two extending, gas cylinder type hold-open devices. The top of the storage compartment shall not exceed the height of the upper side compartments.

8.6 Ice Chest Storage

8.6.1 An integrated ice chest storage area shall be provided on top of the water tank and aft of the dunnage compartment. This storage area shall consist of a walled, open top box with approximate dimensions of 27 inches long by 16 inches wide by 6 inches high. The box shall have provision for the attachment of tie down straps.

8.7 Spare Tire Storage

8.7.1 A storage compartment for one spare tire shall be provided, located toward the rear of the deck, on the right side of the apparatus beside the pump. The storage compartment shall

be an integral component of the water tank assembly. The compartment door shall include one or two adjustable overlapping positive catch style lockable latches of sufficient design to ensure lasting function and integrity. The storage compartment shall not sag, and the door shall open and close freely. All hardware and mounting shall be tamper-resistant when the compartment is in the locked position. No lettering or labeling of the compartment shall be provided.

8.8 Miscellaneous Storage

8.8.1 The tank assembly shall include an integrated lockable storage compartment at the rear of the vehicle, adjacent to the spare tire compartment and below the operator's pump panel. The compartment shall have the minimum inside dimensions of 14 inches wide by 46 inches deep and have the same height as the spare tire storage compartment. There shall be a sliding tray provided. The compartment shall be vented, and the door shall be lockable. All hardware and mounting shall be tamper-resistant when the compartment is in the locked position. No lettering or labeling of the compartment shall be provided.

9 — Body Electrical Requirements

9.1 General Electrical Statement

9.1.1 All apparatus body electrical components shall be served by independent circuits which shall be separate and distinct from the apparatus cab and chassis electrical circuits. All wiring supplied and installed by the apparatus manufacturer shall be installed in flexible split convoluted loom and shall be color coded and function labeled at 6-inch intervals. All wiring supplied and installed by the apparatus manufacturer shall be grease, oil and moisture resistant; and shall be securely fastened with insulated metal clamps and nylon wire ties. Solderless insulated connectors shall be utilized at all splice joints and shall be enclosed with heat shrink tubing for extra corrosion protection. Automatic reset type circuit breakers shall be provided wherever possible in accordance with SAE J1625 and J553.

9.2 Recessed Lighting

9.2.1 All recessed lights shall be protected against impacts from equipment inside compartments by either aluminum guards sufficient for use, or a false bottom as applicable.

9.3 Rear DOT Lighting

9.3.1 The rear DOT lighting shall consist of the following components:

9.4 Taillights, Brake Lights

9.4.1 The manufacturer shall supply and install two 3-inch by 7-inch single color LED stop, tail, and turn lights on the rear of the apparatus, rear-facing, one per side on the lower rear of the apparatus above the rear step in the top position of the common housing with the DOT lights. The stop, tail, turn lights (STT) shall consist of twelve LEDs red in color and with

clear Lexan lens. The lights shall be waterproof using a vibration-welding sealing process. The lights shall have total internal reflection (TIR) collimator optics to prevent stray light. The manufacturer shall install Tomar brand, model R46L-STT, or equivalent.

9.5 Turn Signal Lights

9.5.1 The manufacturer shall supply and install two 3-inch by 7-inch single color LED stop, tail, and turn lights on the rear of the apparatus, rear-facing, one per side on the lower rear of the apparatus above the rear step in the middle position of the common housing with the DOT lights. The stop, tail, turn (STT) lights shall consist of twelve LEDs amber in color and with clear Lexan lens. The lights shall be waterproof using a vibration-welding sealing process. The lights shall have TIR collimator optics to prevent stray light. The manufacturer shall install Tomar brand, model R46L-STT, or equivalent.

9.5.2 The above DOT lighting shall be provided with a vertical chrome plastic three-position bezel at the rear of the body, one on each side (Tomar brand, part number R46-BZ3, or equivalent). The bezels shall have a chrome finish.

9.6 Back Up Lights

9.6.1 See 3.7.1

9.6.2 The manufacturer shall supply and install two vertical three-position frames at the rear of the apparatus body, one each side to house the STT and warning/back-up lights. The frames shall have a chrome finish. The manufacturer shall install Tomar brand, model R37-BZ3, or equivalent.

9.7 License Plate Bracket and Light

9.7.1 One clear light fixture, with license plate mounting bracket, shall be provided at the rear of the body.

9.7.2 One license plate bracket shall be provided on the front of the vehicle.

9.8 Cluster/Clearance Lights and Reflectors

9.8.1 Three round Interstate Commerce Commission (ICC) LED clearance lights shall be located at the rear of the apparatus above the bumper.

9.8.2 Additional lighting shall be provided to conform to DOT, Federal, and NHTSA specifications for vehicles of 80 inches wide. All lighting shall be compatible with the 12-volt chassis electrical system. Lighting shall be located according to ICC regulations.

9.9 Rear Traffic Advisor

9.9.1 The manufacturer shall supply and install one directional light bar, Tomar brand, model LSTICK-14TD8-B, or equivalent, mounted to the crossover platform frame with a weatherproof electrical quick disconnect feature. The directional light bar shall be controlled from the Tomar brand,model 948L-SIREN-R, or equivalent siren/switch controller located on the cab center console.

9.10 Compartment Lights

9.10.1 LED strip lighting shall be provided and installed in each exterior compartment. Full length LED strip lighting shall be installed behind the door frame on the left side, right side and top. The strip lighting shall be positively attached to the inside of the compartment and shall be easily removable for replacement or repair. No adhesive tape shall be used to mount the lights of mounting clips. The LED strip lighting provided shall have a maximum spacing of 1” inch between the light-emitting diodes.

10 — Electrical System Performance Test, Low-Voltage

10.1 Test Requirements

10.1.1 The fire apparatus low voltage electrical system shall be tested as required by this section and the test results shall be certified by the apparatus manufacturer. The certification shall be delivered to the Government with the documentation for the completed apparatus. The tests shall be performed when the air temperature is between 0 degrees Fahrenheit and 110 degrees Fahrenheit (18 degrees Celsius and 43 degrees Celsius).

10.2 Test Sequence

10.2.1 The four tests defined in 10.3, 10.4, 10.5, and 10.6 shall be performed in the order in which they appear. Before each test, the chassis batteries shall be fully charged until the voltage stabilizes at the voltage regulator set point and the lowest charge current is maintained for 10 minutes. The failure of any of these tests shall require a repeat of the test sequence.

10.3 Reserve Capacity Test

10.3.1 The chassis engine shall be started and kept running until the chassis engine and engine compartment temperatures are stabilized at normal operating temperatures and the chassis battery system is fully charged. The chassis engine shall be shut off and the minimum continuous electrical load shall be applied for 10 minutes. All electrical loads shall be turned off prior to attempting to restart the chassis engine. The chassis battery system shall then be capable of restarting the chassis engine. The failure to restart the chassis engine shall be considered a failure of this test.

10.4 Alternator Performance Test at Idle

10.4.1 The minimum continuous electrical load shall be applied with the chassis engine running at idle speed. The chassis engine temperature shall be stabilized at normal operating

temperature. The chassis battery system shall be tested to detect the presence of a chassis battery current discharge. The detection of chassis battery current discharge shall be considered a failure of this test.

10.5 Alternator Performance Test at Full Load

10.5.1 The total continuous electrical load shall be applied with the chassis engine running up to the engine manufacturer's governed speed. The test duration shall be a minimum of two hours. The activation of the electrical system load management system shall be permitted during this test. The activation of an alarm due to excessive chassis battery discharge as detected by the system required by NFPA (current edition), or an electrical system voltage of less than 11.8 volts direct current for a 12-volt direct current nominal system for more than 120 seconds, shall be considered a failure of this test.

10.6 Low Voltage Alarm Test

10.6.1 Following the completion of the tests described above, the chassis engine shall be turned off. With the chassis engine turned off, the total continuous electrical load shall be applied and shall continue to be applied until the excessive battery discharge alarm activates. The chassis battery voltage shall be measured at the battery terminals.

10.6.2 The test shall be considered to be a failure if the low voltage alarm has not yet sounded 140 seconds after the voltage drops to 11.70 volts direct current for a 12-volt direct current nominal system. The chassis battery system shall then be able to restart the chassis engine. The failure of the chassis battery system to restart the chassis engine shall be considered a failure of this test.

10.7 Documentation

10.7.1 The apparatus manufacturer shall provide the results of the low-voltage electrical system performance test, certified in writing, with the documentation provided to the Government at the time of delivery of the completed apparatus.

10.7.2 The test results shall consist of the following documents:

10.7.2.1 Documentation of the electrical system performance tests.

10.7.2.2 A written electrical load analysis, including the following:

- The nameplate rating of the alternator.
- The alternator rating under the conditions specified in NFPA 1900 (current edition).
- Each of the component loads specified that make up the minimum continuous electrical load.
- Additional electrical loads that, when added to the minimum continuous electrical load, determine the total continuous electrical load.
- Each individual intermittent electrical load.

11 — Apparatus Finish

11.1 Apparatus Color

11.1.1 The color of the chassis cab exterior and body shall be No. 14260 of SAE AMS-STD-595 Rev. A (Forest Service Green).

11.2 Apparatus Body Finish

11.2.1 The compartment interiors are to be sealed for leaks. If the body is constructed of 304 Stainless-Steel the inside shall be unpainted. If other materials are used for the apparatus body construction then the inside surface areas shall be cleaned and prepped, then finish painted with a durable polychromatic, modified nitrocellulose coating that is volatile organic compound-compliant (VOC-compliant), isocyanate and lead free. One product that meets these requirements is Zolatone™ 20 Series. Color shall be #20-11 (Apollo Gray). Other sealants may be approved by the Government.

11.2.2 The exterior finish of the apparatus body shall be colored or painted gel coat. All aluminum and stainless steel shall remain unpainted. Any unpainted steel used in the fabrication of the mounting system shall be prepared for painting following the paint manufacturer's recommendations for the preparation of the surface. Paint for all steel parts shall match the chassis cab that the apparatus is mounted upon. Paint or powder coat shall meet or exceed industry standards for color matching, durability and protection of the base material.

11.3 Vehicle Marking

11.3.1 A 4-inch-wide white retro-reflective stripe shall be provided and installed horizontally on both the chassis cab and body. The stripe shall be placed as high as possible on the vertical surfaces on the sides of the chassis tilt hood and shall run the full length of the apparatus at that height. One break shall be provided in the stripping on either side of the apparatus body, approximately ¾ aft on the rear of the body. The ends of the stripe shall be sloped on a forward slant at approximately 45 degrees on either side of the break.

11.3.2 Block style lettering, fabricated from retro-reflective material, shall be provided and installed on the apparatus as follows:

11.3.3 The word “FIRE,” in 4-inch-tall white letters, shall be applied on both sides, centered in the 45-degree angled break of the 4-inch white reflective stripe on the compartment doors, ¾ aft of the apparatus body.

11.3.4 The unit designator and equipment designator (Example: NM-CIF-E651) in 6-inch -tall white letters, shall be provided on the crew door of the cab.

11.3.5 The unit designator, in 4-inch-tall white letters, shall be provided centered on the swept back portion of the front bumper on the passenger's side; the equipment designator, in 4-

inch tall white letters, shall be provided centered on the swept back portion of the front bumper on the driver's side.

11.3.6 The words “USDA” and “FOREST SERVICE” in 1-inch-tall green letters; “FIRE” in 4-inch-tall green letters; and the unit designator and equipment designator (Example: NM-CIF-E651) in 4-inch-tall green letters, shall be provided on a ⅛ polished aluminum plate located on the spare tire storage compartment door. The lettering at the rear of the apparatus shall be arranged as follows:

USDA FOREST SERVICE

FIRE

NM-CIF-E651

11.3.7 The unit designator and equipment designator (Example: NM-CIF-E651) in 12-inch-tall black letters, shall be provided on the cab roof below the unit designator.

11.4 Door Decal (Shield and Vehicle Numbers)

11.4.1 The apparatus manufacturer shall provide and install door decals (shield and vehicle numbers) on the front cab doors, below the reflective striping.

11.4.2 First line: FOR OFFICIAL USE ONLY. All letters must be Engineering Grade reflective (3M series 3279 or equivalent), ½ inch high, Highway Gothic Wide (52 pt.), capitalized, die cut, pre-spaced, and brown.

11.4.3 Second line: U.S. GOVERNMENT. All letters must be Engineering Grade reflective (3M series 3279 or equivalent), 5/8-inch-high, Highway Gothic Wide (64 pt.), capitalized, die cut, pre-spaced, and brown.

11.4.4 The shield decal must have a base layer of brown Engineer Grade reflective (3M series 3279 or equivalent) vinyl die-cut to the FS Shield shape with a second layer of white Engineer Grade reflective (3M series 680-10 or equivalent) vinyl die-cut at a reduced size to create the border of the shield with all the text and graphics die-cut and removed, and in approved Forest Service font.

11.4.5 Fourth line: Four Digit Equipment Number. All letters must be Engineering Grade reflective (3M series 3279 or equivalent), 1 ½ inch high, Highway Gothic Condensed (154 pt), capitalized, die cut, pre-spaced, and brown. Center the equipment number on the door approximately 1-¼ to 2 inches below the shield.

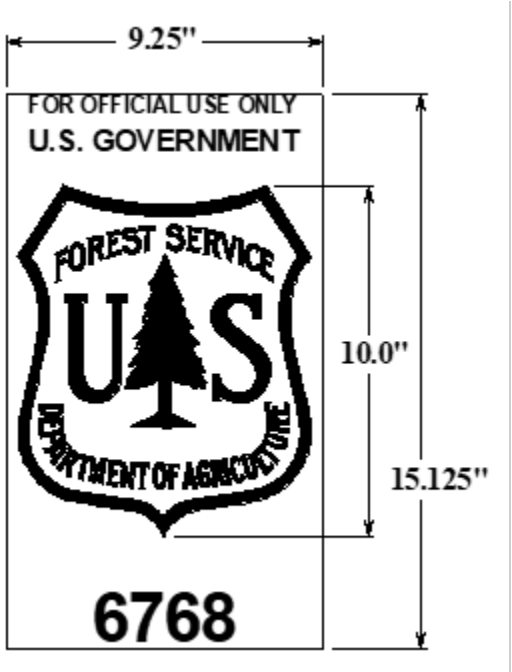

Figure 3 — Example Door Markings Layout

11.5 Compartment Identification

11.5.1 White ½-inch tall numbers shall be provided and installed on the exterior lower right- hand corner of the driver's side compartment doors and the exterior lower left-hand corner of the passenger side doors. The exterior compartments shall be labeled with a standardized numbering system as follows:

11.5.2 Driver's side —

- 1 – compartment forward of the rear wheels
- 2 – center compartment above the rear wheels
- 3 – compartment aft of the rear wheels
- 4 – forward compartment of independent body module
- 5 – aft compartment of independent body module

11.5.3 Passenger's side —

- 6 – compartment forward of rear wheels
- 7 – compartment above the rear wheels
- 8 – compartment aft of the rear wheels, below upper compartment
- 9 – independent body module compartment

12 — Equipment

12.1 Equipment Provided

12.1.1 The following equipment shall be provided with the completed apparatus. The equipment shall be new and unused, and shall meet all current NFPA, OSHA and other applicable safety regulations.

12.2 Manuals and Drawings

12.2.1 The following specified materials shall be provided with the completed apparatus:

12.2.1.1 One complete set of standard chassis operation, parts and service manuals.

12.2.1.2 One apparatus manufacturer's operation and service manual, to include:

- Manufacturer's Record of Construction
- Warranty Registration and Information
- Operator Safety Information
- Pump Operation and Troubleshooting Instructions
- Foam System Operation Instructions
- Vehicle Exterior Maintenance Instructions
- Maintenance and Lubrication Information & Charts
- Complete Electrical Diagrams
- Component Literature (i.e.: siren, PTO, hose reel, etc.)
- Pump Test Certificate, Weight Certificate, Service Parts Replacement List

12.2.2 One Complete set of apparatus drawings

12.3 Road Kit

12.3.1 The completed apparatus shall be equipped with a road kit containing the following items:

- One 5-pound Class B/C fire extinguisher with vehicle mounting bracket, shipped loose.
- One set of warning triangle reflectors, containing three folding reflectors in a plastic storage case.
- One 12-ton hydraulic jack with handle.

12.4 Wheel Chocks

12.4.1 Two NFPA compliant solid bottom wheel chocks shall be provided with the completed apparatus, one on each side. The chocks shall be mounted in a location determined by the Government.

12.5 Hydrant Wrench Holder and Wrenches

12.5.1 One three-position captive latching type/hydrant/spanner wrench holder and hydrant wrenches shall be permanently affixed equidistant between passenger's side rear taillight bezel and the spare tire storage compartment. A National Firefighter™ brand, model FEQ 148 hydrant wrench holder, or equivalent, shall be provided.

13 — Warranty Provisions

13.1 10 Year Apparatus Warranty

13.1.1 All materials and workmanship herein specified, including all equipment furnished, shall be guaranteed for a period of ten years after the acceptance date of the apparatus, unless otherwise noted, with the exception of any normal maintenance services or adjustments which shall be required.

13.1.2 Under this warranty, the apparatus manufacturer shall be responsible for the costs of repairs to the apparatus that have been caused by defective workmanship or materials during this period.

13.1.3 This warranty shall not apply to the following:

13.1.3.1 Any component parts or trade accessories such as chassis, engines, tires, pumps, valves, signaling devices, batteries, electric lights, bulbs, alternators, and all other installed equipment and accessories, in as much as they are usually warranted separately by their respective manufacturers, or are subject to normal wear and tear.

13.1.3.2 Failures resulting from the apparatus being operated in a manner or for a purpose not recommended by the apparatus manufacturer.

13.1.3.3 Loss of time or use of the apparatus, inconvenience or other incidental expenses.

13.1.3.4 Any apparatus which has been repaired or altered outside of the apparatus manufacturer's factory in any way that affects its stability, or which has been subject to misuse, negligence, or accident.

13.2 Water Tank Warranty

13.2.1 The polypropylene water tank that is specified to be supplied with this apparatus shall be warranted by the water tank manufacturer for a “lifetime” period from the date that the apparatus is put into service. The manufacturer shall repair, at no cost to the purchaser, any problems caused by defective materials and/or workmanship. The warranty shall cover the reasonable costs of removing the water tank from the apparatus and reinstalling it after the completion of the covered warranty repairs but shall not cover any liability for the loss of service or downtime costs of the apparatus.