

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

Issue Date: February 2016

Supersedes: August 2015

Table of Contents

Record of Revisions	6
1 — General	8
1.1 General Statement	8
1.2 NFPA 1906 Compliance	8
1.3 Tilt Test	8
1.4 Apparatus Body Material	8
1.5 Auxiliary Pump	8
1.6 Brand Name or Equivalent Products	8
2 — Chassis Electrical Requirements	9
2.1 Chassis Electrical Additional Equipment and Modifications	9
2.2 Multiplex System	9
2.3 Master Body Disconnect Switch	9
2.4 Battery “On” Indicator Light	10
2.5 Junction Box	10
2.6 Bulkhead Connections	10
2.7 Perimeter Lighting	10
2.8 Backup Alarm	11
2.9 Map Light	11
2.10 Antenna	11
2.11 Radio Pre-Wire	11
3 — Traffic Warning Systems	12
3.1 Traffic Warning System	12
3.2 Electronic Siren	12
3.3 Speaker	12
3.4 Forward Upper Zone A/B/D Light Bar	12
3.5 Forward Lower Zone A Warning Lights	13
3.6 Forward Zone B/D Warning Lights	13
3.7 Aft Lower Zone C Warning Lights	14
4 — Chassis Additions and Modifications	15
4.1 Additional Equipment	15
4.2 Apparatus Fluid Types and Quantities	15
4.3 Seating Capacity	15
4.4 Seating	15
4.5 Seat Belt Warning	15
4.6 Vehicle Height Warning	16
4.7 Final Stage Manufacturer Vehicle Certification	16
4.8 Noise Hazard Warning	16
4.9 Air Filter Ember Protection Screen Warning	16
4.10 Cab Console	16
4.11 Front Bumper and Brush Guard	17

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4.12	Mud Flaps	17
4.13	Exhaust System	17
4.14	Fuel Hose and Electrical Harness Protection	17
4.15	Chassis Air Intake Ember Guard	18
4.16	Cabin Air Ember Guard	18
4.17	Chassis Component Protection	18
5	— Apparatus Body Description	19
5.1	General Requirements	19
5.2	Platform Construction	19
5.3	Drilling, Grinding, and Welding	19
5.4	Understructure	19
5.5	Dimensions	19
5.6	Welding	19
5.7	Installation	19
5.8	Platform Mounting	20
5.9	Long Sills	20
5.10	Cross Sills	20
5.11	Outer Rail	21
5.12	Platform Deck	21
5.13	Rear Cab Protection	21
5.14	Tailboard	22
5.15	Rear Steps	22
5.16	Fuel Tank Filler	23
5.17	Draft Line Storage	23
5.18	Spare Tire Mount	23
5.19	Compartmentation	23
5.20	Driver's Side Compartments	24
5.21	Fuel Storage Area	24
5.22	Driver Side Discharge and Pre-Connect Compartment	24
5.23	Cooler Storage Area	25
5.24	Passenger's Side Compartments	25
5.25	Compartment Lining	26
5.26	Passenger Side Discharge and Pre-Connect Compartment	26
5.27	Compartment Doors	26
5.28	Door Latches and Hardware	26
5.29	Door Hold Open Devices	27
5.30	Adjustable Shelf Channels	27
5.31	Compartment Shelves	27
5.32	Compartment Venting	28
5.33	Compartment Floor Mats	28
6	— Pump and Plumbing	29
6.1	Pump, Plumbing, Controls, and Gauges	29
6.2	Plumbing Components	29

U.S.D.A. Forest Service
National Technology And Development Center, San Dimas

6.3	Fasteners and Adjustable Plumbing Brackets	29
6.4	Pump Compartment Components	29
6.5	Auxiliary Pump	29
6.6	Pump Specifications	29
6.7	Fuel Cell	30
6.8	Pump Option - Auxiliary Pump (Diesel Engine-Powered Pump)	30
6.9	Pump Specifications	30
6.10	Pump and Plumbing Cover (Diesel-Powered Pump)	31
6.12	Rear Mounted Pump Operator's Panel	31
6.13	Pump Panel Lights	32
7	— Valves, Controls, Gauges, and Plumbing Requirements	33
7.1	Main Pump Discharge and Intake Plumbing	33
7.2	Truck Identification and Pump Performance Plate	34
7.3	Pump Operating Instruction Plate	34
7.4	Test Gauge Connections	34
7.5	Winterization Port	34
7.6	Pump Panel Labeling	34
7.7	Compound Pressure Gauge	35
7.8	Water Tank Level Electronic Gauges	35
7.9	Pump Cooler/By-Pass	35
7.10	Priming Pump	35
7.11	Stainless Intake Strainer	36
7.12	Discharge Locations	36
7.13	Intake Location	36
7.14	Tank Fill	37
7.15	Tank to Pump Line	37
7.16	Booster Hose Reel	37
7.17	Foam Proportioning System	38
7.18	Pump Performance Test and Certification	38
8	— Water Tank	40
8.1	Fabrication	40
8.2	Independent of the Platform Structure	40
8.3	Baffling	40
8.4	Panel Sight Gauge	40
8.5	Tank Over-Flow System	40
8.6	Tank Drain	40
8.7	Clean Out Plug	40
8.8	Tank Capacity	40
8.9	Foam Tank	41
9	— Body Electrical Requirements	42
9.1	General Electrical Statement	42
9.2	Lighting	42

9.3	Tail Lights, Brake Lights	42
9.4	Turn Signal Lights	42
9.5	Back Up Lights	42
9.6	License Plate Bracket and Light	43
9.7	Cluster/Clearance Lights and Reflectors	43
9.8	Scene Lights	43
9.9	Compartment Lights	43
10	— Electrical System Performance Test, Low-Voltage	44
10.1	General Test Requirement	44
10.2	Test Sequence	44
10.3	Reserve Capacity Test	44
10.4	Alternator Performance Test At Idle	44
10.5	Alternator Performance Test at Full Load	44
10.6	Low Voltage Alarm Test	45
10.7	Documentation	45
11	— Apparatus Finish	46
11.1	Apparatus Body Color	46
11.2	Vehicle Marking (Refer To Model 643P Standard Fire Vehicle Marking Drawing)	46
12	— Equipment	48
12.1	Equipment Provided	48
12.2	Manuals and Drawings	48
12.3	Road Kit	48
12.4	Wheel Chocks	48
12.5	Wheel Chock Mounting Brackets	49
12.6	Hydrant Wrench Holder and Wrenches	49
12.7	Drip Torch Tray	49
12.8	Tool Bracket Mounting	49
13	— Warranty Provisions	50
13.1	10 Year Apparatus Warranty	50
13.2	Water Tank Warranty	50
14	— Standard Vehicle Marking Diagram	51

Record of Revisions

Date

September 2009

March 2010

May 2013

Revision Summary

- Initial Release
- Revision
- Revised multiplex system requirement
- Revised perimeter lighting requirement
- Clarified radio pre-wire requirements Incorporated traffic advisor into light bar
- Revised aft lower zone C warning lights requirements
- Deleted green aviation light from light bar
- Updated console requirements
- Clarified that front bumper bolt-on brush guards are not acceptable
- Deleted mobile attack bracket requirement
- Refined chassis component (skid plate) requirements
- Added provision for steel platform and body
- Defined aluminum grades for body and compartments
- Added requirements for scene light brackets
- Revised rear step locations
- Added requirement for drip tray in fuel storage compartment
- Added driver and passenger side pre-connect compartments
- Revised cooler storage requirements
- Added requirement for compartment lock orientation
- Revised compartment shelf locations
- Substituted compartment floor mats for bed liner material
- Specified gasoline-powered default pump
- Revised diesel-powered pump engine and performance requirements
- Revised pump panel and lighting requirements
- Added requirement for pump performance plate
- Clarified pump operating instruction plate requirements
- Revised discharge pressure gauge requirement
- Clarified that foam system cannot be mounted in a storage compartment Revised rear DOT lighting requirements
- Deleted requirement for stand-alone rear directional light bar
- Revised standard vehicle markings
- Revised wheel chock requirement and wheel chock mounting location Increased warranty to 10 years
- Added standard vehicle marking drawing
- Updated Format
- Added specification for inline check valve on foam system
- Added Brand Name or Equivalent direction
- Updated Lightbar Size and Brand

August 2015

<u>Date</u>	<u>Revision Summary</u>
February 2016	<ul style="list-style-type: none">• Changed lower zone C lights from amber to red• Deleted amp meter• Added hour meter• Updated Electronic Water Level Gauge• Updated Format• Minor Editing• Updated lightbar specification• Changed fire extinguisher to 5 pounds• Updated auxiliary pump specifications• Added additional lighting to Aft Lower Zone C Warning Lights
Future Revisions	<ul style="list-style-type: none">• This space is reserved for future revisions

1 — General

1.1 General Statement

1.1.1 The platform body described in this specification shall be mounted on Government furnished cab and chassis. Government furnished cab and chassis shall be picked up by the apparatus manufacturer at designated locations. 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 NFPA 1906 Compliance

1.2.1 The completed apparatus described in this specification shall be compliant with the requirements of NFPA 1906, latest edition, except where noted.

1.3 Tilt Test

1.3.1 The apparatus shall be tilted to 30 degree minimum before lifting a tire or tire set when tested at the estimated in-service weight in accordance with NFPA 1906.

1.4 Apparatus Body Material

1.4.1 The apparatus body shall be fabricated from aluminum alloy or galvanized treated steel.

1.5 Auxiliary Pump

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

1.6 Brand Name or Equivalent Products

1.6.1 Products equivalent to the brand name components specified herein shall be approved in writing by the Government prior to contract award and documented in the resultant contract.

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 All lights shall 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.
- 2.1.3 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.
- 2.1.4 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. Hale™ Class 1® ES-Key, Hale™ Class 1® Supernode, and Welden™ V-MUX® multiplexing systems meet this requirement.

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 on the floorboard to the left side of the driver’s seat. It shall be placed as far aft as possible to prevent accidental actuation. The exposed terminals shall be protected from damage and inadvertent contact. When in the “OFF” position, with the exception of the radio power 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 side panel on the driver's 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 Box

- 2.5.1 An electrical junction box for all apparatus modules, connections, relays, circuit breakers, etc. shall be located on the aft wall of the cab behind the rear seating area on the crew cab chassis and under the passenger side rear seating area on the extended cab chassis. All connection points shall be labeled according to function. The junction box shall be constructed from black powder coated stainless steel with a hinged door and a spring loaded push-button style latch.

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 box as possible. The harness(s) shall terminate at the point of the cab entry/exit with a hermetic bulkhead connector(s), designed to facilitate in the separation of the cab/chassis/apparatus body. A Pacific Aerospace and Electronics™ (PA&E) bulkhead connector or equivalent shall be installed.

2.7 Perimeter Lighting

- 2.7.1 Eight clear round 35 lumen minimum L.E.D. lights shall be provided around the vehicle's perimeter. The lights shall be activated when either the “PERIMETER LIGHTING” 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 perimeter lighting “OFF” delay shall be synchronized with the chassis exterior courtesy lighting delay.
- 2.7.2 Two 4-inch clear L.E.D. lights shall be provided under the apparatus front bumper.
- 2.7.3 Four 1-inch clear L.E.D. lights shall be provided under the apparatus body forward of the rear wheel wells, two on each side of the body. The lights shall be housed within an enclosure sufficient to protect from damage
- 2.7.4 Two 1-inch clear L.E.D. lights shall be provided under the tail board protected from impact and debris.

2.8 Backup 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 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.

2.9 Map Light

- 2.9.1 One flexible goose neck map light shall be provided on the officer's side of the cab center console. The switch for the map light shall be located on the light and shall include a diffuser to prevent glare at night.

2.10 Antenna

- 2.10.1 One antenna base 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.

2.11 Radio Pre-Wire

- 2.11.1 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.

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 One 100/200 Watt full function electronic siren controller shall be provided. The siren control head shall have electronic air horn, public address mode, wired microphone and contain electronic siren tones of wail, yelp and Hi-Lo. The control head shall be mounted in the rearward position of the cab center console. A Federal Signal™ model PA300-MSD electronic siren meets this requirement.

3.3 Speaker

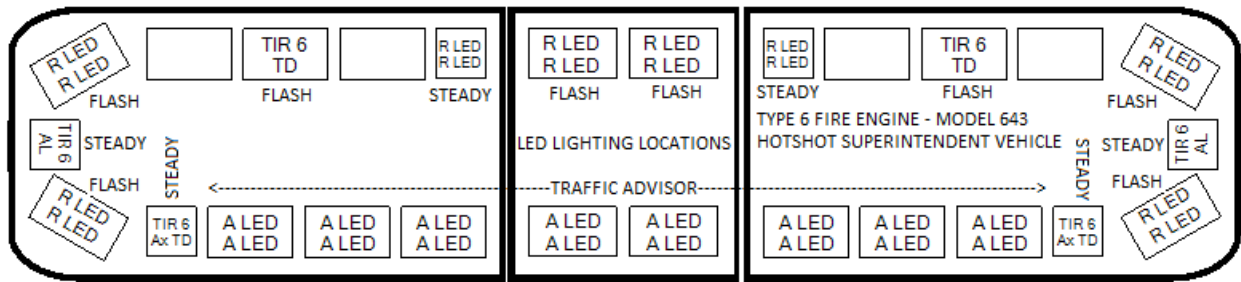
3.3.1 One 100 watt siren speaker shall be provided and installed in a protected forward facing location. The wiring for the speaker shall be routed to the electronic siren controller. A Federal Signal™ model MS100 siren speaker meets this requirement.

3.4 Forward Upper Zone A/B/D Light Bar

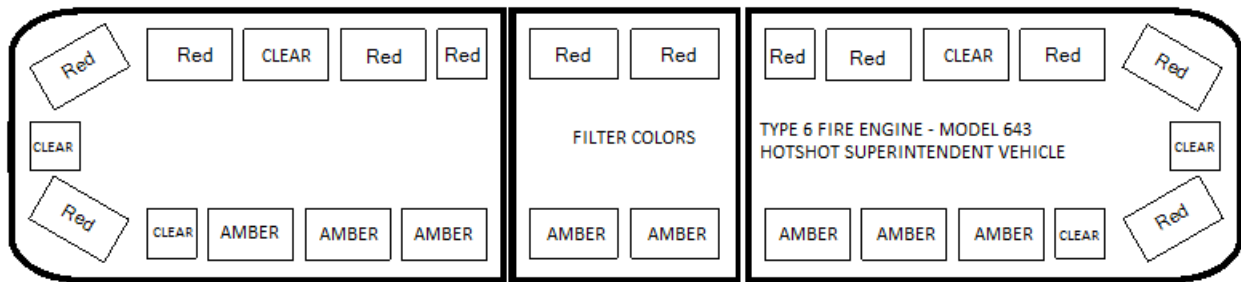
3.4.1 One L.E.D. lightbar shall be provided and installed on the cab roof, facing forward. The light bar shall be 55 inches wide, and shall contain eight flashing L.E.D. modules and six steady L.E.D. modules. L.E.D. lighting locations and filter placement shall conform to the diagrams in this section (below) and consist of: Four 45-degree corner-position red flashing modules with red lens/filters; two forward-facing, flashing white takedown modules with clear lens/filters; two forward-facing, flashing red modules with red lens/filters; two forward-facing, steady red modules with red lens/filters; two steady clear alley lights; and two steady clear rear-facing scene lights. An eight lamp amber L.E.D. Traffic Advisor® shall be installed as an integral component of the lightbar and wired to a separate Traffic Advisor® control head. A Whelen™ brand Freedom IV® L.E.D. lightbar part number F4W2RRRR-USFS6SUPT, or equivalent meets this requirement.

3.4.2 The light bar shall be wired to the “Emergency Master” switch located on the cab center console. 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.

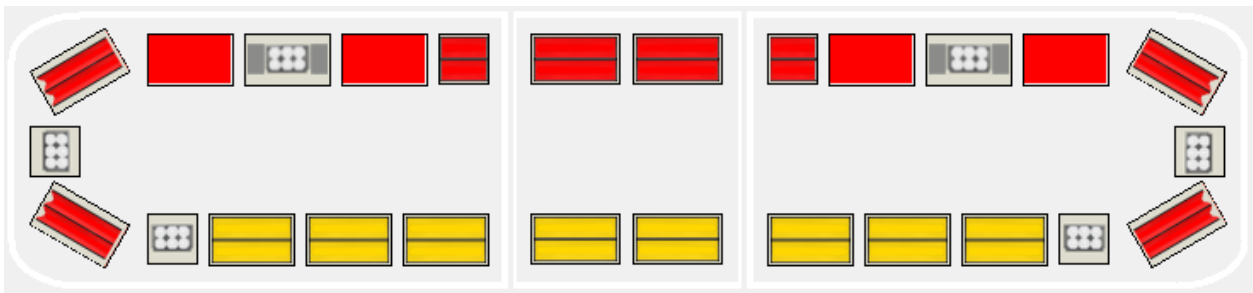
3.4.3 Diagram — L.E.D. Lighting Locations and Flashing/Steady Configuration



3.4.4 Diagram — Lightbar Filter Locations and Colors



3.4.5 Diagram — Lightbar Colors



3.5 Forward Lower Zone A Warning Lights

3.5.1 Two red L.E.D. warning lights, with mounting flanges, shall be provided at on the front of the apparatus, forward facing, one per side, in the brush guard. The lights shall be wired to the “Emergency Master” switch located on the cab center console. A Whelen™ brand, 500 Series red L.E.D. flasher or equivalent shall be installed.

3.6 Forward Zone B/D Warning Lights

3.6.1 Two red L.E.D. warning lights, with mounting flanges, shall be provided on the front corners of the apparatus chassis, side facing, and one per side. The lights shall be programmed in a triple flash mode. The lights shall be wired to the “Emergency Master” switch located on the cab center console. A Whelen™ brand, 400 Series or LINZ6 red L.E.D. flasher or equivalent shall be installed.

3.7 Aft Lower Zone C Warning Lights

- 3.7.1 Two red L.E.D. warning lights shall be provided on the lower rear of the apparatus, rear facing, one on each side centered below the stop and turn signal lights. The lights shall be attached with a rubber grommet. The lights shall be wired to the “Emergency Master” switch located on the cab center console. A Whelen™ brand, 500 Series red L.E.D. flasher or equivalent shall be installed.
- 3.7.2 Two amber L.E.D. warning lights shall be provided on the lower rear of the apparatus, rear facing, vertically mounted to the outboard sides of the rear bumper, one on each side. The lights shall be attached with a rubber grommet. The lights shall be wired to the “Emergency Master” switch located on the cab center console. A Whelen™ brand, Micron Series Model #MCRNSA amber L.E.D. flasher or equivalent shall be installed.

4 — Chassis Additions and Modifications

4.1 Additional Equipment

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 permanently-mounted label, showing the recommended fluid types and quantities for the apparatus chassis and associated components, shall be provided in the apparatus cab interior near the driver's seating position.

4.2.2 This label 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

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 Warning

- 4.6.1 A warning label, listing the overall height, length and 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 Cab Console

- 4.10.1 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 switch panel for the control of the emergency and general illumination lighting, siren controller, traffic advisor control head, and customer-mounted radios. The switch panel shall consist of an eight switch multiplex module with lighted switches. The switch module shall have back lighted identification plates on a non-glare panel surface. The switch panel shall be illuminated whenever the master switch is in the "ON" position. 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.

- 4.10.2 The following controls and switches shall be positioned from forward to aft on the center console as follows:

- One flexible map light
- One faceplate and pre-wiring for Government-mounted radio
- Two microphone clip brackets
- One switch panel with eight switches
- One electronic siren controller

- One Traffic Advisor® control head
- One 2-position cup holder
- One 4-position 12-volt power outlet
- One 6-inch lockable storage compartment

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

- (1) EMERGENCY MASTER
- (2) HIGH IDLE
- (3) PERIMETER LIGHTING
- (4) COMPARTMENT LIGHTING
- (5) LEFT SCENE LIGHT
- (6) REAR SCENE LIGHTS
- (7) RIGHT SCENE LIGHT
- (8) BLANK (Future Use)

4.11 Front Bumper and Brush Guard

4.11.1 A heavy duty black powder coated finish integral 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. Brush guards bolted onto OEM bumper are not acceptable.

4.12 Mud Flaps

4.12.1 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 logos.

4.12.2 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.

4.13 Exhaust System

4.13.1 The exhaust system shall remain unmodified and as received from the chassis manufacturer. The exhaust system shall be mounted in a horizontal configuration under the passenger's side of the cab.

4.14 Fuel Hose and Electrical Harness Protection

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

4.15 Chassis Air Intake Ember Guard

4.15.1 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.

4.16 Cabin Air Ember Guard

4.16.1 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.

4.17 Chassis Component Protection

4.17.1 Aftermarket skid plates shall be installed to protect as a minimum the radiator system and the diesel emissions fluid (DEF) tank. The skid plates shall be constructed of powder-coated 1-inch diameter .095 minimum wall thickness tubular steel. Skid plates shall attach to existing chassis mounting points and shall be readily removable for maintenance.

5 — Apparatus Body Description

5.1 General Requirements

- 5.1.1 All materials, parts and assemblies shall be new and of current manufacture. Workmanship, fabrication, assembly, and finished appearance shall be of the highest quality and in conformance with standard manufacturing practices. Examples of poor workmanship that will, not be accepted are grinding marks or gouges on the outer rail, floors that are not flush with the outer rail, joints that are not flush or square, unfilled joints, and warped or uneven floors.

5.2 Platform Construction

- 5.2.1 Platform shall be of marine grade 6061-T6 aluminum alloy or minimum 12 gauge galvanized treated steel construction. Structural connections shall be made by welding or minimum Grade 5 bolts and self-locking nuts.

5.3 Drilling, Grinding, and Welding

- 5.3.1 There shall be no drilling, grinding, or welding on chassis frame flanges ahead of the rear most spring hanger.

5.4 Understructure

- 5.4.1 The understructure shall have no lips or pockets that will trap water and mud.

5.5 Dimensions

- Length for platform shall be 114 inches \pm 1-inch.
- Width for platform shall be 96 inches \pm ½-inch.
- Bodies shall be flat \pm ⅛-inch over their entire length or width.
- Bodies shall be square with ⅛-inch or less offset from the opposite parallel side.

5.6 Welding

- 5.6.1 Welds shall meet American Welding Society Standards (AWS). Welds on the top and outer sides of the body and miscellaneous equipment shall be ground flush.

5.7 Installation

- 5.7.1 The body shall be mounted in compliance with FMVSS 301-75 standards. The body shall be mounted as low as possible without limiting tire clearance or restricting the ability to fuel the truck. The minimum distance from the top of the tire to the bottom of the floor shall be equal to maximum suspension travel plus 2 inches. Maximum suspension travel is the distance between the axle and the rubber bumper that limits suspension travel plus 1-inch.

5.8 Platform Mounting

- 5.8.1 A spring-loaded body mounting system shall be used to mount the platform to the chassis. This system shall be designed to allow independent movement between the platform frame and the chassis frame protecting the module from the stresses and twisting rendered by the flexing of the chassis frame. As such, the platform frame shall not rest on the chassis frame at any point. The mounts shall be pre-engineered for their intended use.
- 5.8.2 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.
- 5.8.3 The platform front shall be mounted utilizing springer type mounts. The rear platform mounts shall be affixed via solid mounts to the chassis frame. The center mount shall consist of an 18 inches long polyurethane spacer mounted mid-length allowing the body frame to rest in a neutral position under full load.

5.9 Long Sills

- 5.9.1 Two long sills shall run full length in alignment with and perpendicular to the chassis frame rails. The ends of the long sills shall be capped and perimeter welded.
- 5.9.2 Aluminum Body
- 5.9.2.1 Long sills on bodies shall be rectangular tube aluminum alloy 6 inches tall by 2 inches wide minimum, 0.1875-inch wall thickness material.
- 5.9.3 Steel Body
- 5.9.3.1 Long sills on bodies shall be rectangular channel 6 inches tall by 8.2 pounds per foot material.

5.10 Cross Sills

- 5.10.1 Cross sill to long sill welds shall be at least 100 percent of the length of the contact edges on two opposing sides of the long sill. Cross sill to outer rail welds shall be 100 percent of the length of both vertical sides of the cross sill.
- 5.10.2 The cross sills located directly above the dual rear wheels shall be notched and re-supported to provide additional clearance when apparatus is being used off road.
- 5.10.3 Aluminum Body
- 5.10.3.1 Cross sills on bodies shall be rectangular aluminum alloy channel 6 inches tall by 2 inches wide minimum, 0.1875-inch wall thickness material.

5.10.3.2 Cross sills shall be located on maximum 16-inch centers. All bodies shall have ½-inch by 6-inch by 6-inch gussets at the connection of cross sills to the long sills.

5.10.4 Steel Body

5.10.4.1 Cross sills on bodies shall be rectangular tubing 3 inches tall by 1½ inches wide minimum .14 gauge wall thickness material.

5.10.4.2 Cross sills shall be located on maximum 16-inch centers. All bodies shall have ½-inch by 6-inch by 6-inch gussets at the connection of cross sills to the long sills.

5.11 Outer Rail

5.11.1 Unless specified otherwise, the outer rail shall be either 6-inch performed body side rail, or 6-inch, 0.1875-inch wall thickness I-beam.

5.11.2 The outer rail shall form the complete bed perimeter without any open or off set seams.

5.11.3 The outer rail shall consist of square rear corners.

5.12 Platform Deck

5.12.1 Decking on the platform shall be diamond plate of 0.125-inch marine grade aluminum, or 12 gauge mild steel. Decking shall be perimeter welded to the outer rail, and 6 to 12 inches intermittently along the cross sills.

5.13 Rear Cab Protection

5.13.1 One headboard shall be fabricated and installed at the forward end of the apparatus body, directly behind the cab. The frame perimeter shall conform to the shape of the chassis cab. The interior frame shall consist of two uprights in alignment with the chassis frame rails and one horizontal cross-member located at approximately one-half the height. The upper interior portion shall be expanded metal. The lower interior portion shall be ½-inch diamond tread plate, configured in two pieces perimeter welded with the tread plate on the forward edge of the framework. The tread plate shall be configured in two separate outboard pieces welded between the inner and outer uprights on either side of the frame rails/inner uprights. The lower portion shall be open between the frame rails/inner uprights.

5.13.2 The bracket for the scene lights shall be mounted such that the right and left scene lights can swivel freely 180 degrees side to side. The bracket shall be approximately mid-height of the independent outer brace of the cab protection rack on both the passenger and driver side.

5.13.3 Gusseted, heavy duty brackets shall be provided on the leading edge for mounting of the light bar.

5.13.4 Aluminum Body

- 5.13.4.1 The frame perimeter shall be fabricated from 4-inch aluminum alloy channel or square tubing. The frame shall be constructed of aluminum alloy 2-inch by 4-inch by 0.1875-inch wall thickness boxed material. The tread plate and expanded metal shall be aluminum.

5.13.5 Steel Body

- 5.13.5.1 The frame perimeter shall be fabricated from 4-inch mild steel channel or square tubing. The frame shall be constructed of 2-inch by 4-inch by 0.125-inch wall thickness boxed material. The tread plate and expanded metal shall be steel.

5.14 Tailboard

- 5.14.1 The completed tailboard assembly shall serve as the vehicle bumper and meet all associated requirements. The tailboard shall consist of a framed tail apron integral in design with the platform. The tailboard shall finish with the outside edge of the apron frame even with the corners of the platform. The apron shall house all referenced lighting, steps, and draft tube storage. The apron shall be sufficient in design to support 300 pounds static load on the rear steps. The completed tailboard assembly shall meet the requirements of NFPA 1906 for angle of departure. The tailboard shall not extend below the rear tow hooks.

5.14.2 Aluminum Body

- 5.14.2.1 The apron frame shall consist of either 4-inch channel with the flat surface facing the inside of the frame or 4-inch by 2-inch by 0.1875-inch wall thickness box material. The interior flat surface of the apron shall consist of 1/8-inch aluminum diamond plate with the smooth surface to the inside.

5.14.3 Steel Body

- 5.14.3.1 The apron frame shall consist of either 6-inch by 8.2 pounds per foot channel with the flat surface facing the inside of the frame or 6-inch by 2-inch by 0.125-inch wall thickness box material. The interior flat surface of the apron shall consist of 1/8-inch diamond plate with the smooth surface to the inside. The bumper shall be constructed of 6-inch by 8.2 pounds per foot channel with a length of approximately 80 inches.

5.15 Rear Steps

- 5.15.1 Three NFPA-compliant fold down steps shall be provided and installed at the rear of the apparatus on the rear tail board 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 located in the space between the

chock blocks and draft tube caps. The top of the steps when folded shall line up horizontally ± 0.75 inches with the top edge of the chock blocks when they are enclosed in the chock block mounting brackets. The steps when folded shall not impede the ability of the engine crew to remove the caps from the draft tube holders and remove the draft tubes. Sufficient backing shall be provided to support a 300 pound load without any distortion to the body surface.

- 5.15.2 A warning plate shall be affixed to the rear of the apparatus in a conspicuous place. The warning plate shall read: "WARNING: DO NOT RIDE ON REAR STEP WHILE VEHICLE IS IN MOTION. DEATH OR SERIOUS INJURY MAY RESULT."

5.16 Fuel Tank Filler

- 5.16.1 The fuel filler and urea filler bezels shall be incorporated into the headboard channel. If not feasible with chassis design, they may be located into the channel of the outer rail. Fuel cap shall not protrude past outer rail. The fuel tank filler shall be mounted in accordance with FMVSS 301. The fuel filler hose shall not touch any rough or sharp surfaces, and have no kinks or restrictions. Hose shall be supported on no more than 16-inch centers, have at least 6 inches clearance from the rear tire with any amount of suspension travel, and if closer than 12 inches to the tires, have a shield to protect it from objects that may be thrown from the tires.

5.17 Draft Line Storage

- 5.17.1 Three draft hose tubes shall be mounted under the platform, between the frame rails of the truck. The draft tubes shall be a minimum of 5 inches in diameter and 106 inches \pm 1-inch deep. The drafts tubes shall be covered at the opening with cast aluminum covers.

5.18 Spare Tire Mount

- 5.18.1 Mount shall be a stationary horizontal cradle attached to the underside of the body, on the passenger side, ahead of the rear axle, with maximum possible ground clearance. The cradle shall not extend beyond the side of the body. 114-inch beds shall have the mount constructed of 2-inch by $\frac{3}{8}$ -inch steel or aluminum and sized to fit the stock tires.
- 5.18.2 The mount shall be welded or bolted to the body side rail and/or understructure. Spare tire shall not extend past the outer rail. Attachment points shall be gusseted. A folding hasp or five-sixteenths inch chain, secured with a padlock, shall act as a spare tire lock.

5.19 Compartmentation

- 5.19.1 All storage compartment walls shall be constructed from 0.188-inch 5052-H32 smooth aluminum sheet, or 14 gauge galvanized steel as specified. All internal framework shall be constructed of 10 gauge or greater, formed aluminum, or 14 gauge formed steel structural members. 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. Compartment configuration and approximate sizes required are listed below:

5.20 Driver's Side Compartments

5.20.1 The driver's side of the apparatus body shall have approximate dimensions of 84 inches long by 22½ inches high by 23 inches deep and contain two compartments. Independent from the body shall be one compartment mounted on top of the apparatus body. Rubber drain plugs shall be provided in the lower compartments to allow for ease of cleaning.

One forward compartment shall be provided with approximate inside dimensions of 30 inches wide by 22½ inches high by 23 inches deep. The door shall be vertically hinged as to have the hinge be toward the front of the apparatus and shall have a weather tight seal. The door shall be provided with one "D-Handle" door latch.

One aft compartment shall be provided with approximate inside dimensions of 54 inches wide by 22½ inches high by 23 inches deep. The door shall be a horizontally hinged drop down door. The door shall be provided with two "D-Handle" door latches.

5.20.2 One independent upper storage compartment shall be provided and installed above the two compartments, with approximate dimensions of 84 inches wide by 15½ inches high by 23 inches deep. The door shall be a horizontally hinged, overhead lift-up door, with a gas strut to remain open, and have a clear door opening of approximately 80 inches wide by 12 inches high. Dimensions shall be ± ¼-inch. The door shall be provided with two "D-Handle" door latches.

5.21 Fuel Storage Area

5.21.1 One well ventilated compartment shall be mounted under the platform body, forward of the rear wheels, equipped with a door that opens to the driver's side of the apparatus with the hinge being toward the front of the apparatus. The storage compartment shall have approximate dimensions of 18 inches wide by 18 inches high by 23 inches deep. This storage area shall be supplied with the ability to secure fuel containers. One stainless steel drip tray, of maximum length and width, shall be provided on the floor of the compartment with a 1-inch full perimeter lip. The compartment shall have a drain tube with a drip loop to prevent vapor ignition.

5.22 Driver Side Discharge and Pre-Connect Compartment

5.22.1 One compartment designated for the driver side discharge and pre-connected hose storage shall be provided and installed forward of the fuel storage compartment with approximate dimensions of 7 inches wide by 12 inches high by 23 inches deep. The compartment is designed to accommodate 50 feet of 1½-inch hose that is pre-connected inside the compartment and serves as an engine protection line. The discharge shall be positioned at the rear top of the compartment. The compartment door shall be vertically hinged and open to the rear of the apparatus.

5.23 Cooler Storage Area

- 5.23.1 A slide out rack shall be mounted on full extension ball bearing locking slides under the platform body behind the rear wheel on the driver's side. It shall have a minimum live load rating of 250 pounds. This slide out tray will securely hold a 40 quart cooler with approximate dimensions of 26 inches long by 14 inches wide by 16 inches deep. The door shall be vertically hinged on the forward side of the cooler box with two latches installed on the aft side of the cooler box.

5.24 Passenger's Side Compartments

- 5.24.1 The passenger's side of the apparatus body shall have approximate overall dimensions of 84 inches long by 22½ inches high by 23 inches deep and contain one compartment. Independent from the body shall be one compartment and one flow-through storage rack mounted on top of the apparatus body. Rubber drain plugs shall be provided in the lower compartments to allow for ease of cleaning.

One full length compartment shall be provided over the rear wheels, with approximate inside dimensions of 84 inches wide by 22½ inches high by 23 inches deep. The door shall be horizontally hinged drop down door and shall have a weather tight seal. The door shall be provided with two "D-Handle" door latches.

- 5.24.2 One independent upper forward storage compartment shall be provided and installed above the full length compartment, with approximate dimensions of 24 inches wide by 15½ inches high by 23 inches deep. The door shall be a horizontally hinged, overhead lift-up door, and have a clear door opening of approximately 22 inches wide by 12 inches high. Tolerances shall be ± 0.25-inch. The door shall be provided with one "D-Handle" door latch.
- 5.24.3 One storage cage shall be provided and installed above the storage compartment and aft of the upper storage compartment, with approximate dimensions of 60 inches wide by 15½ inches high by 23 inches deep. The storage cage shall be constructed of slotted material as to allow free air flow, and shall be open at the top. The passenger side segment of the storage cage shall be constructed with a continuous hinge that allows the top 10 inches to function as a drop-down door that shall open flat to the surface of the bottom storage compartment. The drop-down door shall be held shut by two lockable stainless latches (Hasp Style).
- 5.24.4 One independent storage compartment, constructed from 0.125-inch minimum aluminum alloy, shall be provided and installed on the rear portion of the platform under the hose reel. Approximate dimension for the storage compartment shall be 25½ inches wide by 6 inches high by 23 inches deep. The storage compartment shall be flush with the aft edge of the platform and the 84-inch compartment. The door and lid shall be designed as one piece to provide the largest clear door opening possible. The latching system shall consist of two SouthCo™ latches keyed to 1250. The storage compartment shall have:

- Internal, compartmentalized, drawer with full-extension ball bearing locking slides with a 100 pound load capacity.
 - Drawer will have 9 to 12 compartments that are separated by metal dividers.
- 5.24.5 The required hose reel shall be mounted to the top of this storage compartment. The storage compartment shall have the capacity to withstand the weight of the hose reel loaded with hose and full of water.

5.25 Compartment Lining

- 5.25.1 All enclosed side body compartments shall be coated inside with a spray on polyurethane bed liner, or Zolatone™, black or graphite in color, covering all exposed surfaces. Surfaces shall be coated to a depth of 1/8-inch to 1/4-inch.

5.26 Passenger Side Discharge and Pre-Connect Compartment

- 5.26.1 One compartment designated for the passenger side discharge and pre-connected hose storage shall be provided and installed below the platform forward of the tailboard/bumper with approximate dimensions of 12 inches wide by 7 inches high by 23 inches deep. The compartment is designated to accommodate 50 feet of 1½-inch hose that is pre-connected inside the compartment and serves as an engine protection line. The discharge shall be positioned at the center rear of the compartment. The compartment door shall be vertically hinged and open to the rear of the apparatus.

5.27 Compartment Doors

- 5.27.1 All compartment doors shall be integral in design and recessed into the apparatus body sides, 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.

5.28 Door Latches and Hardware

- 5.28.1 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 door latch assemblies shall be of a flush-mount, "D-Handle" design, with all external components fabricated from polished stainless steel. All latches shall be of a two-step 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.
- 5.28.2 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 or not a compartment is locked or unlocked. Ten spare keys shall be provided.

5.29 Door Hold Open Devices

- 5.29.1 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.
- 5.29.2 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.
- 5.29.3 All horizontally-hinged, drop-down, outward-opening compartment doors shall open to a 90 degree angle and be provided with two heavy duty chains encased in anti-rattle sheaths, one on each side of the compartment door opening. Each chain shall have a carabineer or detachable "S" hook on the door end that will hold the door open at 90 degrees to the body or allow the door to swing down 180 degrees.
- 5.29.4 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.
- 5.29.5 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.

5.30 Adjustable Shelf Channels

- 5.30.1 Vertically-mounted aluminum or steel Unistrut™ channels or composite shelving tracks shall be provided and installed in all enclosed body compartments, for the current or future installation of infinitely-adjustable shelving, slide out trays or equipment brackets.

5.31 Compartment Shelves

- 5.31.1 Six adjustable shelves shall be provided and installed in the completed body compartments. The shelving system shall be mounted on a track to allow the change of elevation. The shelves shall be 18 inches in depth, constructed of fiber composite, galvanized steel or aluminum and be capable of supporting 250 pounds of live load without being damaged or permanently distorted.
- 5.31.2 The shelf locations shall be as follows:

5.31.3 Two in the driver's side forward compartment

5.31.4 Two in the driver's side aft compartment

5.31.5 Two in the passenger's side full length compartment

5.32 Compartment Venting

5.32.1 The driver's side fuel storage compartment shall be vented at the door face and at the compartment rear wall.

5.32.2 The full length passenger side compartment shall be vented at the forward portion of the door face and at the compartment back wall.

5.32.3 Vents shall compliment fit and finish of the body and not impede door function.

5.33 Compartment Floor Mats

5.33.1 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® or Dri-Deck® brand floor mats meet this requirement.

6 — Pump and Plumbing

6.1 Pump, Plumbing, Controls, and Gauges

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 Plumbing Components

6.2.1 All plumbing components shall be fabricated from stainless steel with the exception of the tank-to-pump and tank fill, which will be brass and flex hose.

6.3 Fasteners and Adjustable Plumbing Brackets

6.3.1 All fasteners and adjustable plumbing brackets used shall be stainless steel. All tubing shall use metal fittings, rated to 500 P.S.I. and requiring no special tools. No underside nuts or bolts shall be used.

6.4 Pump Compartment Components

6.4.1 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.

6.5 Auxiliary Pump

6.5.1 A Briggs and Stratton™ Vanguard®, or equivalent, 23 horsepower, 2 cylinder, four-cycle, air cooled gasoline engine-powered fire pump shall be provided and isolation-mounted on the rear driver's side corner of the platform. 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. A WATERAX™ BB-4-23 or a Darley™ 1.5AGE23V-HP pump meets the requirements of this specification.

6.6 Pump Specifications

6.6.1 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.

6.6.2 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:

6.6.3 Capacities:

- 90 GPM at 150 P.S.I. net pump pressure

- 55 GPM at 250 P.S.I. net pump pressure
- 40 GPM at 300 P.S.I. net pump pressure
- 15 GPM at 375 P.S.I. net pump pressure

6.6.4 Tested under the following conditions:

- An elevation of not more than 2000 feet above sea level
- Through a single intake with 10 feet of 3-inch suction hose equipped with a suction hose strainer
- With a lift of 5 feet
- At 29.9 inches of mercury atmospheric pressure (corrected to sea level)
- At a water temperature of 60 degrees Fahrenheit

6.7 Fuel Cell

6.7.1 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 forward of the pump engine and insulated from direct contact with the apparatus body. The fuel tank volume shall be 4 to 6 gallons and shall be easily accessed for filling. The fuel tank shall meet applicable EPA, DOT, and CARB standards. The fuel spout shall be on the outboard driver's side.

6.8 Pump Option - Auxiliary Pump (Diesel Engine-Powered Pump)

6.8.1 A Darley™ 1-1/2 AGE or WATERAX™ BB-4-D902 fire pump, or equivalent, powered by a Kubota™ model DH902, or equivalent, 24.8 horsepower, four-cycle, water cooled diesel engine 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 arrestor.

6.8.2 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 or oil pressure drops too low.

6.9 Pump Specifications

6.9.1 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 2½-inch suction hose with a strainer and also from the apparatus water tank.

6.9.2 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:

6.9.3 Capacities:

- 105 GPM at 150 P.S.I. net pump pressure
- 70 GPM at 250 P.S.I. net pump pressure
- 40 GPM at 300 P.S.I. net pump pressure

6.9.4 Tested under the following conditions:

- An elevation of not more than 2000 feet above sea level
- Through a single intake with 20 feet of 3-inch suction hose equipped with a suction hose strainer
- With a lift of 5 feet
- At 29.9 inches of mercury atmospheric pressure (corrected to sea level)
- At a water temperature of 60 degrees Fahrenheit.

6.10 Pump and Plumbing Cover (Diesel-Powered Pump)

6.10.1 A cover shall be provided over the area at the rear of the body where the engine-driven pump and plumbing are located. The cover framework shall be fabricated from tubular aluminum, with the top of the framework being the same height as the side body compartments. The cover framework shall be painted to match the exterior of the body.

6.10.2 The top horizontal surface of the cover shall be overlaid with a panel fabricated from 0.125-inch aluminum tread plate, reinforced as required. This panel shall be hinged for access into the pump and plumbing area from above, and shall be held in the closed position by two pushbutton compression latches. The entire pump cover assembly shall be fully removable for major repairs to the pump, engine or plumbing.

6.11.3 A warning plate shall be permanently affixed to the top of the pump cover that shall read, "WARNING: NOT A STEP."

6.12 Rear Mounted Pump Operator's Panel

6.12.1 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. The operator panel shall be located a safe distance away from the pump motor exhaust system to protect the operator panel wiring and the pump operator from damage or bodily injury due to the heat radiating from the pump motor exhaust system. Exposed positive terminals shall be covered by a protective boot or otherwise protected from inadvertent contact.

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

- Pump engine ignition/start/stop controls

- Throttle control
- Primer control
- Compound 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
- Diesel pump engine only: Tachometer
- Pump engine oil pressure gauge
- Coolant temperature gauge
- Gasoline pump engine only:
 - a. Low oil pressure warning light
 - b. Low oil pressure override switch
- Lower water pressure override switch (protected toggle type)

6.13 Pump Panel Lights

- 6.13.1 Two white downward facing L.E.D. scene lights shall be provided to illuminate the rear pump operator's panel. One white L.E.D. scene light shall be provided to illuminate the valve area. This light shall be located in 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 L.E.D. lights meet this requirement.
- 6.13.2 One L.E.D. strip light shall be installed vertically on the back surface of the driver's side compartment near the pump panel for illumination of the valves and pump plumbing. FRC™ SUNSTRIP® L.E.D. strip lighting meets this requirement.

7 — Valves, Controls, Gauges, and Plumbing Requirements

7.1 Main Pump 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, or equivalent, swing-out style. 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 Victaulic™ couplings.
- 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 Victaulic™ coupling on at least one end of the hose. Pump-to-plumbing vibration isolation shall be provided by using either flexible hose connections or two Victaulic™ couplings on the intake and discharge of the pump. The nominal sizes of all of the plumbing supplying the pump and discharges shall be as follows:
- 7.1.7 Main suction — 2½-inch NH (diesel-powered pump) or 2-inch NPSH (gasoline-powered pump).
- Discharges — 1½-inch NH
- Hose reel — 1-inch NPSH
- 7.1.8 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.
- 7.1.9 The plumbing shall be arranged to allow a clear walkable area from the edge of the tailboard forward inboard of the hose reel. The platform surface shall be coated with a non-skid type material on the clear opening area.

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:

- 150 pounds per square inch
- 250 pounds per square inch
- 300 pounds per square inch

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 NWCG (National Wildfire Coordinating Group) "Water Handling Equipment Guide," latest edition. This labeling shall be accomplished through the use of identification tags. The tags shall be self-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 Compound Pressure Gauge

- 7.7.1 One 4-inch diameter 30-0-400 pounds per square inch glycerin-filled master compound pressure gauge shall be provided at the top of the operator's panel. The glycerin in the bourdon tube shall be retained by a flexible rubber plug. A Class 1® brand gauge, or equivalent, 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 Water Tank Level Electronic Gauges

- 7.8.1 One Fire Research™ (FRC) brand, Model WLA-200, 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 L.E.D. bar graph display.

7.9 Pump Cooler/By-Pass

- 7.9.1 A pump cooler/by-pass line, labeled #17 Pump Bypass, shall be plumbed from the discharge side of the pump to the water tank fill tower to help cool the pump when it is engaged and water is not being discharged. This line shall be plumbed through a quarter-turn panel-mounted ball valve. The valve shall be labeled "open" and "closed" and a warning label shall be affixed near the valve that states "pump damage can occur if valve is closed." The valve handle position shall be vertical when open and horizontal when closed. Water flow shall be between 1 and 1.5 gallons per minute at 150 pounds per square inch pump pressure. A check valve shall be included in the line to facilitate priming. A larger diameter line may be used with an orifice at the fill tower, provided the orifice can be removed for cleaning.

7.10 Priming Pump

- 7.10.1 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 vacuum at 2000 feet above sea level.
- 7.10.2 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."
- 7.10.3 The primer shall be connected to the priming port provided on the top of the pump inlet.

7.11 Stainless Intake Strainer

7.11.1 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-off cap to allow easy cleaning of the filter element in the field. The plumbing shall have two Victaulic™ couplings between the strainer and the pump for ease of service on the pump.

7.12 Discharge Locations

7.12.1 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 NSTM threads. The discharge valve shall be controlled at the valve with a TS style handle. The exposed threads on the discharge shall extend one inch beyond the leading edge of the tailboard

7.12.2 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 NSTM threads. The discharge valve shall be controlled at the valve with a TS style handle. The exposed threads on the discharge shall extend one inch beyond the leading edge of the tailboard.

7.12.3 One 1½-inch discharge, labeled “#3 Discharge,” plumbed to the on-board foam system, shall be provided on the passenger side of the apparatus below the platform immediately forward of the rear tailboard/bumper. The discharge shall be plumbed with stainless steel pipe or 1½-inch flexible high pressure hose, and shall terminate with 1½-inch NSTM threads. The discharge valve shall be controlled by a valve with a TS style handle, located at the rear of the apparatus.

7.12.4 One 1½-inch discharge, labeled “#3 Discharge,” plumbed to the on-board foam system, shall be provided on the driver's side of the apparatus immediately forward of the lower fuel storage module. The discharge shall be plumbed with stainless steel pipe or 1½-inch flexible high pressure hose, and shall terminate with 1½-inch NSTM threads. The discharge valve shall be controlled by a valve with a TS style handle, located at the rear of the apparatus.

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

7.13 Intake Location

7.13.1 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 2½-inch NSTM intake plumbed with 2½-inch piping to the intake side of the pump if equipped with a diesel-powered pump, and a 2-inch NPSH male intake plumbed with 2-inch piping to the intake side of the pump if equipped with a gasoline-powered pump. The exposed threads on the overboard suction line shall extend one inch beyond the leading edge of the tailboard on the gasoline-powered pump. A removable screen shall be installed in the intake to prevent debris from entering the pump.

7.14 Tank Fill

7.14.1 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.

7.15 Tank to Pump Line

7.15.1 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 2½-inch if equipped with a diesel-powered pump and a 2-inch if equipped with a gasoline-powered pump.

7.16 Booster Hose Reel

7.16.1 One booster hose reel, with a 70 amp breaker, and a capacity of 100 feet of 1-inch booster hose, shall be provided and installed at the rear passenger side of the platform deck, on top of the storage compartment as required. The hose reel frame and drum shall be fabricated of polished aluminum, 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. A Hannay™ brand, Model #SBEPF-24-23-24 or equivalent shall be installed.

7.16.2 The reel shall be provided with a ¾ horsepower, 12-volt electric motor for rewinding the hose on to the reel. The hose reel motor shall be located on the inboard side of the apparatus. This motor shall be controlled with one push button switch located at the hose reel. 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. A Cole-Hersee™ M-612 push button switch or equivalent shall be installed. The pump motor shall be installed underneath the hose reel on the gasoline-powered pump option.

7.16.3 One roller assembly, or equivalent, shall be provided on the aft end of the reel. A Hannay™ model FH3 roller assembly or equivalent shall be installed.

7.17 Foam Proportioning System

- 7.17.1 The pump system shall be provided with a Foam Pro™ model 1601 foam injection system, plumbed to the specified discharges. This product shall be an automatic foam proportioning system, with electronically controlled, direct concentrate injection occurring 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 percent to 0.5 percent 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 pounds per square inch at 200 gallons per minute. A microprocessor control device shall be provided which incorporates a closed-loop feedback signal for more accurate proportioning in variable flow conditions. 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.
- 7.17.2 The proportioner shall maintain accurate foam concentrate proportioning and injection rates over water discharge flows of 5 to 200 gallons per minute, and shall maintain accurate proportioning and injection rates throughout a range of 0 to 400 pounds per square inch. The proportioner shall be provided with a Foam Pro™ model 2660-0051 1½-inch flowmeter. It shall be installed using 1½-inch Victaulic™ couplings. 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 percent to 1.0 percent of the corresponding water discharge flow within the accuracy parameters recommended by NFPA.
- 7.17.3 The system shall be compatible with nozzle aspirating systems, where nozzle flow volumes must be adjustable on demand, while maintaining a constant quality foam solution.
- 7.17.4 Foam concentrate shall be provided from the onboard foam concentrate storage tank.
- 7.17.5 The foam system may be mounted in a protective housing but shall not be mounted in any of the driver or passenger side storage compartments.

7.18 Pump Performance Test and Certification

- 7.18.1 Upon completion, the apparatus shall undergo a complete pumping test that conforms to the requirements of NFPA Standard 1906 (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.

U.S.D.A. Forest Service
National Technology And Development Center, San Dimas

The results of the test shall be documented to establish the performance of the apparatus and to further insure that the unit shall 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.

- 7.18.2 As installed in the engine, 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 suction hose with a strainer and also from the apparatus water tank when installed on the apparatus. This shall be measured through both the #19 and #3 rear discharges.

8 — Water Tank

8.1 Fabrication

- 8.1.1 The water tank shall be fabricated from ½-inch thick, non-corrosive stress relieved polypropylene, natural black in color and U.V. stabilized for maximum protection. Materials used shall be compatible with firefighting foam, retardants and wetting agents.

8.2 Independent of the Platform Structure

- 8.2.1 The tank shall be completely independent of the platform structure and compartments and shall be equipped with lifting eyes to facilitate ease of removal.

8.3 Baffling

- 8.3.1 Full baffling is required in accordance with NFPA 1906 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. The height of the fill towers shall not exceed the top of the upper compartments.

8.4 Panel Sight Gauge

- 8.4.1 The end wall of the tank, closest to the pump mount location shall have a vertical translucent panel sight gauge.

8.5 Tank Over-Flow System

- 8.5.1 The tank shall have a vent over-flow 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 swirl. 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 detectors inside the tank.

8.6 Tank Drain

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

8.7 Clean Out Plug

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

8.8 Tank Capacity

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

8.9 Foam Tank

- 8.9.1 One 12-gallon capacity foam concentrate storage tank shall be provided and plumbed to the on- board foam system. The tank shall be fabricated from polypropylene 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.
- 8.9.2 The foam tank shall have a vertical translucent panel sight gauge that can be viewed by the operator while standing at the pump panel.

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. The following electrical components shall be provided and installed on the completed apparatus by the apparatus builder:

9.2 Lighting

9.2.1 All Lighting shall meet Federal Motor Vehicle Safety Standards. It is acceptable to utilize the existing light fixtures furnished with the cab and chassis. Clearance and identification lights shall be easily changed rubber-mounted, shock proof L.E.D., and meet FMVSS 108 requirements.

9.3 Tail Lights, Brake Lights

9.3.1 A pair of flush-mount round 4-inch red L.E.D. combination tail/brake lights shall be provided at the rear of the body, one on each side, below the platform outboard of the turn signal lights. The lights shall be attached with a rubber grommet. Grote™ brand SuperNova® series, or equivalent, shall be installed.

9.4 Turn Signal Lights

9.4.1 A pair of flush-mount round 4-inch amber L.E.D. turn signal lights shall be provided at the rear of the body, one on each side below the platform. The lights shall be attached with a rubber grommet. Grote™ brand SuperNova® series, or equivalent, shall be installed.

9.5 Back Up Lights

9.5.1 A pair of flush-mount round 4-inch clear L.E.D. back up lights shall be provided at the rear of the body, one on each side, below the platform inboard of the turn signal lights. The lights shall be attached with a rubber grommet. The back-up lights shall be wired so that they illuminate when the chassis is placed in reverse gear and/or when the rear flood light switch is activated in the cab. Grote™ brand SuperNova® series, or equivalent, shall be installed.

9.6 License Plate Bracket and Light

- 9.6.1 One clear light fixture, with license plate mounting bracket, shall be provided at the left rear of the body below the tail/brake/turn signal/back up lights.

9.7 Cluster/Clearance Lights and Reflectors

- 9.7.1 Three round ICC L.E.D. clearance lights shall be located at the rear of the apparatus below the draft tubes.
- 9.7.2 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.

9.8 Scene Lights

- 9.8.1 Two sealed beam incandescent flood lights, with toggle switch, shall be provided and installed, one each side of the apparatus on the rear cab protection rack. The mounting bracket shall enable full 360 degree rotation both in the horizontal and vertical axis. The flood lights shall be mounted on the lower outboard edge of the cab protection rack, and shall not block the view of the light bar. The mounting brackets shall be painted to match the apparatus body. Each light shall be wired to an individual scene light switch on the cab center console. Betts™ Model 305003 par 36 sealed beam incandescent flood lights or equivalent shall be installed. The lights shall be wired with a waterproof plug-in type connector located approximately three inches above lower edge of the mounting bracket and below the top of the mounting bracket to facilitate the replacement of the lights.

9.9 Compartment Lights

- 9.9.1 All compartments shall be equipped with plastic or silicone-encapsulated, shock resistant, continuous L.E.D. light strips. The L.E.D. strip lights shall be attached securely at the sides and top of each compartment opening. The L.E.D. lights within the strip shall be spaced no greater than 2½ inches apart. Each compartment shall have a door switch installed to activate compartment lighting when any door is opened.

10 — Electrical System Performance Test, Low-Voltage

10.1 General Test Requirement

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 purchaser 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 three tests defined below 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 purchaser at the time of delivery of the completed apparatus.

10.7.2 The test results shall consist of the following documents:

- Documentation of the electrical system performance tests.
- A written electrical load analysis, including the following:
- The nameplate rating of the alternator.
- The alternator rating under the conditions specified in NFPA 1906 (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 Body Color

11.1.1 The color of the chassis cab exterior and body shall be No. 14260 of Federal Standard No. 595 (Forest Service Green).

11.2 Vehicle Marking (Refer To Model 643P Standard Fire Vehicle Marking Drawing)

11.2.1 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 three-quarters 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.

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

11.2.3 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, three-quarters aft of the rear of the apparatus body.

11.2.4 The unit designator and equipment designator (Example: NC-NCF-E632) in 6-inch tall white letters, shall be provided on the compartment doors (aft compartment on driver's side), above the 4-inch stripe, on each side of the apparatus body.

11.2.5 The unit designator, in 4-inch tall letters, shall be provided centered on the swept back portion of the front bumper on the passenger's side, and the equipment designator, in 4-inch tall letters, shall be provided centered on the swept back portion of the front bumper on the driver's side.

11.2.6 The words "USDA," "FOREST SERVICE" in 1-inch tall white letters, "FIRE" in 4-inch tall white letters; and the unit designator and equipment designator (Example: NC-NCF-E632), in 4-inch tall white letters, shall be provided on the rear-facing surface of the upper compartment module on the driver's side. The lettering at the rear of the apparatus shall be arranged as follows:

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NC-NCF-E632

U.S.D.A. Forest Service
National Technology And Development Center, San Dimas

- 11.2.7 The unit designator (Example: NC-NCF), in 12-inch tall black letters, shall be provided on the cab roof, and the equipment designator (Example: E632), in 12-inch tall black letters, shall be provided on the cab roof below the unit designator.
- 11.2.8 The apparatus manufacturer shall install Government-supplied door decals in their entirety (FOR OFFICIAL USE ONLY, US GOVERNMENT, 10-inch shield and vehicle number) below the horizontal stripe on the forward chassis cab doors. There shall be no break in the stripe on the chassis cab doors

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:

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

12.2.3 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, hose reel, etc.)
- Pump Test Certificate, Weight Certificate, Service Parts Replacement List

12.3 Road Kit

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

12.3.2 One 5-pound Class B/C fire extinguisher with vehicle mounting bracket, shipped loose

12.3.3 One set of warning triangle reflectors, containing three folding reflectors in a plastic storage case

12.3.4 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. Zico™ Model #AC-32-W, or equivalent, shall be provided.

12.5 Wheel Chock Mounting Brackets

12.5.1 Two vertical wheel chock mounting brackets shall be installed on the rear tailboard, one on each side between the back-up lights and the draft tubes. Aluminum tread plate shall be provided above the mounting brackets to protect the paint from damage.

12.6 Hydrant Wrench Holder and Wrenches

12.6.1 One three-position captive latching type/hydrant/spanner wrench holder and hydrant wrenches shall be provided, but not installed. A National Firefighter™ brand model FEQ 148 hydrant wrench holder or equivalent shall be provided.

12.7 Drip Torch Tray

12.7.1 One aluminum drip tray shall be provided, but not installed. The tray shall be approximately 3 inches deep with a mounting plate to mount two vendor supplied drip torch retaining brackets.

12.8 Tool Bracket Mounting

12.8.1 Two Zico™ brand QM-CSM-L, or equivalent, chainsaw mounts shall be provided, but not installed.

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:

- 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.
- Failures resulting from the apparatus being operated in a manner or for a purpose not recommended by the apparatus manufacturer.
- Loss of time or use of the apparatus, inconvenience or other incidental expenses.
- 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.

14 — Standard Vehicle Marking Diagram

