SUGAR LOAF FIRE PROTECTION DISTRICT
Brush Truck Production Specification
SVI #859

Contents

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LIABILITY INSURANCE

Bidder shall furnish with the bid a certificate of insurance for;

Workman's Compensation and Employer's Liability Insurance covering for all employees.

General Liability (each occurrence) of $1,000,000.00. General Aggregate coverage of $2,000,000.00. Products Completed / Operations Aggregate coverage of $2,000,000.00. Medical Expense coverage of $5,000 (any one person). Personal Injury of $1,000,000.00.

Automobile liability of $1,000,000.00 combined single limit (each accident), including any auto, all owned autos, scheduled autos, hired autos, non-owned autos, and garage liability.

Excess Umbrella Liability coverage of $4,000,000.00 each occurrence, Aggregate of $4,000,000.00.
Garage Keepers Liability coverage of $4,500,000.00 combined limit.

All insurance policies must be;

- Maintained for the life of the contract,
- Must provide ten (10) days notice before cancellation,
- Must cover all operations of the contractor, or anyone employed by them.

INTERNET IN-PROCESS SITE

The Bidder shall post and maintain a website where the Sugar Loaf Fire Protection District will be able to view digital images of their apparatus as its being manufactured. The digital images shall be posted once a week starting when the body begins production or when the cab/chassis arrives and shall continue until the final completion of the apparatus.

VEHICLE STABILITY SUPPLIED WITH CAB/CHASSIS

The cab/chassis shall be equipped with a stability control system. The system shall have, at a minimum, a steering wheel position sensor, a vehicle yaw sensor, a lateral accelerometer and individual wheel brake controls.

ROADABILITY

The apparatus, when loaded to its estimated in-service weight, shall be capable of the following performance while on dry, paved roads that are in good condition:

1. From a standing start, the apparatus shall be able to attain a speed of 35 mph (55 km/hr) within 25 seconds on a level road.
2. The apparatus shall be able to attain a minimum top speed of 50 mph (80 km/hr) on a level road.
3. The apparatus shall be able to maintain a speed of at least 20 mph (32 km/hr) on any grade up to and including 6 percent.

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

If the combined water tank and foam agent tank capacities on the fire apparatus exceed 1250 gal (4732 L), or the GVWR of the vehicle is over 50,000 lb (22,680 kg), the maximum top speed of the apparatus shall not exceed either 60 mph (85 km/ hr) or the manufacturer's maximum fire service speed rating for the tires installed on the apparatus, whichever is lower.

SERVICEABILITY

The fire apparatus shall be designed to allow the manufacturer's recommended routine maintenance checks of lubricant and fluid levels to be performed by the operator without lifting the cab of a tilt-cab apparatus or without the need for hand tools.

Where special tools are required for routine service on any component of the apparatus, such tools shall be provided with the apparatus.

Apparatus components that interfere with repair or removal of other major components shall be attached with fasteners, such as cap screws and nuts, so that the components can be removed and installed with ordinary hand tools. These components shall not be welded or otherwise permanently secured into place.

CONSTRUCTION DOCUMENTATION

The contractor shall supply, at the time of delivery, at least one (1) copy of the following documents:

The manufacturers record of apparatus construction details, including the following information:

1. Owner's name and address
2. Apparatus manufacturer, model, and serial number
3. Chassis make, model, and serial number
    a. GAWR of front and rear axles and GVWR
    b. Front tire size and total rated capacity in pounds (kilograms)
    c. Rear tire size and total rated capacity in pounds (kilograms)
    d. Chassis weight distribution in pounds (kilograms) with water and manufacturer-mounted equipment (front and rear)
    e. Engine make, model, serial number, rated horsepower and related speed, and governed speed; and if so equipped, engine transmission PTO(s) make, model, and gear ratio
    f. Type of fuel and fuel tank capacity
    g. Electrical system voltage and alternator output in amps
    h. Battery make, model, and capacity in cold cranking amps (CCA)
    i. Chassis transmission make, model, and serial number; and if so equipped, chassis transmission PTO(s) make, model, and gear ratio
4. Pump make, model, rated capacity in gallons per minute (liters per minute where applicable), and serial number
5. Pump transmission make, model, serial number, and gear ratio
6. Auxiliary pump make, model, rated capacity in gallons per minute (liters per minute where applicable), and serial number
7. Water and Foam tank certified capacity in gallons or liters
8. Paint manufacturer and paint number(s)
9. Company name and signature of responsible company representative
10. If the apparatus is a mobile foam fire apparatus, the certification of foam tank capacity
11. Certification of compliance of the optical warning system
12. Siren manufacturer's certification of the siren
13. Written load analysis and results of the electrical system performance tests
14. Certification of slip resistance of all stepping, standing, and walking surfaces
15. If the apparatus has a fire pump, the pump manufacturer's certification of suction capability
16. If the apparatus is equipped with a fire pump and special conditions are specified by the purchaser, the pump manufacturer's certification of suction capacity under the special conditions
17. If the apparatus has a fire pump, a copy of the apparatus manufacturer's approval for stationary pumping applications
18. If the apparatus has a fire pump, the engine manufacturer's certified brake horsepower curve for the engine furnished, showing the maximum governed speed
19. If the apparatus has a fire pump, the pump manufacturer's certification of the hydrostatic test
20. If the apparatus has a fire pump, the certification of inspection and test for the fire pump
21. If the apparatus is equipped with an auxiliary pump, the apparatus manufacturer's certification of the hydrostatic test
22. When the apparatus is equipped with a water tank, the certification of water tank capacity
23. If the apparatus has an aerial device, the certification of inspection and test for the aerial device
24. If the apparatus has an aerial device, all the technical information required for inspections to comply with NFPA 1911, Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus
25. If the apparatus has a foam proportioning system, the foam proportioning system manufacturer's certification of accuracy and the final installer's certification the foam proportioning system meets this standard

26. If the system has a CAFS, the documentation of the manufacturer's pre delivery tests
27. If the apparatus has a line voltage power source, the certification of the test for the power source
28. If the apparatus is equipped with an air system, air tank certificates, the SCBA fill station certification, and the results of the testing of the air system installation
29. Any other required manufacturer test data or reports.

OPERATIONS AND SERVICE DOCUMENTATION

The Contractor shall deliver with the fire apparatus at least two (2) sets of complete operation and service documentation covering the completed apparatus as delivered and accepted.

The documentation shall address at least the inspection, service, and operations of the fire apparatus and all major components thereof.

The Contractor shall also deliver with the fire apparatus the following documentation for the entire apparatus and each major operating system or major component of the apparatus:

1) Manufacturer's name and address
2) Country of manufacture
3) Source for service and technical information
4) Parts replacement information
5) Descriptions, specifications, and ratings of the chassis, pump (if applicable), and aerial device (if applicable)
6) Wiring diagrams for low voltage and line voltage systems to include the following information:
   a) Pictorial representations of circuit logic for all electrical components and wiring
   b) Circuit identification
   c) Connector pin identification
   d) Zone location of electrical components
   e) Safety interlocks
   f) Alternator–battery power distribution circuits
   g) Input/output assignment sheets or equivalent circuit logic implemented in multiplexing systems
7) Lubrication charts
8) Operating instructions for the chassis, any major components such as a pump or aerial device, and any auxiliary systems
9) Precautions related to multiple configurations of aerial devices, if applicable
10) Instructions regarding the frequency and procedure for recommended maintenance
11) Overall apparatus operating instructions
12) Safety considerations
13) Limitations of use
14) Inspection procedures
15) Recommended service procedures
16) Troubleshooting guide
17) Apparatus body, chassis and other component manufacturer's warranties
18) Special data required by this standard
19) A material safety data sheet (MSDS) for any fluid that is specified for use on the apparatus

The Contractor shall deliver with the apparatus all manufacturer's operations and service documents supplied with components and equipment that are installed or supplied by the Contractor.

NFPA REQUIRED DOCUMENTATION FORMAT - CD-ROM

The vehicle construction details and the operations and service documentation as required per NFPA 1901 latest edition shall be provided on a CD-ROM. These manuals shall be divided into sections for ease of reference. There shall be two (2) copies of the CD-ROM provided with the completed vehicle.

	Chassis GVWR		Storage Area		Equipment Weight		Ground Clearance	
Apparatus Type	**lb.**	**kg.**	**ft.3**	**m3**	**lb.**	**kg.**	**in.**	**mm.**
Wildland Fire Apparatus	15,000	7,000	20	0.56	200	90	12	300
	15,001 - 20,000	7,001 - 9,000	50	1.42	500	225	13	330
	20,001 - 26,000	9,001 - 12,000	50	1.42	500	225	15	380
	>26,000	>12,000	75	2.12	750	340		
Wildland Mobile Water Supply Fire Apparatus	All	All			200	90		

TESTING

ROAD TEST

Road test shall be conducted in accordance with this section to verify that the completed apparatus is capable of compliance with Roadability Section.

The tests shall be conducted at a location and in a manner that does not violate local, state or provincial or federal traffic laws.

The tests shall be conducted on dry, level, paved roads that are in good condition. The apparatus shall be loaded to its estimated in service weight.

The engine shall not operate in excess of the maximum governed speed. Acceleration tests shall consist of two runs in opposite directions over the same route. The fire apparatus shall attain a speed of 35 mph (55 km/hr) from a standing start within 25 seconds. The fire apparatus shall attain a minimum top speed of 50 mph (80 km/hr).

If the apparatus is equipped with an auxiliary braking system, the Body Manufacturer shall road test the system to confirm that the system is functioning as intended by the auxiliary braking system manufacturer.

If the apparatus is equipped with an air brake system, the service brakes shall bring the apparatus, when loaded to its GVWR, to a complete stop from an initial speed of 20 mph (32.2 km/hr) in a distance not exceeding 35 ft (10.7 m) by actual measurement on a paved, level, dry surface road that is free of loose material, oil or grease.

If the apparatus is equipped with a hydraulic brake system, the service brakes shall bring the apparatus, when loaded to its GVWR, to a complete stop from an initial speed of 30 mph (48.2 km/hr) in a distance not exceeding 88 ft (26.8 m) by actual measurement on a paved, level, dry surface road that is free of loose material, oil or grease.

LOW VOLTAGE - ELECTRICAL SYSTEM PERFORMANCE TEST

The vehicles low voltage electrical system shall be tested and certified by the manufacturer. The certified test results shall be delivered with the completed vehicle. Tests shall be performed when the air temperature is between 0°F and 110°F (–18°C and 43°C).

TEST SEQUENCE

The following three (3) tests shall be performed in the order in which they appear below. Before each test, the batteries shall be fully charged until the voltage stabilizes at the voltage regulator set point and the lowest charge current is maintained for ten (10) minutes. Failure of any of these tests shall require a repeat of the sequence.

1. RESERVE CAPACITY TEST

The engine shall be started and kept running until the engine and engine compartment temperatures are stabilized at normal operating temperatures and the battery system is fully charged. The engine shall be shut off and the minimum continuous electrical load shall be activated for ten (10) minutes.

All electrical loads shall be turned off prior to attempting to restart the engine. The battery system shall then be capable of restarting the engine. Failure to restart the engine shall be considered a test failure of the battery system.

2. ALTERNATOR PERFORMANCE TEST

TEST AT IDLE

The minimum continuous electrical load shall be activated with the engine running at idle speed. The engine temperature shall be stabilized at normal operating temperature. The battery system shall be tested to detect the presence of battery discharge current. The detection of battery discharge current shall be considered a test failure.

TEST AT FULL LOAD

The total continuous electrical load shall be activated with the engine running up to the engine manufacturer’s governed speed. The test duration shall be a minimum of two (2) hours. Activation of the load management system shall be permitted during this test.

An alarm sounded by excessive battery discharge, as detected by the warning system required in 13.3.4, or a system voltage of less than 11.8 V dc for a 12 V nominal system, 23.6 V dc for a 24 V nominal system, or 35.4 V dc for a 42 V nominal system for more than 120 seconds shall be considered a test failure.

3. LOW VOLTAGE ALARM TEST

The following test shall be started with the engine off and the battery voltage at or above 12 V for a 12 V nominal system, 24 V for a 24 V nominal system or 36 V for a 42 V nominal system.

With the engine shut off, the total continuous electrical load shall be activated and shall continue to be applied until the excessive battery discharge alarm activates. The battery voltage shall be measured at the battery terminals.

The test shall be considered a failure if the alarm does not sound in less than 140 seconds after the voltage drops to 11.70 V for a 12 V nominal system, 23.4 V dc for a 24 V nominal system, or 35.1 V for a 42 V nominal system.

The battery system shall then be able to restart the engine. Failure to restart the engine shall be considered a test failure.

LOW VOLTAGE - ELECTRICAL SYSTEM PERFORMANCE TEST

DOCUMENTATION

The manufacturer shall deliver the following with the fire apparatus:

1. Documentation of the electrical system performance tests
2. A written electrical load analysis, including the following:
    a. The nameplate rating of the alternator
    b. The alternator rating
    c. Each of the component loads specified that make up the minimum continuous electrical load
    d. Additional electrical loads that, when added to the minimum continuous electrical load, determine the total continuous electrical load
    e. Each individual intermittent electrical load

WARRANTY

A full statement shall be provided of the warranties for the vehicle(s) being bid. Warranties should clearly describe the terms under which the vehicle manufacturer accepts responsibility for the cost to repair defects caused by faulty design, quality of work or material and for the applicable period of time after delivery.

Cost of repairs refers to all costs related thereto including, but not limited to, the cost of materials and the cost of labor.

The Body Manufacturer shall warrant all materials and accessories used on the vehicle(s), whether fabricated by manufacturer or purchased from an outside source and will deal directly with the Sugar Loaf Fire Protection District on all warranty work.

GENERAL LIMITED WARRANTY - TWO (2) YEARS

The vehicle shall be free of defects in material and workmanship for a period of two (2) years or 36,000 miles (or 57,936 kilometers), whichever occurs first starting thirty (30) days after the original invoice date.
The Contractor must be the "single source" coordinator of all warranties on the vehicle.

LOW VOLTAGE ELECTRICAL WARRANTY - FIVE (5) YEARS

The vehicle low voltage electrical system shall be free of defects in material and workmanship for a period of five (5) years or 60,000 miles (or 96,561 kilometers), whichever occurs first, starting thirty (30) days after the original invoice date.

STRUCTURAL WARRANTY - TEN (10) YEARS

The body shall be free of structural or design failure or workmanship for a period of ten (10) years, or 100,000 miles (or 160,934 kilometers), whichever occurs first, starting thirty (30) days after the original invoice date.

GRAPHICS LIMITED WARRANTY

The 3M graphics installation shall be warranted for a period of two (2) years. The 3M materials installed on completed vehicle shall be warranted for seven (7) years. The 3M Diamond grade film (if specified) shall be warranted for ten (10) years.

DARLEY THREE YEAR PUMP WARRANTY

The fire pump shall be warranted by Darley for a period of three (3) years from the date of delivery to the Sugar Loaf Fire Protection District.

UPF POLY WATER TANK WARRANTY

The UPF poly water tank shall be provided with a lifetime material and workmanship limited warranty. The manufacturer shall supply details of their warranty information with their bid submission.

CONSTRUCTION PERIOD

The completed vehicle shall be delivered within one hundred fifty (150) days after receipt of a purchase order or contract.

Contractor shall not be held liable for delays of chassis delivery due to accidents, strikes, floods or other events not subject to their control. Contractor shall provide immediate written notice to Sugar Loaf Fire Protection District as to delays and to what extent these delays have in completing vehicle within the stated construction time period.

SUGAR LOAF FIRE PROTECTION DISTRICT
Brush Truck Production Specification
SVI #859

OVERALL HEIGHT

The overall height (OAH) of the vehicle shall be approximately 100“ (8' - 4") from the ground. This measurement shall be taken on flat ground with the tires properly inflated, in the unloaded condition, at that highest point of the vehicle.

OVERALL LENGTH

The overall length (OAL) of the vehicle shall be approximately 265“ (22' - 1").

OVERALL WIDTH

The overall width (OAW) of the body at drip rails shall be 98" (8' - 2"), and body shall be 96" (8' - 0").

DELIVERY AND DEMONSTRATION

The Contractor shall be responsible for the delivery of the completed unit to the Sugar Loaf Fire Protection District's location. On initial delivery of the apparatus, the Contractor shall supply a qualified representative to demonstrate the apparatus and provide initial instruction to representatives of the Sugar Loaf Fire Protection District regarding the operation, care and maintenance of the apparatus and equipment supplied at Sugar Loaf Fire Protection District location.

The Delivery Engineer shall set delivery and instruction schedule with the person appointed by Sugar Loaf Fire Protection District.

After delivery of the apparatus, the Sugar Loaf Fire Protection District shall be responsible for ongoing training of its personnel to proficiency regarding the proper and safe use of the apparatus and associated equipment.

SUGAR LOAF FIRE PROTECTION DISTRICT
Brush Truck Production Specification
SVI #859

CAB CHASSIS SPECIFICATIONS

MANUFACTURER: Ford

Model: 2013 (OR LATEST MODEL YEAR) F550 Super Duty, Super Cab, 4 x 4

G.V.W.R.: 19,500 lbs., Payload Plus Upgrade

FRONT AXLE:

Rating: 7,000 lbs.

Type: Dana Super 60 mono beam drive axle, or equal

Shocks: Heavy duty

Front Springs: 4.1" Diameter Coil, 7,000 lb. capacity

Steering: Power

REAR AXLE:

Rating: 14,700 lbs.

Type: Dana S130 or equal full floating with 4.88 ratio, Limited-slip, and Stabilizer bar

Rear Springs: Two-stage, 14,700 lb. capacity

Shocks: Heavy duty

BRAKES:

Type: Four-wheel power disc brakes with four-wheel ABS system

Parking Brake: Cable actuation, foot operated, hand release

TIRES AND WHEELS:

Front Tires: (2) LT225/70R 19.5, Max Trac Tread

Rear Tires: (4) LT225/70R 19.5, Max Trac Tread

Wheels: 19.5", 10-hole steel disc

FRAME:

Type: Single channel

Rating: 36,000 PSI steel, 17.2 section modulus

SUGAR LOAF FIRE PROTECTION DISTRICT
Brush Truck Production Specification
SVI #859

CHASSIS SPECIFICATIONS

ENGINE:

Manufacturer: Ford

Model: 6.7 L Power Stroke Turbo Diesel

Rating: 400 GHP @ 2,800 RPM, 800 GT @ 1,600 RPM

Engine Equipment: 50 State Emissions with Clean Idle Decal, Heavy duty dry type air cleaner, fuel filter, horizontal muffler and exhaust, block heater.

TRANSMISSION:

Manufacturer: Ford HD TorqShift

Type: Automatic, NO PTO provisions

Speeds: 6 - speed forward with overdrive
1 - speed reverse

Transfer Case: New Venture 271 or equal, Hi/Lo, manual hubs, with fuel tank skid plate

ELECTRICAL:

Alternator: 200 amp

Battery: Dual maintenance free 78 amp/hr, 750 CCA each

FUEL TANK:

Size: 40 total gallons

Location: Mid ship mounted aft of rear axle

DEF TANK:

Size: 6 total gallons

Location: Mid ship frame mounted

SUGAR LOAF FIRE PROTECTION DISTRICT
Brush Truck Production Specification
SVI #859

CAB SPECIFICATIONS

Cab Type: Super cab with XL trim interior, Snow Plow Package

Cab Equipment: Heater and defroster, air conditioning, dome light, sun visor, electric horn, all clearance lights and identification lights required by State and Federal Department of Transportation and all standard equipment, Speed control, Tilt steering wheel, Power door locks, Power windows, Remote keyless entry, AM/FM stereo/clock, Driver air bag SRS system.

Cab Instruments and Gauge: Fuel, Odometer, Tachometer, Engine oil pressure, Engine water temperature, Volt meter.

Front Seats: Front high back 40/20/40 cloth bench seats with 3-point seat belts.

Rear Seats: Rear flip down seats with 3-point seat belts.

Cab Mirrors: Door mounted telescopic, powered adjustable black camper tow mirrors

Cab Glass: Tinted solar glass

Bumper: Chromed steel

Grille: Chrome

Windshield Wipers: 2-speed electric with washers

Cab Color: Ford Red

Cab Interior Color: Medium Flint

Floor Mats: Rubber floor mats in lieu of carpet

Tow Package: High trailer tow

WARRANTY:
Bumper to Bumper: 3 years / 36,000 miles
Powertrain: 5 years / 60,000 miles
Safety Restraint System: 5 years / 60,000 miles
Corrosion (Perforation only): 5 years / Unlimited miles
Roadside Assistance Program: 5 years / 60,000 miles

CAB TO AXLE DIMESION

Cab to axle will be 60”.

CAB/CHASSIS PREPAYMENT

The specified cab/chassis shall be prepaid by Sugar Loaf Fire Protection District within 30 days of invoice. Sugar Loaf Fire Protection District understands that if payment is made after 30 days, additional interest charges may apply.

CHASSIS MODIFICATIONS

LUBRICATION AND TIRE DATA PLATE

A permanent label in the driving compartment shall specify the quantity and type of the following fluids used in the vehicle and tire information:

- Engine oil
- Engine coolant
- Chassis transmission fluid
- Pump transmission lubrication fluid . . (if applicable)
- Pump priming system fluid, if applicable . . (if applicable)
- Drive axle(s) lubrication fluid
- Air conditioning refrigerant . . (if applicable)
- Air conditioning lubrication oil . . (if applicable)
- Power steering fluid
- Cab tilt mechanism fluid . . (if applicable)
- Transfer case fluid . . (if applicable)
- Equipment rack fluid (if applicable)
- CAFS air compressor system lubricant . . (if applicable)
- Generator system lubricant . . (if applicable)
- Front tire cold pressure
- Rear tire cold pressure
- Maximum tire speed ratings

VEHICLE DATA PLATE

A permanent label in the driving compartment which indicates the following:

- Filter part numbers for the;
  - Engine
  - Transmission
  - Air
  - Fuel
  - Serial numbers for the;
  - Engine
  - Transmission
  - Delivered Weights of the Front and Rear Axles
  - Paint Brand and Code(s)
  - Sales Order Number

OVERALL HEIGHT, LENGTH DATA PLATE (US)

The fire apparatus manufacturer shall permanently affix a high-visibility label in a location visible to the driver while seated.

The label shall show the height of the completed fire apparatus in feet and inches, the length of the completed fire apparatus in feet and inches, and the GVWR in pounds.

Wording on the label shall indicate that the information shown was current when the apparatus was manufactured and that, if the overall height changes while the vehicle is in service, the fire department must revise that dimension on the plate.

ACCIDENT PREVENTION

There shall be a placard in the cab seating area which reads, "ALL OCCUPANTS MUST BE SEATED AND BELTED WHEN THE APPARATUS IS IN MOTION".

PERSONNEL CAPACITY

A label that states the number of personnel the vehicle is designed to carry shall be located in an area visible to the driver.

ACCIDENT PREVENTION

If the rear bumper is 8" deep or more, there shall be a placard on the rear face of the body, in clear sight from the ground, which reads, "WARNING - DO NOT RIDE ON STEPS OR DECK AREAS WHILE THE APPARATUS IS IN MOTION. DEATH OR SERIOUS INJURY MAY RESULT".

WEARING HELMET WARNING

A label stating “DO NOT WEAR HELMET WHILE SEATED” shall be visible from each seating location.

FRONT BUMPER REPLACMENT

The factory Ford bumper shall be removed and replaced with a Buck Stop Classic I front bumper/brush guard with fully enclosed winch area, a winch access cover door, frenched light buckets, OEM tow hook mounts, and a license plate bracket. Complete unit shall have a hammer-tone black powder coat painted finish.

The factory Ford bumper shall ship loose with the completed apparatus.
SHOP NOTES
Verify that the factory bumper shall ship loose with the completed apparatus.

FRONT MOUNTED WINCH

The bumper extension shall be equipped with a Warn M12000, 12 volt electric, 12,000 lb. capacity winch.

The control of the winch shall be with a plug-in remote control unit. The unit shall have 12' of control cable, with forward, neutral and reverse dead man type hand control.

The winch shall be equipped with 125' of 3/8" galvanized cable. The cable shall end with a clamped type loop and a drop forged heavy duty hook. The cable shall feed through a full captive type 4-way roller and guide assembly.

FRONT BUMPER NOZZLES

Two (2) spray nozzles shall be provided at the front bumper, one (1) on each end of the bumper. These nozzles shall be plumbed to a discharge on the Darley pump module.
SHOP NOTES
Verify nozzle plumbing to Darley Pump Module.

FRONT TOW PROVISIONS

The front tow provisions shall be supplied and installed by the cab/chassis manufacturer.

EXHAUST

The existing exhaust tailpipe shall be modified from the stock location by cutting the pipe and adding a connector and band clamp.

The exhaust piping and discharge outlet shall be located or shielded so as not to expose any portion of the apparatus or equipment to excessive heating.

Exhaust pipe discharge shall be directed away from any operator's position.

Where parts of the exhaust system are exposed so that they are likely to cause injury to operating personnel, protective guards shall be provided.

SUGAR LOAF FIRE PROTECTION DISTRICT
Brush Truck Production Specification
SVI #859

WHEELS

The chassis shall be converted from single front and dual stock wheels/tires to super single front and rear wheels/tires. The front and rear tracks must be the same width.

The six (6) stock wheels shall be removed and replaced with four (4) Firematic BRAT, 13.5 x 19.5 steel wheels. The rims shall be third party certified by Standard Testing Labs. The wheels shall be powdercoat painted hammer-tone black prior to installation on tire set and the completed unit. Wheels shall be rated for 6,400 pounds each.

The factory Ford wheels/tires shall ship loose with the completed apparatus.
SHOP NOTES
Verify that the factory Ford wheels/tires shall ship loose with the completed apparatus.

TIRES

The super single wheels aboveshall be fitted with (4) Interco Tire Company IROK Super Swamper (or equal) custom 36x13.5-19.5 rugged On/Off road, load range H, 16 ply tires. Tires shall be rated for 6,400 pounds each.

SPARE TIRE/WHEEL

One (1) matching spare tire/wheel will be provided with completed unit.

GROUND CLEARANCE

A Fabtech (or equal) 6" suspension lift shall with front torsion bars shall be provided to allow for proper wheel well clearance for 36" diameter tires. The components shall be readily available, and not custom built. Payload must not be adversely affected by any changes in the suspension. Drive lines must not be adversely affected by any changes in the suspension.

Ensure that the tires will not contact any part of the body when turned to maximum on uneven grounds such as going through a ditch or other rough terrain.
SHOP NOTES
Ensure that the tires will not contact any part of the body when turned to maximum on uneven grounds such as going through a ditch or other rough terrain.

FENDER FLARES

Fender flares shall be provided to protect both cab and the body.

RADIO/ANTENNA INSTALLATION

There shall be one (1) Sugar Loaf Fire Protection District supplied radio(s) with antenna installed in the cab within easy reach of driver. The location of radio shall be determined by the Sugar Loaf Fire Protection District at the chassis arrival to SVI.
Radio shall be installed per Manufacturer's requirements and wired for proper 12 volt power and ground.
SHOP NOTES
Radio location TBD at chassis arrival to SVI.

SEAT BELT COLOR AND MOUNTING

Section 14.1.3.4 of the NFPA 1901 Standards, 2009 edition, requires all seat belt webbing in cab to be bright red or bright orange in color, and the buckle portion of the seat belt shall be mounted on a rigid or semi rigid stalk such that the buckle remains positioned in an accessible location.

Per Sugar Loaf Fire Protection District specification for a commercial chassis, this emergency vehicle may not have the required seat belt webbing colors or buckle in an accessible location. These belts may not provide visibility to driver that seat belts are on or buckle is easily accessible. This specifications for an emergency fire apparatus for these seat belts shall be non-compliant to NFPA 1901 standards, effective at the time of the bid opening.

SEAT BELT WEB LENGTH - COMMERCIAL CAB

Sections 14.1.3.2 and 14.1.3.3 of the NFPA 1901 standards, 2009 edition, require the effective seat belt web length for a Type 1 lap belt for pelvic restraint to be a minimum of 60", and a Type 2 pelvic and upper torso restraint-style seat belt assembly to be a minimum of 110".

The chassis seat belt web length as supplied by the commercial chassis manufacturer shall be compliant to NFPA Standards 14.1.3.2 and 14.1.3.3.

Per Sugar Loaf Fire Protection District specification for a commercial chassis, this emergency vehicle may not have seat belts of this required length. These belts may not provide sufficient length for large firefighters in bunker gear. This specification for an emergency fire apparatus for these seat belts shall be non-compliant to NFPA 1901 standards, effective at the time of the bid opening.

SEAT BELT MONITORING SYSTEM - COMMERCIAL CAB

Section 14.1.3.10 of the NFPA 1901 Standards, 2009 edition, requires that a seat belt warning system be provided. The seat belt warning device is intended to assist the driver or officer in determining whether all occupants are seated and belted before the vehicle is driven.

Per Sugar Loaf Fire Protection District specification for a commercial chassis, this emergency vehicle may not have a seat belt monitoring system. Without this device, the driver must manually determine that all occupants are seated and belted before the apparatus is placed in motion. This specification for an emergency fire apparatus for the seat belt monitoring system shall be non-compliant to NFPA 1901 standards, effective at the time of the bid opening.

IGNITION KEY

If the vehicle is specified to have an ignition key it will be attached to steering column or dash with vinyl covered steel cable.

SIX (6) – LED TIRE PRESSURE VISUAL INDICATORS

Each tire shall be equipped with a VECSAFE heavy duty valve cap (or equal) LED indicator that indicates proper tire pressure.

CAB RUNNING BOARDS

The chassis shall be provided with running boards steps each side below the cab doors. The running board framework shall be constructed of 3" diameter aluminized steel tubing with 6" radius at front and rear bolted to chassis frame. Frame shall be able to support 300 lb. person. Open ends of tubing shall have 3" plastic caps to prevent water and dirt from accumulating inside tubing. All framework components shall be powder coat painted hammer-tone black.

Stepping surface shall be minumum 8" deep and covered with aluminum Diamond Back anti-slip material with large drain holes to prevent water from accumulating on the surface.

Steps shall to be the full length of the door openings on both sides.

MUDFLAPS

There shall be rubber mudflaps furnished and installed behind each set of tires.

ROAD EMERGENCY SAFETY KIT

One (1) set of three (3) dual faced triangular warning flares with fold away base complete with storage case per DOT requirements shall be provided with the completed apparatus.

One (1) 2.5 lb. ABC type vehicle fire extinguisher with bracket per DOT requirements shall be provided with the completed apparatus.

FUEL FILL

There shall be one (1) fuel fill located on the top deck or side panel of the body. The fill door shall have a permanent label with the text "DIESEL FUEL ONLY".

DEF FLUID FILL

There shall be one (1) DEF fluid fill located on top or in a side panel of the body. The fill guard shall have an open face and a permanent label with the text "DEF ONLY".

BODY DESIGN

The importance of public safety associated with emergency vehicles requires that the construction of this vehicle meet the following specifications. These specifications are written to establish the minimum level of quality and design. All Bidders shall be required to meet these minimum requirements.

It is the intent of these specifications to fully describe the requirements for a custom built emergency type vehicle. In order to extend the expected service life of this vehicle, the body module shall be removable from the chassis frame and be capable of being installed on a new chassis.

The sheet metal material requirements, including alloy and material thickness, throughout the specifications are considered to be a minimum. Since such materials are available to all Manufacturers, the material specifications shall be strictly adhered to.

The fabrication of the body shall be formed sheet metal. Formed components shall allow the Sugar Loaf Fire Protection District to have the body repaired locally in the case where any object has struck the body and caused damage. The use of proprietary extrusions will prevent the Sugar Loaf Fire Protection District from such repair and shall NOT be used.

Following construction of the subframe, which supports the apparatus body, the sheet metal portion of the body shall be built directly on the subframe. The joining of the subframe and body shall be of a welded integral construction.

The sheet metal fabrication of the body shall be performed using inert gas continuous feed welders only. The entire body shall be welded construction. The use of pop rivets in any portion of structural construction may allow premature failure of the body structure. Therefore, pop rivets shall NOT be used in the construction of the structural portions of the body. This includes side body sheets, inner panels of compartment doors, and any other structural portions of the body.

SUGAR LOAF FIRE PROTECTION DISTRICT
Brush Truck Production Specification
SVI #859

EXTERIOR ALUMINUM FLAT BED BODY

The fabrication of the body shall be constructed from aluminum 3003H-14 alloy tread plate. This shall include compartment front panel, vertical side sheets, rear panels and compartment door frames.

The body compartments shall be a modular design and bolted in place for ease of replacement, if necessary. Compartments shall be constructed with not less than 1/8" (.125) aluminum 3003H-14 smooth plate. Lighter gauge sheet metal will not be acceptable in these areas.

The front and rear body corners shall be formed as part of the front or rear body panels. The front corners of body shall have an 8" 45 degree angle. This provides a stronger body corner and finished appearance. The use of extruded corners, or caps will not be acceptable, No Exceptions.

One-way rubber drain valves shall be provided in compartment floors so that a water hose may be used to flush-out compartment area.

All exterior seams in sheet metal below frame, and around the rear wheel well area shall be welded continuous to prevent moisture from entering compartments. All other interior seams and corners shall be sealed with silicone based caulk prior to painting.

Only stainless steel bolts, nuts, and sheet metal screws shall be used in mounting exterior trim, hardware and equipment.

Exterior compartments shall have louvers in lower back wall of compartment for ventilation.

BODY SUBFRAME

The body subframe shall be constructed from 6061T6 aluminum alloy tubing. Subframe shall consist of two (2) 2" x 4" x 1/8" aluminum tubes minimum, the same width as the chassis frame rails. Welded to this tubing shall be cross members of 2" x 4" x 1/8" aluminum. Smaller dimension, lighter gauge tubing or angle material subframe shall not be accepted.

These cross members shall extend the full width of the body to support the compartments. Cross members shall be located at front and rear of the body, below compartment divider walls, and in front and rear of wheel well opening. Additional aluminum cross members shall be located on 16" centers, or as necessary to support walkway or heavy equipment.

To form the frame, the tubing shall be beveled and welded at each joint using 5356 aluminum alloy welding wire.

BODY MOUNTING

For optimum chassis frame and body life, the body subframe shall be fastened to the chassis frame with a minimum of four (4) 1/2" x 2" strap mounts, welded to the body subframe. The straps shall be bolted to the chassis frame work utilizing 1/2" Grade 8 bolts.

8" REAR STEP BUMPER

The full width rear bumper shall be constructed from 2" x 2" x 1/4" aluminum tubing frame and covered with 3/16" NFPA compliant aluminum tread plate. The bumper shall extend from the rear vertical body panel 8" and provide a rear step with a minimum of 1/2" space at body for water drainage.

REAR TOW EYES

There shall be two (2) heavy duty rear mounted tow eyes securely attached to the body subframe, below the apparatus body. The tow eyes shall be fabricated from 3/4" thick steel plate and shall have a black powder coat finish.

TRAILER HITCH

A Class III, 7,500 lbs. weight carrying capacity (gross trailer weight) rear hitch receiver shall be provided below the rear bumper. The receiver shall be attached to the apparatus body frame.

The hitch shall be complete with a 2" square receiver. Without the use of a "weight distribution" ball hitch the Class III receiver shall have a capacity of 5,000 lbs. gross trailer weight and a maximum tongue weight of 500 lbs.

A label shall be provided in a location in which it is visible to an operator making trailer connections. The label shall state the maximum GVWR and tongue weight of the trailer that can be safely towed with the hitch system.

Two (2) safety chain attachment points shall be provided near the hitch point for hitches designed to use safety chains, each designed with an ultimate strength of not less than the maximum GVWR specified on label.

TRAILER ELECTRICAL RECEPTACLE

For hydraulic brake equipped or electric brake equipped trailer towing capability, a primary electrical receptacle shall be provided near the hitch point and shall match the umbilical cable specified. Receptacle shall be a 7-Way Blade Type socket, the same as used on most Light Duty Trucks and RV’s.

TRAILER AUXILIARY ELECTRICAL RECEPTACLE

An auxiliary electrical receptacle shall be provided near the hitch point and shall match the umbilical cable specified for optical warning lights. Receptacle shall be a 7-Way Pin Type Socket, ISO3731 compliant with a reverse ground terminal.

GROUND LIGHTS

There shall be two (2) OnScene 9" Premium LED light(s) installed below bumper capable of providing illumination at a minimum level of 2 fc (20 lx) on ground areas within 30 in. (800 mm) of the edge of the vehicle in areas designed for personnel to climb onto or descend from the vehicle to the ground level.

Lighting shall be switchable but activated automatically when the vehicle park brake is set.

WHEEL WELL EXTERIOR PANEL

The exterior panel of the body wheel well enclosure shall be constructed from 3/16" aluminum treadplate panels.

BODY WHEEL WELL OPENING

The body wheel well openings shall be provided with black poly plastic fender flares. The fender flares shall be bolted and easily replaceable if damaged.

WHEEL WELL LINERS

The wheel wells shall be constructed by the compartment walls that surround the wheel well area. The interior wheel well area shall be designed so that it does not accumulate dirt or water.

BODY PAINT SPECIFICATIONS

BODY PAINT PREPARATION

After the body and components have been fabricated they shall be disassembled prior to painting so when the vehicle is complete there shall be finish paint beneath the removable components. The body shall be totally removed from chassis during the paint process to insure the entire unit is covered. The body and components shall be metal finished as follows to provide a superior substrate for painting.

The exterior body shall undergo a thorough cleaning process starting with a biodegradable phosphoric acid solution to begin the etching process followed by a complete clear water rinse. The next step shall consist of a chemical conversion coating applied to seal the metal substrate and become part of the metal surface for greater film adhesion. If the compartment interior is to be painted the interior shall be acid etched as described above then primed with an epoxy primer and all seams caulked.

All bright metal fittings, if unavailable in stainless steel or polished aluminum, shall be chrome plated. Iron fittings shall be copper under plated prior to chrome plating.

SUGAR LOAF FIRE PROTECTION DISTRICT
Brush Truck Production Specification
SVI #859

PAINT PROCESS

The paint process shall follow the strict standards set forth by PPG Industries guidelines. Painters applying PPG products will be PPG Certified Commercial Technicians, and re-certified every two (2) years.

The body shall go through an eight-stage paint process;

1. Clean bare metal using a solvent base wax & grease remover.
2. Finish all exterior body seams as necessary, followed by a thorough sanding of all bare metal to be painted.
3. Re-clean bare metal using a solvent base wax & grease remover.
4. Bare Metal Epoxy Primer Coat - PPG Delfleet® Evolution corrosion resistance epoxy primer to be applied at 1.0-2.0 mills DFT over clean abraded bare metal.
5. Primer Filler Coat - PPG Delfleet® Evolution urethane build primer to achieve total thickness of 3.0-6.0 mils DFT after sanding.
6. Base coat (Color) - PPG Delfleet® Evolution High Solids Polyurethane Base coat. Apply 1.0-3.0 mils DFT of base coat color to achieve full hiding.
7. Clear coat PPG Delfleet® Evolution polyurethane premium quality clear coat with improved mar resistant finish. The clear coat shall be applied to achieve a total dry film thickness of 2.0-3.0 mils.
8. Curing process of the painted body shall go through a force dry/bake cycle process. The painted components shall be baked 180 degrees for 2 hours to achieve a complete coating cure on the finished product.

MACHINE POLISHED

After the force dry/bake cycle and ample cool down time, the coated surface shall be sanded using 1,000, 1,500, and or 3,000 grit sandpaper to remove surface defects. In the final step, the surface shall be buffed then polished to an extra high gloss smooth finish. Total dry film thickness of paint will average between 8.0-12.0 mils.

PAINT - ENVIRONMENTAL IMPACT

The contractor shall meet or exceed all current State (his) regulations concerning paint operations. Pollution control shall include measures to protect the atmosphere, water and soil. PPG Delfleet® Evolution paint shall be free of all heavy metal (lead & chromate) components. Paint emissions from sanding and painting shall be filtered and collected. All paint wastes shall be disposed of in an environmentally safe manner. Solvents used in cleanup operations shall be collected, sent off-site for distillation and returned for reuse.

PAINT FINISH

The flat bed body design shall not require any painted finish and shall be a maintenace free finish.

Prior to the assembly and reinstallation of exterior components; i.e. warning and DOT lights, handrails, steps, door hardware, and miscellaneous items, an isolation tape, or gasket shall be used to prevent damage to the finish surfaces. These components shall be fastened to body using either a plastic insert into body metal with stainless steel screws or zinc coated nutserts into body surface using stainless steel bolts to prevent corrosion from dissimilar metals.

COMPARTMENT INTERIOR FINISH

The interior of all exterior body compartments shall be a "Maintenance Free" smooth unpainted finish. All body seams shall be finished with a caulk sealant for both appearance and moisture protection.

REFLECTIVE STRIPE REQUIREMENTS

Material

All retroreflective materials shall conform to the requirements of ASTM D 4956, *Standard Specification for Retroreflective Sheeting for Traffic Control*, Section 6.1.1 for Type I Sheeting.

All retroreflective materials used that are colors not listed in ASTM D 4956, Section 6.1.1, shall have a minimum coefficient of retroreflection of 10 with observation angle of 0.2 degrees and entrance angle of -4 degrees.

Any printed or processed retroreflective film construction used shall conform to the standards required of an integral colored film as specified in ASTM D 4956, Section 6.1.1.

Minimum Requirements

A retroreflective stripe(s) shall be affixed to at least 50 percent of the cab and body length on each side, excluding the pump panel areas, and at least 25 percent of the width of the front of the apparatus.

The stripe or combination of stripes shall be a minimum of 4 in. (100 mm) in total width.

The 4 in. (100 mm) wide stripe or combination of stripes shall be permitted to be interrupted by objects (i.e., receptacles, cracks between slats in roll up doors) provided the full stripe is seen as conspicuous when approaching the apparatus.

GRAPHICS PROOF

A color graphics proof of the reflective striping layout shall be provided for approval by Sugar Loaf Fire Protection District prior to installation. The graphics proof shall be submitted to Sugar Loaf Fire Protection District on 8.5" x 11" sheets with front, sides, rear and plan views, each on one (1) sheet. In addition if there is any special art work an additional sheet shall be provided showing all details.

REFLECTIVE STRIPE - CAB SIDE

The reflective stripe material shall be 4" wide, 3M Scotchcal 680 series.

- This reflective stripe shall be white in color.

REFLECTIVE STRIPE - CAB FRONT

The reflective stripe material shall be 4" wide, 3M Scotchcal 680 series.

- This reflective stripe shall be white in color.

REFLECTIVE STRIPE - CAB DOOR INTERIOR

Any door of the apparatus designed to allow persons to enter or exit the apparatus shall have at least 96 in.2 (62,000 mm2) of retroreflective material affixed to the inside of the door.

The stripe material shall be 3M Scotchlite 680.

- This reflective stripe shall be white in color.

REFLECTIVE STRIPE - BODY SIDES

The reflective stripe material shall be 4" wide, 3M Scotchcal 680 series.

- This reflective stripe shall be white in color.

The stripe shall remain in a straight line from the front of the vehicle to the rear.

CHEVRON REFLECTIVE STRIPE - REAR SIDES PANELS

At least 50 percent of the rear-facing vertical surfaces, visible from the rear of the apparatus, excluding any pump panel areas not covered by a door, shall be equipped with retroreflective striping in a chevron pattern sloping downward and away from the centerline of the vehicle at an angle of 45 degrees. Each stripe shall be 6" width.

The rear side panels only of the body shall have a Chevron style reflective stripe layout, and cover as much of the rear side panels as possible. Each chevron panel shall be a full sheet and shall have a 3M UV over laminate to protect from UV rays, scene damage, and everyday use. Chevron panel shall have a minimum 10 year warranty for material failure, and colorfastness.

The stripe material shall be 3M Diamond Grade.

This reflective chevron stripe shall alternate red and fluorescent yellow-green in color.

LETTERING

GRAPHICS PROOF

A color graphics proof of the lettering layout shall be provided for approval by Sugar Loaf Fire Protection District prior to installation. The graphics proof shall be submitted to Sugar Loaf Fire Protection District on 8.5" x 11" sheets with front, sides, rear and plan views, each on one (1) sheet. In addition if there is any special art work an additional sheet shall be provided showing all details.

The following lettering shall be provided and installed on the completed unit as follows;

SIDE CAB DOOR LETTERING

There shall be fifty (50) 3" high reflective letters furnished and installed on the vehicle.

- This reflective lettering shall be white in color.

UPPER BODY SIDE LETTERING

REAR BODY LETTERING

FRONT OF CAB LETTERING

EXTERIOR COMPARTMENT DOORS

HINGED DOOR CONSTRUCTION

The exterior compartment doors shall be custom manufactured and built for each compartment. The compartment doors must be able to withstand years of rugged service and wear. For this reason, the compartment door design, metal thickness, and attachments must be strictly adhered to.

The compartment doors shall be all aluminum 3003H-14 alloy construction. The exterior panel shall be of 1/8" thickness smooth plate aluminum and the interior panel shall be of 1/8" thickness smooth plate aluminum. Lighter gauge material will NOT BE ACCEPTABLE in these areas. The double panel doors shall be 1-3/4" thick to completely enclose the door latching assembly. Doors shall have drain hole openings for drainage and ventilation.

The doors shall be flush mounted so that the outer surface is in line with the side body surface. Lap or bevel type constructed doors, doors framed with extrusions, or doors requiring rubber bumpers to prevent unnecessary contact are NOT ACCEPTABLE.

Compartment door openings shall be sealed with closed cell automotive type rubber molding to provide a weather resistant seal around door. In addition, rubber molding shall be provided along hinge to prevent moisture entry. Open cell foam type rubber moldings are NOT ACCEPTABLE.

Hinged compartment doors shall have 14 gauge stainless steel hinge, with 1/4" stainless steel pin. The hinge shall be bolted to the door and body with stainless steel machine screws. A polyester barrier film gasket shall be placed between stainless steel hinge and any dissimilar metals as necessary.

Drip rails shall be installed above all compartment door openings. Drip rails shall be completely removable for easy replacement if necessary.

The latching mechanism of hinged compartment doors shall include stainless steel 6" offset bent D-ring keyed handles. A gasket shall be placed between stainless steel handle and door. Door latches shall be a double catching two-point rotary slam latch, recessed inside the double panel door with striker plate.

All vertically hinged compartment doors shall have a pneumatic cylinder to hold door in the open and closed positions. Each door shall be capable of being closed without unlatching. Door checks shall be bolted to the upper compartment door header and the box pan of the door. Door checks that require unlatching by hand will NOT BE ACCEPTABLE. All horizontally hinged compartment door shall have a door check as specified with each door.

STREETSIDE COMPARTMENT - ABOVE REAR WHEELS (S1)

The interior useable compartment shall be approximately 72.0" wide x 17” high x 10” deep at top and 18” deep at bottom.

The compartment door shall be approximately 68.0" wide x 14” high.

This compartment shall have a horizontally hinged lift-up style door with an unpainted finish. The hinged door shall have a pair of gas shocks to hold door in open position.

Top of cabinet will have a 10" deep storage area fabricated from expanded aluminum for storage of hand tools and equipment. Compartment will not have a lid.

- One (1) OnScene 36" Access LED compartment light, horizontally mounted at the top of the compartment toward the door opening.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

STREETSIDE COMPARTMENT - REAR (S2)

The interior useable compartment shall be approximately 25.0" wide x 13” high x 17” deep.

The compartment door shall be approximately 28.0" wide x 14” high.

This compartment shall have a horizontally hinged box pan style door fabricated of 1/8" thick smooth aluminum. The inner liner of the door shall be 1/8" thick smooth aluminum with an unpainted finish. The door exterior shall be aluminum treadplate.

The hinged door(s) shall have a stainless steel 6" offset non-locking handle. A gasket shall be placed between stainless steel handle and door. Door latches shall be a single point slam style, recessed inside the double panel door with striker plate.

The hinged door(s) shall have a pair of tailgate style mechanisms to stop the door at 90 degrees. Each door shall be capable of being closed without unlatching.
SHOP NOTES
Clarify that the fold down compartment doors shall be used as steps to access items from the upper baskets.

- One (1) OnScene 10" Access LED compartment light, horizontally mounted at the top of the compartment toward the door opening.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

CURBSIDE COMPARTMENT - ABOVE REAR WHEEL (C1)

The interior useable compartment shall be approximately 72.0" wide x 17” high x 10” deep at top and 18” deep at bottom.

The compartment door shall be approximately 68.0" wide x 14” high.

This compartment shall have a horizontally hinged lift-up style door with an unpainted finish. The hinged door shall have a pair of gas shocks to hold door in open position.

Top of cabinet will have a 10" deep storage area fabricated from expanded aluminum for storage of hand tools and equipment. Compartment will not have a lid

- One (1) OnScene 36" Access LED compartment light, horizontally mounted at the top of the compartment toward the door opening.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

CURBSIDE COMPARTMENT - REAR (C2)

The interior useable compartment shall be approximately 25.0" wide x 13” high x 17” deep.

The compartment door shall be approximately 28.0" wide x 14” high.

This compartment shall have a horizontally hinged box pan style door fabricated of 1/8" thick smooth aluminum. The inner liner of the door shall be 1/8" thick smooth aluminum with an unpainted finish. The door exterior shall be aluminum treadplate.

The hinged door(s) shall have a stainless steel 6" offset bent D-ring non-locking handle. A gasket shall be placed between stainless steel handle and door. Door latches shall be a two-point rotary slam, double-catch latch, recessed inside the double panel door with striker plate.

The hinged door(s) shall have a pair of tailgate style mechanisms to stop the door at 90 degrees. Each door shall be capable of being closed without unlatching.
SHOP NOTES
Clarify that the fold down compartment doors shall be used as steps to access items from the upper baskets.

- One (1) OnScene 10" Access LED compartment light, horizontally mounted at the top of the compartment toward the door opening.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

PLASTIC FLOOR AND SHELF TILE

All compartment floors, shelves, and trays shall be covered with Dri-Dek plastic interlocking grating. Dri-Dek to be supplied in the upper baskets as well.
SHOP NOTES
Dri-dek in upper baskets as well.

- The plastic floor tile shall be red.
- The plastic edge trim shall be red.

REAR BODY HANDRAILS

There shall be two (2) vertical handrails on the rear of the body. Handrails shall be NFPA compliant 1-1/4" knurled 304 stainless steel with welded end stanchions.

UPPERBODY BASKETS

There shall be two (2) baskets constructed of expaned aluminum located on top of upper compartments (S1 & C1). The baskets shall be the same width and length of the upper compartments (S1 & C1) and the height of the interior wall of the basket shall be raised to the same height of the pump module hose lay, making a compartment above the water tank.

There shall also be a partition on top of the tank for protection of the booster hose reel.

LOW VOLTAGE ELECTRICAL SYSTEM- 12 VDC

General

Any low voltage electrical systems or warning devices installed on the fire apparatus shall be appropriate for the mounting location and intended electrical load.

Where wire passes through sheet metal, grommets shall be used to protect wire and wire looms. Electrical connections shall be with double crimp water-tight heat shrink connectors.

All 12 VDC wiring running from front to back of vehicle body shall be run in full length electrical wiring raceway down each side of body.

Wiring

All electrical circuit feeder wiring supplied and installed by the fire apparatus manufacturer shall meet the requirements of NFPA Chapter 13.

The circuit feeder wire shall be stranded copper or copper alloy conductors of a gauge rated to carry 125 % of the maximum current for which the circuit is protected. Voltage drops in all wiring from the power source to the using device shall not exceed 10 %. The use of star washers for circuit ground connections shall not be permitted.

All circuits shall otherwise be wired in conformance with SAE J1292, *Automobile, Truck, Truck-Tractor, Trailer, and Motor Coach Wiring.*

Wiring and Wire Harness Construction

All insulated wire and cable shall conform to SAE J1127, *Low Voltage Battery Cable,* or SAE J1128, *Low Voltage Primary Cable,* type SXL, GXL, or TXL.

All conductors shall be constructed in accordance with SAE J1127 or SAE J1128, except where good engineering practice dictates special strand construction. Conductor materials and stranding, other than copper, shall be permitted if all applicable requirements for physical, electrical, and environmental conditions are met as dictated by the end application. Physical and dimensional values of conductor insulation shall be in conformance with the requirements of SAE J1127 or SAE J1128, except where good engineering practice dictates special conductor insulation. The overall covering of conductors shall be moisture-resistant loom or braid that has a minimum continuous rating of 194°F (90°C) except where good engineering practice dictates special consideration for loom installations exposed to higher temperatures. The overall covering of jacketed cables shall be moisture resistant and have a minimum continuous temperature rating of 194°F (90°C), except where good engineering practice dictates special consideration for cable installations exposed to higher temperatures.

All wiring connections and terminations shall use a method that provides a positive mechanical and electrical connection. The wiring connections and terminations shall be installed in accordance with the device manufacturer’s instructions. All ungrounded electrical terminals shall have protective covers or be in enclosures. Wire nut, insulation displacement, and insulation piercing connections shall not be used.

Wiring shall be restrained to prevent damage caused by chafing or ice buildup and protected against heat, liquid contaminants, or other environmental factors.

Wiring shall be uniquely identified at least every 2 ft (0.6 m) by color coding or permanent marking with a circuit function code. The identification shall reference a wiring diagram.

Circuits shall be provided with properly rated low voltage overcurrent protective devices. Such devices shall be readily accessible and protected against heat in excess of the overcurrent device's design range, mechanical damage, and water spray. Circuit protection shall be accomplished by utilizing fuses, circuit breakers, fusible links, or solid state equivalent devices.

If a mechanical-type device is used, it shall conform to one of the following SAE standards:

20) SAE J156, *Fusible Links*
21) SAE J553, *Circuit Breakers*
22) SAE J554, *Electric Fuses (Cartridge Type)*
23) SAE J1888, *High Current Time Lag Electric Fuses*
24) SAE J2077, *Miniature Blade Type Electrical Fuses*

Switches, relays, terminals, and connectors shall have a direct current (dc) rating of 125 % of maximum current for which the circuit is protected.

Power Supply

A 12 V or greater electrical alternator shall be provided. The alternator shall have a minimum output at idle to meet the minimum continuous electrical load of the vehicle, at 200°F (93°C) ambient temperature within the engine compartment, and shall be provided with full automatic regulation.

Minimum Continuous Electrical Load

The minimum continuous electrical load shall consist of the total amperage required to simultaneously operate the following in a stationary mode during emergency operations:

1) The propulsion engine and transmission
1) All legally required clearance and marker lights, headlights, and other electrical devices except windshield wipers and four-way hazard flashers
2) The radio(s) at a duty cycle of 10 percent transmit and 90 % receive (for calculation and testing purposes, a default value of 5 A continuous)
3) The lighting necessary to produce 2 fc (20 lx) of illumination on all walking surfaces on the apparatus and on the ground at all egress points onto and off the apparatus, 5 fc (50 lx) of illumination on all control and instrument panels, and 50 percent of the total compartment lighting loads
4) The minimum optical warning system, where the apparatus is blocking the right-of way
5) The continuous electrical current required to simultaneously operate any fire pumps, aerial devices, and hydraulic pumps
6) Other warning devices and electrical loads defined by the purchaser as critical to the mission of the apparatus

If the apparatus is equipped to tow a trailer, an additional 45 A shall be added to the minimum continuous electrical load to provide electrical power for the federally required clearance and marker lighting and the optical warning devices mounted on the trailer.

The condition of the low voltage electrical system shall be monitored by a warning system that provides both an audible and a visual signal to persons on, in, or near the apparatus of an impending electrical system failure caused by the

excessive discharge of the battery set.

The charge status of the battery shall be determined either by direct measurement of the battery charge or indirectly by monitoring the electrical system voltage.

If electrical system voltage is monitored, the alarm shall sound if the system voltage at the battery or at the master load disconnect switch drops below 11.8 V for 12 V nominal systems, 23.6 V for 24 V nominal systems, or 35.4 V for 42 V nominal systems for more than 120 seconds.

A voltmeter shall be mounted on the driver's instrument panel to allow direct observation of the system voltage.

Electromagnetic Interference

Electromagnetic interference suppression shall be provided, as required, to satisfy the radiation limits specified in SAE J551/1, *Performance Levels and Methods of Measurement of Electromagnetic Compatibility of Vehicles, Boats (up to 15 m), and Machines (16.6 Hz to 18 GHz)*.

Wiring Diagram

A complete electrical wiring schematic of actual system shall be provided with finished apparatus. Similar or generic type electrical schematics shall NOT BE ACCEPTABLE.

Low Voltage Electrical System Performance Test

A low voltage electrical system test certification shall be provided with delivered apparatus.

12 VOLT DIAGNOSTIC RELAY CONTROL CENTER

The 12 volt power distribution shall be conveniently located with easy access for service. All relays and circuit breakers shall be plug-in type allowing for removal for repairs without necessitating soldering or tools. The sockets mounts for both the relays and circuit breakers shall be of a design that permits the use of standard automotive type components.

ELECTRICAL SYSTEM MANAGER

LOAD MANAGEMENT

If the total continuous electrical load exceeds the minimum continuous electrical output rating of the installed alternator(s), an automatic electrical load management system shall be required. The minimum continuous electrical loads shall not be subject to automatic load management.

The apparatus 12 volt electrical system shall be provided with a system manager for:

- Monitoring chassis battery voltage
- Shedding pre-determined electrical circuits
- Sequencing pre-determined electrical circuits
- Automatically controlling chassis engine fast-idle
- Monitor master switch and parking brake applications
- Automatically control warning light modes ("Calling-For" and "Blocking Right of Way")
- Provide low voltage alarm
- Programmable control circuits
- Remote system status indicator panel

System manager shall perform all electrical functions required by current NFPA 1901 Standards.

BATTERY MONITORING

The system manager shall monitor the vehicle battery voltage. When electrical loads exceed the alternator output and the voltage drops, the load manager shall start shutting down electrical outputs. The system shall shut down only as many outputs required to maintain the system voltage. A special indicator to show different states of the electrical system by flashing at rate proportional to the battery discharge.

LOAD SEQUENCING AND SHEDDING

The system shall be capable of sequentially switching and shedding 12 volt loads. The Master light switch starts the sequential switch when it is turned "On". Likewise turning the Master Switch "Off" will sequentially de-energize the loads.

BATTERY SYSTEM

The battery connectors shall be heavy duty type with cables terminating in heat shrink loom. Heavy duty battery cables shall provide maximum power to the electrical system. Where required, the cables shall be shielded from exhaust tubing and the muffler. Large rubber grommets shall be provided where cables enter the battery compartment.

Batteries shall be of the high-cycle type. With the engine off, the battery system shall be able to provide the minimum continuous electrical load for 10 minutes without discharging more than 50 percent of the reserve capacity and then to restart the engine. The battery system cold cranking amps (CCA) rating shall meet or exceed the minimum CCA recommendations of the engine manufacturer. The batteries shall be mounted to prevent movement during fire apparatus operation and shall be protected against accumulations of road spray, snow, and road debris. The batteries shall be readily accessible for examination, testing, and maintenance.

A means shall be provided for jump-starting the engine if the batteries are not accessible without lifting the cab of a tilt-cab apparatus.

Where an enclosed battery compartment is provided, it shall be ventilated to the exterior to prevent the buildup of heat and explosive fumes. The batteries shall be protected against vibration and temperatures that exceed the battery manufacturer’s recommendation.

A master load disconnect switch shall be provided between the starter solenoid(s) and the remainder of the electrical loads on the apparatus. The starter solenoids shall be connected directly to the batteries.

Electronic control systems and similar devices shall be permitted to be otherwise connected if so specified by their manufacturer.

The alternator shall be wired directly to the batteries through the ammeter shunt(s), if one is provided, and not through the master load disconnect switch.

A green “battery on” pilot light that is visible from the driver’s position shall be provided.

A sequential switching device shall be permitted to energize the optical warning devices and other high current devices required in minimum continuous electrical load, provided the switching device shall first energize the electrical devices required in minimum continuous electrical load within 5 seconds.

BATTERY SWITCH

The chassis ignition key shall activate a heavy duty relay to provide 12 volt battery power to the vehicle. There shall be a green "BATTERY ON" pilot light that is visible from the driver’s position.

BATTERY SOLENOID

Battery switch shall consist of a minimum 200 ampere, constant duty solenoid to feed from positive side of battery.

BATTERY CONDITIONER

One (1) Kussmaul model Auto Charge 1000 single battery conditioner, with 120 VAC input and 15 amp, 12 volt output shall be provided. This system shall monitor the condition of batteries and provide an electrical current at variable rates to overcome battery failure. A display shall be provided with charge indicator, remote mounted.

The battery conditioner shall be mounted under the rear cab seat. And the display shall be provided in the front wall of compartment (S1) adjacent to the shore power inlet.
SHOP NOTES
The battery conditioner shall be mounted under the rear cab seat. And the display shall be located in the front wall of compartment (S1) adjacent to the shore power inlet.

SHORE POWER INLET

One (1) Kussmaul 120 VAC, 20 amp shore power inlet with weather resistant snap cover shall be provided. The protective ground from the shoreline inlet shall be bonded to the vehicle frame.

- The outlet cover shall be yellow.
- The shore power plug shall be located in the front wall of the compartment (S1)

SHOP NOTES
The shore power inlet and battery display panel shall be located in the front wall of compartment (S1).

ENGINE COMPARTMENT LIGHT

There shall be one (1) light(s) mounted in the engine compartment with integral switch with a light output of at least 20 candlepower (250 lumens). The engine compartment light(s) shall operate only when the master battery switch is turned "On".

CAB HAZARD WARNING LIGHT

A red flashing or rotating light, located in the driving compartment, shall be illuminated automatically whenever the vehicles parking brake is not fully engaged and any of the following conditions exist:

- Any passenger or equipment compartment door is not closed.
- Any ladder or equipment rack is not in the stowed position.
- Stabilizer system is not in its stowed position.
- Powered light tower is not stowed.
- Any other device permanently attached to the apparatus is open, extended, or deployed in a manner that is likely to cause damage to the apparatus if the apparatus is moved.

Compartments and equipment meeting all of the following conditions shall be permitted to be exempt from being wired to the hazard light:

- The volume is less than or equal to 4 ft3 (0.1 m3).
- The compartment has an opening less than or equal to 144 in.2 (92,900 mm2).
- The open door does not extend sideways beyond the mirrors or up above the top of the fire apparatus.
- All equipment in the compartment is restrained so that nothing can fall out if the door is open while the apparatus is moving.
- Manually raised pole lights with an extension of less than 5 ft (1.5 m).

The hazard light shall be labeled "DO NOT MOVE APPARATUS WHEN LIGHT IS ON".

An audible alarm shall be provided for the door ajar light.

BACK-UP ALARM

The body manufacturer shall furnish and install one (1) 107 dB(A) electronic back-up alarm. Back-up alarm to actuate automatically when the transmission gear selector is placed in reverse.

TAIL LIGHTS

Rear body tail lights shall be vertically mounted and located per Federal Motor Vehicle Safety Standards, FMVSS and Canadian Motor Vehicle Safety Standards CMVSS. The following lights shall be furnished;

- Two (2) Whelen red LED 600 Series 60R00XRR stop/tail lights
- Two (2) Whelen Halogen 600 Series 60J000CR back-up lights with clear lens

Each of the lights above shall be mounted in a 6EFLANGE, chrome finish bezel.

Each of the lights above shall be mounted with a powder-coat painted hammer-tone black aluminum guard similar to Edmonton #832-835
SHOP NOTES
Powder-coated black aluminum guards around the lights like Edmonton #832-835.

MARKER LIGHTS

The body shall be equipped with all necessary clearance lights and reflectors in accordance with Federal Motor Vehicle Safety Standards (FMVSS) and Canadian Motor Vehicle Safety Standards (CMVSS) regulations. All body clearance lights shall be Truck-Lite Model 18 LED to reduce the need for maintenance and lower the amp draw. Clearance lights shall be wired to the headlight circuit of the chassis.

Each of the marker lights shall be mounted with a powder-coat painted hammer-tone black aluminum guard similar to Edmonton #832-835
SHOP NOTES
Powder-coated black aluminum guards around the lights like Edmonton #832-835.

CAB STEP LIGHTS / GROUND LIGHTS

There shall be two (2) OnScene Solutions 9" LED NightStik light(s) installed on the vehicle capable of providing illumination at a minimum level of 2 fc (20 lx) on ground areas within 30 in. (800 mm) of the edge of the vehicle in areas designed for personnel to climb onto or descend from the vehicle to the ground level.

Lighting designed to provide illumination on areas under the driver and crew riding area exits shall be switchable but activated automatically when the exit doors are opened.

ELECTRONIC SIREN

One (1) Whelen model 295HFSA5 6-function electronic siren head with Si-Test function, plug-in microphone, air horn button switch and 9 light/accessory switches shall be provided in cab. Siren to be located when chassis arrives at SVI.
SHOP NOTES
Siren location TBD upon chassis arrival at SVI.

SIREN SPEAKER

One (1) Cast Products Inc. model SA4301, 100 watt siren speaker shall be provided.

- The siren speaker shall be located on the streetside of front bumper.

REAR SCENE LIGHTS

Two (2) Whelen Super LED 900 series (9" x 7") recess mounted scene lights (9SC0ENZR) shall be provided on the upper rear body to light the work area immediately behind the vehicle to a level of at least 3 fc (30 lx) within a 10 ft × 10 ft (3 m × 3 m) square. Each light will have twenty-four LED diodes that draw a total of 4.0 amps, with 3000 Lumens. The light shall be an 8-32 degree gradient lens and chrome flange.

The rear scene lights shall be mounted one (1) on each of the upper body baskets.
SHOP NOTES
The rear scene lights shall be mounted one (1) each side on the back of the upper rear baskets.

The lights shall be switched at the 12 volt control panel in the cab.
The rear scene lights shall also be activated when the apparatus is in reverse.

WARNING LIGHT PACKAGE

Each apparatus shall have a system of optical warning devices that meets or exceeds the requirements of this section.

The optical warning system shall consist of an upper and a lower warning level. The requirements for each level shall be met by the warning devices in that particular level without consideration of the warning devices in the other level.

For the purposes of defining and measuring the required optical performance, the upper and lower warning levels shall be divided into four (4) warning zones. The four zones shall be determined by lines drawn through the geometric center of the apparatus at 45 degrees to a line drawn lengthwise through the geometric center of the apparatus. The four (4) zones shall be designated A, B, C, and D in a clockwise direction, with zone A to the front of the apparatus.

Each optical warning device shall be installed on the apparatus and connected to the apparatus's electrical system in accordance with the requirements of this standard and the requirements of the manufacturer of the device.

A master optical warning system switch that energizes all the optical warning devices shall be provided.

The optical warning system on the fire apparatus shall be capable of two (2) separate signaling modes during emergency operations. One (1) mode shall signal to drivers and pedestrians that the apparatus is responding to an emergency and is calling for the right-of-way. One (1) mode shall signal that the apparatus is stopped and is blocking the right-of-way. The use of some or all of the same warning lights shall be permitted for both modes provided the other requirements of this chapter are met.

A switching system shall be provided that senses the position of the parking brake or the park position of an automatic transmission. When the master optical warning system switch is closed and the parking brake is released or the automatic transmission is not in park, the warning devices signaling the call for the right-of-way shall be energized. When the master optical warning system switch is closed and the parking brake is on or the automatic transmission is in park, the warning devices signaling the blockage of the right-of-way shall be energized. The system shall be permitted to have a method of modifying the two (2) signaling modes.

The optical warning devices shall be constructed or arranged so as to avoid the projection of light, either directly or through mirrors, into any driving or crew compartment(s). The front optical warning devices shall be placed so as to maintain the maximum possible separation from the headlights.

UPPER LEVEL OPTICAL WARNING DEVICES

The upper-level optical warning devices shall be mounted as high and as close to the corner points of the apparatus as is practical to define the clearance lines of the apparatus. The upper-level optical warning devices shall not be mounted above the maximum height, specified by the device manufacturer.

ZONE A - FRONT WARNING LIGHTS

There shall be one (1) Whelen Edge FN60VLED LED 60" lightbar permanently mounted to the cab roof.

The lightbar configuration (streetside to curbside) shall be:

SECTION	INTERNAL COMPONENTS	LENS COLOR
1	Red Rear Corner Linear LED	Clear
2	Red Front Corner Linear LED	Clear
3	Clear Linear LED	Clear
4	Blank	Clear
5	Red Linear LED	Clear
6	Blank (Opticom if specified)	Clear
7	Blank (Opticom if specified)	Clear
8	Red Linear LED	Clear
9	Blank	Clear
10	Clear Linear LED	Clear
11	Red Front Corner Linear LED	Clear
12	Red Rear Corner Linear LED	Clear

All clear lights shall shut down when the parking brake is set to comply with "Blocking" mode requirements as outlined in NFPA 1901.
SHOP NOTES
Add MK8H lightbar mount on Wecad program if there is a brow light on cab

The lightbar shall be separately switched at the 12 volt control panel in the cab.

The lightbar shall be supplied with LR11 halogen alley lights on each end and wired to come on with park brake switch.

LOWER LEVEL OPTICAL WARNING DEVICES

To define the clearance lines of the apparatus, the optical center of the lower-level optical warning devices in the front of the vehicle shall be mounted on or forward of the front axle centerline and as close to the front corner points of the apparatus as is practical.

The optical center of the lower-level optical warning devices at the rear of the vehicle shall be mounted on or behind the rear axle centerline and as close to the rear corners of the apparatus as is practical. The optical center of any lower-level device shall be between 18 in. and 62 in. (460 mm and 1600 mm) above level ground for large apparatus, and 18 in. and 48 in. (460 mm and 1220 mm) above level ground for small apparatus.

A midship optical warning device shall be mounted right and the left sides of the apparatus if the distance between the front and rear lower-level optical devices exceeds 25 ft (7.6 m) at the optical center. Additional midship optical warning devices shall be required, where necessary, to maintain a horizontal distance between the centers of adjacent lower-level optical warning devices of 25 ft (7.6 m) or less. The optical center of any midship mounted optical warning device shall be between 18 in. and 62 in. (460 mm and 1600 mm) above level ground.

ZONE A - FRONT WARNING LIGHTS

There shall be two (2) Whelen 400 series (4" x 3") red Linear Super-LED lights (40R02ZRR) provided, one (1) each side. Each light shall have a red lens and chrome flange.

Each of the lights above shall be mounted with a powder-coat painted hammer-tone black aluminum guard similar to Edmonton #832-835
SHOP NOTES
Powder-coated black aluminum guards around the lights like Edmonton #832-835.

The lights shall be switched at the 12 volt control panel in the cab.

ZONES B AND D - CAB INTERSECTOR LIGHT (CAB FRONT CORNERS)

There shall be two (2) Whelen 400 series (4" x 3") red Linear Super-LED lights (40R02ZRR) provided, one (1) each side. Each light shall have a red lens and chrome flange.

Each of the lights above shall be mounted with a powder-coat painted hammer-tone black aluminum guard similar to Edmonton #832-835
SHOP NOTES
Powder-coated black aluminum guards around the lights like Edmonton #832-835.

The lights shall be switched at the 12 volt control panel in the cab.

ZONES B AND D - BODY INTERSECTOR LIGHT (BODY WHEELWELL AREA)

There shall be two (2) Whelen 400 series (4" x 3") red Linear Super-LED lights (40R02ZRR) provided, one (1) each side. Each light shall have a red lens and chrome flange.

Each of the lights above shall be mounted with a powder-coat painted hammer-tone black aluminum guard similar to Edmonton #832-835
SHOP NOTES
Powder-coated black aluminum guards around the lights like Edmonton #832-835.

The lights shall be switched at the 12 volt control panel in the cab.

ZONE C - REAR WARNING LIGHTS (LOWER REAR CORNERS)

There shall be two (2) Whelen 400 series (4" x 3") red Linear Super-LED lights (40R02ZRR) provided, one (1) each side. Each light shall have a red lens and chrome flange.

Each of the lights above shall be mounted with a powder-coat painted hammer-tone black aluminum guard similar to Edmonton #832-835
SHOP NOTES
Powder-coated black aluminum guards around the lights like Edmonton #832-835.

The lights shall be switched at the 12 volt control panel in the cab.

Pump Type: Side Mount Pump

DARLEY COBRA CAFS SYSTEM

The compressed air foam system shall be a high-output, engine-driven, module- type design. It shall include all of the following necessary components built into a compact frame assembly.

The CAFS shall be designed to discharge water only, air only, foam solution only or compressed air foam from the same discharge outlet. In addition, the consistency of the compressed air foam (expansion ratio), wet/dry shall be fully adjustable

.

Engine
The power to drive the system shall be provided by a *Deutz* model BF4L2011, air/oil-cooled, directinjection, pressure lubricated, turbo-charged diesel engine. The heavy-duty rating for this engine is 79 hp @ 2800 rpm. Automotive engines or ratings will not be used. The engine shall have a cylinder head and crankcase of grey cast iron without liners. A cooling blower with a guard shall be provided along with a 14 VDC, 60-amp alternator and engine oil cooler with a thermostatic oil valve.

Water Pump
The water pump shall be a *Darley* model 2-1/2 AGE single-stage, centrifugal pump with a vertically split aluminum case and bronze impeller on a stainless steel shaft. It is designed to provide up to 250 gpm (946.3 L/min) of plain water flow and pressures up to 250 psi (15.5 b). The pump seal shall be of pallet style. Helical cut gears shall be utilized in the pump transmission.

Air Compressor
The air compressor shall be of the oil injected rotary screw type, designed and installed to supply a minimum of 120 cfm @ 125 psi (2831.7 L/min @ 8.6 b) of free air at maximum engine rpm. The compressor air/oil receiver shall be built and designed by the compressor manufacturer. A spin-on oil filter shall be integrated into the compressor system. Replacement elements shall be readily available.

A pneumatic modulating inlet valve mounted on the air end inlet shall control the compressor. An *AutoOdin* balancing system shall be provided to automatically maintain the air pressure within plus-orminus 5% of the water pump pressure throughout the CAFS operating range.

All air lines shall be rated to a minimum of 250 psi (17.2 b). All control air fittings shall be of brass, stainless steel or chrome construction. Stainless steel or brass check valves shall be utilized at air injection points to prevent water/solution back-flow into air lines.

The cooling water to the heat exchanger shall be supplied through a dedicated, filtered line from the unit's water pump. Water shall flow through the heat exchanger whenever the water pump is operating. The air compressor cooling system shall incorporate a thermostat that maintains the system oil temperature within 168°F (75.6°C) to 225°F (107.2°C) range. The system shall be capable of maintaining recommended operating temperatures throughout the full operational range of ambient temperatures up to 115°F (46.1°C). A dry cartridge type air filter shall be provided on the compressor air intake.

Drive System
The water pump shall be directly driven using a centaflex coupling on an extension shaft in line with the crankshaft of the engine. The compressor shall be mounted to the water pump bell housing and will be belt-driven using a *Gates Poly-Chain*®ii drive system.

Foam Proportioner
The foam proportioner shall be a *FoamPro* model 2001 automatic, 12 VDC, direct-injection system. It will provide push-button control of foam proportioning rates from 0.1% to 9.9%, in 0.1% increments. The pump output shall be 2.6 gpm @ 150 psi (9.84 L/min @ 10.3 b). The motor shall be rated at ½ hp with a maximum amp draw of 40 amps. The proportioner shall be capable of using different types of liquid foam concentrates. This complete system will be mounted within the module.

Electrical System
All electrical equipment installed by the manufacturer shall conform to current automotive electrical system standards and the requirements of the applicable NFPA apparatus standards. The wiring shall be individually and permanently color and function coded. The installation shall meet SAE Standard J1128 in its latest edition for GXL or SXL temperature rating.

All exposed wiring shall run in loom with a minimum of 280°F (137.8°C) rating. All wiring loom shall be properly supported and attached to frame members along the entire run. At any point where wire or looms must pass through metal, rubber grommets shall be installed to protect the wire from abrasion.

The main low voltage electrical terminal block and circuit breaker panel shall be provided behind the pump operator's panel in a location providing easy service access. The electrical connections shall be made using heat shrink and/or weatherproof connectors. All electrical circuits shall be protected with automatic reset circuit breakers or fuses.

Engine Compartment Light
An engine compartment light shall be installed in the module. The panel lights switch shall control the engine compartment light.

Priming System
A *Darley* 12 VDC electric, oil-less, rotary-vane priming system shall be utilized. The primer is capable of priming the water pump through 20' of hard suction hose with a 10' lift. Primer controls and instruction plate shall be mounted on the operator's panel.

Relief Valve
The pump shall be equipped with a Darley automatic pressure control device. The relief valve control (pilot valve) shall be protected from malfunction due to sand or other sediment in the water by a strainer, which can be removed, cleaned, and replaced from the operator's panel while the pump is operating. The relief valve indicator lights shall be provided and mounted on the pump panel adjacent to the pilot valve assembly. The indicator lights are to be amber, marked OPEN to indicate the relief valve is bypassing and green marked CLOSED to indicate the valve is closed.

Plumbing, Hose and Lines
All piping shall be stainless steel. Use of grooved end pipe couplings is required for flexibility and movement of system components on mobile equipment. All air compressor control lines shall be of stainless steel outer braid *Teflon* liner or supplied by the compressor manufacturer. Hydraulic hoses will only be used for air injection lines and not control air lines. Flexible piping may be used where applicable. Check valves are required throughout the system to maintain integrity and shall be placed so that the air, water foam and foam solution do not inadvertently mix. One (1) master drain valve shall be provided on the control panel to completely drain the system to prevent freeze damage.

Tank to Pump
There shall be a 2½" tank-to-pump suction valve fitted in the module and controlled from the operator's panel with a push/pull T-handle control.

Tank to Pump Check Valve
A 2½" check valve shall be installed in the water pump inlet plumbing, between the water tank and the pump inlet.

Inlets
There shall be a 2½" Stortz connection with cap on the operator's panel for drafting. Adapter is a (Kochek S37S2525) 2 1/2" stortz x 2 1/2" rigid female for the 2 1/2" NH connection.

Direct Tank Fill
There shall be a 2½" gated valve with a 2 ½" Female NPT on the operator's panel for direct tank fill operations with a pressurized water source.

Tank Refill
There shall be a 1.5" tank refill valve, with push pull operator on the panel.

CAFS Outlets
There shall be a minimum of Three (3) mix points. Each mix point will consist of an independent control on the operator's panel for air injection and an independent control on the operator's panel for foam solution. Two (2) Crosslay mix points will have 2" plumbing with 1½" discharge outlets. One (1) Panel discharge to be 2" valve, with 2" plumbing. All outlets will be independent mix points for air and foam solution and shall be controlled from the operator's panel. The CAF mix point controls shall be grouped together on the panel. Locking, push/pull, T-handle controllers inlaid with calibrated wet/dry foam labels shall be used for water and quarter-turn, ball valves for air injection points. Discharge threads are to be 1 ½" NH on crosslays.

Module Frame
The frame shall be constructed of aluminum and designed for rigorous fire service. The top of the module shall be a computer-cut, aluminum diamond-plate material, hinged for a complete service access door. The top access door shall use pneumatic gas shocks to maintain the door in the open position. The cab-side of the module shall be covered with a removable sheet of aluminum diamond plate.

The top of the module shall have two (2) pre-connect hose trays, installed complete with dividers. Both pre-connects shall be CAFS capable. They shall be sized to hold a minimum of 150 ft. of hose. **Discharge threads are to be 1 ½" NH. One (1) of the pre-connect hose trays shall be dedicated to the booster reel. Verify that the booster reel control is clearly labeled on the pump panel. Also, this tray will be dedicated to house the four (4) sections of hard suction hoses with stortz fittings.**

The module lid shall have an engine cooling air exhaust duct, which MUST be left open and free to emit hot air from the module.

Corrosion Resistance Treatments
Die electric tape (laminating type UHMW) is used through out the construction of the module for dissimilar metal contact surfaces. This will include, but not be limited to control panel to frame, engine mounts to frame, and solution injection unit to frame.

All SS screws, which secure the SS panel to the aluminum frame, will be treated with dielectric liquid. The majority of fasteners throughout the module will be SS. All electrical ground connections to the frame will be treated with dielectric silicone compound. Wire ends will have waterproof and corrosion resistant shrink tube, adhesive lined type terminals and connectors.

All electrical plugs in the module will be environmentally sealed Deutsch type. The entire surface of the electric fuse / connection box will be treated with a urethane seal coat, to seal out moisture

Control Panel
A brushed stainless steel, laser-cut control panel shall be provided on the operator's side of the module. A stainless steel engine control door shall be mounted to the control panel, which shall be of a water resistant design. The following items shall be positioned and clearly marked in a logical manner on the control panel to provide for simple and easy operation.

1. Shielded Control Panel Light Cluster
2. Water Tank Level Gauge
3. Foam Tank Level Gauge A
4. Auxiliary
5. Foam Proportioner System Control
6. 4" Master Water Pressure Gauge
7. 4" Master Air Pressure Gauge
8. 4" Master Inlet Compound Gauge
9. Pump Test Ports
10. Primer Control
11. Vernier Throttle
12. Operation Instruction Placard
13. Master Drain Valve
14. Discharge Pressure Relief Valve
15. Three (3)) Separate Sets of Mix Point Controls
    a) Water Solution Valve
    b) Quarter-Turn Air Injection Control Valve
    c) Quarter-Turn Mix Point Pressure Drain Valve
    d) Mix Point Pressure Gauge 2½ "
16. 2½" NH Male Suction Inlet with Cap & Lanyard
17. 2½" NH Female Swivel Direct Tank Fill Inlet with Plug & Lanyard
18. Locking, Push/Pull, T-Handle Valve for Direct Tank Fill
19. Locking, Push/Pull, T-Handle Valve for Tank to Pump
20. Locking, Push/Pull, T-Handle Valve for Tank Refill
21. 2½" NH Male CAF with Cap & Lanyard
22. Electrical Door
    a) Low Oil Pressure Light
    b) Oil Pressure Gauge
    c) Engine High Temperature Light
    d) Engine Temperature Gauge
    e) Volt Meter
    f) Alternator Light
    g) Compressor High Temperature Light
    h) Compressor Temperature Gauge
    i) Ignition Switch
    j) Tachometer with Hourmeter
    k) 97dB Audible Alarm
    l) Panel Light Switch

Labels
All controls, inlets and discharges shall be clearly labeled. The labels shall comply with applicable NFPA standards.

SUGAR LOAF FIRE PROTECTION DISTRICT
Brush Truck Production Specification
SVI #859

Testing
The completed unit shall undergo a manufacturer's run-in test prior to delivery. The engine, pump and air compressor shall be operated for a minimum period of six (6) hours, during which time the test operator shall monitor and record the functions and performance of each system component. Compressed air foam shall be produced during the test. This testing shall be performed to ensure proper system operation and performance prior to shipment. The manufacturer shall provide written certifications that the tested unit meets all performance criteria contained herein (NFPA). Water flow performance shall be tested in accordance with NFPA 1901.The
pump will meet the stated flow as per specifications below, in the performance section. System to meet all
Airflow performance shall be measured with a temperature and pressure compensated air flow meter. Air Outlets shall be a 2½" NH connection with cap on the operator's panel for drafting.

Manuals
One (1) copy of the *Operation and Maintenance Manual* and a CD copy shall be provided to the purchaser with each unit. This manual shall include detailed instructions in the operation and maintenance of the overall unit, engine, water pump, and air compressor and foam proportioner.

Dimensions
Length 69" (175.26 cm)
Width 34" (91.44 cm)
Height 65" (165.1 cm)
Weight 2,100 lbs. (1133.98 kg)

Performance
Water Pump 250 gpm @ 150 psi (946.3 L/min @ 10.3 b)
Water Pump Performance 175 gpm @ 200 psi, 150 gpm @ 250 psi
Air Compressor 130 cfm @ 125 psi (3681.2 L/min @ 8.6 b)
Simultaneous Flow (NFPA) 250 gpm & 125 cfm @ 125 psi (946.3 L/min & 3539.6 L/min @ 8.6 b)
Simultaneous Flow 260 gpm & 130cfm @ 100 psi (946.3 L/min & 3681.2 L/min @ 6.9 b)
Engine Horsepower 79 hp @ 2800 rpm
Fuel Use @ Full Load 4.2 gph (15.9 L/hr)

Warranty
Engine 1 year
Compressor 1 year
Water Pump 3 year / 3000 hours
Chemical Injector 1 year

All fabrication and materials are warranted for a period of two (2) years barring accidents, abuse or negligence. Excluding from warranty are all consumables and parts subject to routine replacement. We will repair or assist in the repair or replacement of the product in its entirety.

Remote Start with Auto Throttle
The remote control panel shall be pre-wired with plug-in connectors for ease of installation. Thestandard wire harness length is twenty-five feet (25'). The remote start option shall include the auto throttle actuator mounted to the throttle linkage on the engine. The assembly shall include the following components mounted on an 8 ½" W X 7" H placard with the necessary labels permanently painted on the placard.

1. Low Oil psi Light
2. System High Temp. Light
3. Glow Plug Light *(when used)*
4. Low Water Pressure Light
5. FoamPro Remote On / Off Control
6. FRC Tank Vision Mini Water Tank Level Gauge
7. Auto Throttle Switch with Safety Cover
8. Ignition Switch
9. 97dB Audible Alarm

The remote control panel shall be located upon chassis arrival to SVI.

SHOP NOTES
The suction inlet adapter is a Kochek S37S2525 - 2.5" storz x 2.5" rigid female adapter to go from 2.5" NH to 2.5" storz

One (1) of the hose tray pre-connects will be dedicated to the booster reel, verify the booster reel control is clearly labeled on the pump panel.

This hose tray will also be dedicated for housing four (4) sections of hard suction hose with storz fittings.

Control panel to be located upon chassis arrival at SVI.

PUMP PANEL GROUND LIGHT

One (1) OnScene 9" LED ground light shall be provided below the streetside pump operators panel.

SHOP NOTES
Ground light under streetside pump panel only.

MISCELLANEOUS DISCHARGE

SHOP NOTES
Verify plumbing to front bumper spray nozzles.

- One (1) of the discharge(s) shall flow water and foam.
  - One (1) Akron Brass 8000 series, 1-1/2" valve(s)
  - Valve(s) shall be controlled with a push/pull type chromed "T" handle with adjustable linkage connected to the valve. The control handle shall be located adjacent to the plumbing connection.

BOOSTER REEL

There shall be one (1) Hannay SBEF24-23-24-12-RT (27.75" wide x 23" deep x 23.5" high) aluminum booster hose reel discharge with electric rewind motor located per itemized compartment layout. Booster reel shall have a capacity of 100' of 1" booster hose.

- The Hannay booster reel shall be equipped with two (2) set(s) of hose guide rollers, so the hose is completely encapsulated with hose rollers. 4-roller guide to be provided.
  SHOP NOTES
  Hose roller to have 4-roller guides.
- One (1) 100' x 1" section(s) of Neidner "ReelTex" booster hose coupled with 1" NST pyrolite coupling shall be provided.
- No nozzle shall be provided with specified booster hose reel.

POLY WATER TANK

The water tank capacity shall be a minimum of 450 US gallons. Certification of the tank capacity shall be recorded on the manufacturer's record of construction and shall be provided to the purchaser upon delivery of the apparatus.

SUGAR LOAF FIRE PROTECTION DISTRICT
Brush Truck Production Specification
SVI #859

CONSTRUCTION

The tank must be designed and fabricated by a tank manufacturer that is ISO 9001:2008 certified. The ISO certification must be to the current standard in effect at the time of the design and fabrication of the tank.

The water tank shall be of a specific configuration and designed to be completely independent of the body and compartments. Joints and seams shall be fused using nitrogen gas as required and tested for maximum strength and integrity. The tank construction shall include PolyProSeal™ technology wherein a sealant shall be installed between the plastic components prior to being fusion welded. This sealing method will provide a liquid barrier offering leak protection in the event of a weld compromise. The top of the booster tank is fitted with removable lifting assembly designed to facilitate tank removal. The transverse and longitudinal swash partitions shall be manufactured of a minimum of 3/8" PT3™ polypropylene. All partitions shall be equipped with vent and air holes to permit movement of air and water between compartments. The partitions shall be designed to provide maximum water flow. All swash partitions interlock with one another and are completely fused to each other as well as to the walls of the tank. All partitions and spacing shall comply with NFPA 1901. The walls shall be welded to the floor of the tank providing maximum strength as part of the tank's unique Full Floor Design™. Tolerances in design allow for a maximum variation of 1/8" on all dimensions.

WATER FILL TOWER AND COVER

The tank shall have a combination vent and manual fill tower. The fill tower shall be constructed of 1/2" PT3™ polypropylene and shall be a minimum dimension of 8" x 8" outer perimeter. The fill tower shall be blue in color indicating that it is a water-only fill tower. The tower shall be located in the left front corner of the tank unless otherwise specified by the tank manufacturer to the purchaser. The tower shall have a 1/4" thick removable polypropylene screen and a PT3™ polypropylene hinged cover. The capacity of the tank shall be engraved on the top of the fill tower lid. Inside the fill tower there shall be a combination vent/overflow pipe. The vent overflow shall be a minimum of schedule 40 polypropylene pipe with a minimum I.D. of 4" that is designed to run through the tank, and shall be piped to discharge water behind the rear wheels as required in NFPA 1901 so as to not interfere with rear tire traction.

The tank cover shall be constructed of 1/2" thick PT3™ polypropylene and UV stabilized, to incorporate a multi-piece locking design, which allows for individual removal and inspection if necessary. The tank cover(s) shall be flush or recessed 3/8" from the top of the tank and shall be fused to the tank walls and longitudinal partitions for maximum integrity. Each one of the covers shall have hold downs consisting of 2" minimum polypropylene dowels spaced a maximum of 40" apart. These dowels shall extend through the covers and will assist in keeping the covers rigid under fast filling conditions. A minimum of two lifting dowels shall accommodate the necessary lifting hardware.

SUMP

There shall be one (1) sump standard per tank. The sump shall be constructed of a minimum of 1/2" PT3™ polypropylene and be located in the left front quarter of the tank, unless specified otherwise. On all tanks that require a front suction, a 3" schedule 40 polypropylene pipe shall be installed that will incorporate a dip tube from the front of the tank to the sump location. The sump shall have a minimum 3" N.P.T. threaded outlet on the bottom for a drain plug per NFPA. This shall be used as a combination clean-out and drain. All tanks shall have an anti-swirl plate located approximately 3" above the inside floor.

SUGAR LOAF FIRE PROTECTION DISTRICT
Brush Truck Production Specification
SVI #859

OUTLETS

There will be two (2) standard tank outlets: one for the tank-to-pump suction line, which shall be sized to provide adequate water flow to the pump; and, one for tank fill line, which shall be sized according to the NFPA minimum size chart for booster tanks. All tank fill couplings shall be backed with flow deflectors to break up the stream of water entering the tank, and be capable of withstanding sustained fill rates of up to 1000 G.P.M. The addition of rear suction fittings, nurse valve fittings, dump valve fittings, and through-the-tank sleeves to accommodate rear discharge piping must be specified. All auxiliary outlets and inlets must meet all NFPA guidelines in effect at the time of manufacture.

MOUNTING

The tank shall rest on the body cross members in conjunction with such additional cross members, spaced at a distance that would not allow for more than 530 square inches of unsupported area under the tank floor. In cases where overall height of the tank exceeds 40 inches, cross member spacing must be decreased to allow for not more than 400 square inches of unsupported area.

The tank must be isolated from the cross members through the use of hard rubber strips with a minimum thickness and width dimension of 1/4” x 1” and a Shore A Hardness of approximately 60 durometer. The rubber must be installed so it will not become dislodged during normal operation of the vehicle. Additionally, the tank must be supported around the entire bottom outside perimeter and captured both in the front and rear as well as side to side to prevent tank from shifting during vehicle operation.

A picture frame type cradle mount with a minimum of 2" x 2" x 1/4” mild steel, stainless steel, or aluminum angle shall be provided or the use of corner angles having a minimum dimension of 4" x 4" x 1/4” by 6” high are permitted for the purpose of capturing the tank.

Although the tank is designed on a free floating suspension principle, it is required that the tank have adequate vertical hold down restraints to minimize movement during vehicle operation. If proper retention has not been incorporated into the apparatus hose floor structure, an optional mounting restraint system shall be located on top of the tank, half way between the front and the rear on each side of the tank. These stops can be constructed of steel, stainless steel or aluminum angle having minimum dimensions of 3" x 3" x 1/4” and shall be approximately 6” to 12” long. These brackets must incorporate rubber isolating pads with a minimum thickness of 1/4” inch and a hardness of 60 durometer affixed on the underside of the angle. The angle should then be bolted to the body side walls of the vehicle while extending down to rest on the top outside edge of the upper side wall of the tank. Hose beds floors must be so designed that the floor slat supports extend full width from side wall to side wall and are not permitted to drop off the edge of the tank or in any way come in contact with the individual covers where a puncture could occur. Tank top must be capable of supporting loads up to 200 lbs per sq. foot when evenly distributed. Other equipment such as generators, portable pumps, etc. must not be mounted directly to the tank top unless provisions have been designed into the Poly-Tank® III for that purpose. The tank shall be completely removable without disturbing or dismantling the apparatus structure.

SIGHT GAUGE

A clear liquid level sight gauge shall be provided on end of tank.

CENTER OF GRAVITY

A center of gravity calculation shall be determined for each tank and provided as requested in order to provide the apparatus manufacturer with the necessary data to design and certify the apparatus with respect to the NFPA requirements regarding rollover stability.
SHOP NOTES
Tank to be a minimum of 450 US gallons.

CLASS A POLYPROPYLENE FOAM CELL

There shall be one (1) 20 US gallon or 16.6 Imperial gallons polypropylene foam cell incorporated into the polypropylene water tank.

There shall be one (1) pressure/vacuum vent installed on the foam tank.

There shall be one (1) drain hose connected to the foam cell. The drain shall have a 1/4 turn valve installed inside the pump house and it shall drain below the frame rail of the chassis.

SIGHT GAUGE

A clear liquid level sight gauge shall be provided on end of tank.

UPF POLY WATER TANK WARRANTY

The UPF poly water tank shall be provided with a lifetime material and workmanship limited warranty. The manufacturer shall supply details of their warranty information with their bid submission.

EQUIPMENT PAYLOAD WEIGHT ALLOWANCE

In compliance with NFPA 1901 standards, the initial attack vehicle shall be designed for an equipment loading allowance of 1,500 lbs. of Sugar Loaf Fire Protection District provided loose equipment based on a 15,001 - 20,000 pound gross vehicle weight rating.

SUGAR LOAF FIRE PROTECTION DISTRICT
Brush Truck Production Specification
SVI #859

EQUIPMENT

The following equipment shall be furnished with the completed initial attack vehicle;

- One (1) container of assorted stainless steel nuts, bolts, screws and washers used in the construction of the apparatus shall be provided with the completed apparatus.

- Two (2) Streamlight FireBox halogen flashlight(s) shall be provided by Sugar Loaf Fire Protection District. The flashlight(s) two (2) be wired to battery direct unless otherwise specified by Sugar Loaf Fire Protection District.

  - The flashlight(s) shall be mounted in cab, locations per Sugar Loaf Fire Protection District upon chassis arrival to SVI.
    SHOP NOTES
    Flashlight locations shall be determined upon chassis arrival to SVI.

- Four (4) sections of (Kochek P257-6) 2 1/2" x 6' hard suction hose with stortz fittings shall be provided with the apparatus.

  - The hoses shall be mounted and secured in one (1) of the pre-connect hose trays on the pump module.
    SHOP NOTES
    Kochek part number is P257-6 - 2.5"x6' PVC with 2/5" storz.

- One (1) (Kochek S37S254) 2 1/2" storz x 4" rigid female hard suction hose adpater shall be provided with the apparatus.
  SHOP NOTES
  Kochek part number is S37S254 - 2.5"x4" storz female adapter.

- Mounting for F.D. supplied equipment such as fire extinguishers, drip torches and wheel chocks shall be provided. Locations to be determinded by F.D.

- Sugar Loaf Fire Protection District supplied NFPA required fire hose and nozzles shall be provided on completed unit before placing vehicle in service.

REMAINING NFPA MINOR EQUIPMENT BY PURCHASER

All other minor equipment not specified above, but required by NFPA 1901, section 10.5.1 shall be supplied and mounted by Sugar Loaf Fire Protection District before the unit is placed in emergency service.