

CITY of SANTA FE, NM FIRE DEPARTMENT

TYPE III, SVI #1052
Production Specification

Contract Administrator: Jackie Sipes
Sales Administrator: Blaire Schrock



ROCK SOLID QUALITY

City of Santa Fe NM, Santa Fe Fire Department

TYPE III Pumper SVI #1052

LIABILITY INSURANCE

The manufacturer 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 \$4,000,000.00 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 manufacturer shall post and maintain a website where the City of Santa Fe NM, Santa Fe Fire Department will be able to view digital images of their apparatus as its being built. 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 unit.

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.

FIRE APPARATUS PERFORMANCE

The fire apparatus shall meet the requirements of this standard at elevations of 2000 ft (600 m) above sea level.

The fire apparatus shall meet all the requirements of this standard while stationary on a grade of 10 percent in any direction.

The fire apparatus shall meet the requirements of this standard in ambient temperature conditions between 32°F (0°C) and 110°F (43°C).

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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 33,000 lb (11,800 kg) shall not exceed 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.

The vehicle shall be capable of maneuvering across a 20 percent grade and up and down a 25 percent grade.

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.

WILDLAND DOCUMENTATION

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

1. The manufacturer's record of apparatus construction details, including the following information:
 - (a) Owner's name and address
 - (b) Apparatus manufacturer, model, and serial number
 - (c) Chassis make, model, and serial number
 - (d) GAWR of front and rear axles and GVWR
 - (e) Front tire size and total rated capacity in pounds (kilograms)
 - (f) Rear tire size and total rated capacity in pounds (kilograms)
 - (g) Chassis weight distribution in pounds (kilograms) with water and manufacturer-mounted equipment (front and rear)
 - (h) For each 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
 - (i) Type of fuel and fuel tank capacity
 - (j) Electrical system voltage and alternator output in amps
 - (k) Battery make, model, and capacity in cold cranking amps (CCA)

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- (l) Chassis transmission make, model, and serial number; and if so equipped, chassis transmission PTO(s) make, model, and gear ratio
 - (m) Ratios of all driving axles
 - (n) Maximum governed road speed
 - (o) For each pump: make, model, rated capacity in gallons per minute (liters per minute where applicable), and serial number
 - (p) For each pump transmission: make, model, serial number, and gear ratio
 - (q) Reserved
 - (r) Water tank certified capacity in gallons or liters
 - (s) Reserved
 - (t) Paint manufacturer and paint number(s)
 - (u) Company name and signature of responsible company representative
 - (v) Weight documents from a certified scale showing actual loading on the front axle, rear axle(s), and overall fire apparatus (with water tank full but without personnel, equipment, and hose)
2. Certification of compliance of the optical warning system
 3. Siren manufacturer's certification of siren
 4. Written load analysis and results of the electrical system performance tests
 5. Certification of slip resistance of all stepping, standing, and walking surfaces
 6. The wildland fire pump manufacturer's certification of suction capability
 7. If special conditions are specified by the purchaser of the wildland fire pump, the pump manufacturer's certification of suction capacity under the special conditions
 8. A copy of the apparatus manufacturer's approval for stationary pumping applications of the wildland fire pump
 9. For each pump, the pump manufacturer's certification of the hydrostatic test
 10. For each pump, the certification of inspection and test for the pump
 11. The certification of water tank capacity
 12. If the apparatus has a foam proportioning system, the foam proportioning system manufacturer's certification of accuracy and the final installer's certification that the foam proportioning system meets this standard
 13. If the system has a CAFS, the documentation of the manufacturer's pre delivery tests
 14. If the apparatus has a line voltage power source, the certification of the test for the power source (*see NFPA 1901, Standard for Automotive Fire Apparatus, 22.15.7.2*)
 15. If the apparatus is equipped with an air system, air tank certificates (*see NFPA 1901, 24.5.1.2*), the SCBAfill station certification (*see NFPA 1901, 24.9.7*), and the results of the testing of the air system installation (*see NFPA 1901, 24.14.5 and NFPA 1901, 24.15.4*)
 16. Certification of vehicle side slope stability, including the weight distribution assumed for the calculations or as loaded on the vehicle for the tilt table test
 17. Any other required manufacturer test data or reports

OPERATIONS AND SERVICE DOCUMENTATION

The contractor shall deliver with the fire apparatus 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)

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- 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
- 20) One copy of the latest edition of FAMA's *Fire Apparatus Safety Guide*

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 - USB FLASH DRIVE

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

FIRE APPARATUS SAFETY GUIDE

A Fire Apparatus Safety Guide published by Fire Apparatus manufacturer's Association shall be provided with delivered vehicle. This manual includes essential safety information for fire fighters, fire chiefs, apparatus mechanics, and fire department safety officers. The guide is applicable to municipal, wildland, and airport fire fighting apparatus manufactured on either custom or commercial chassis.

STATEMENT OF EXCEPTIONS

The final-stage manufacturer shall deliver with the fire apparatus either a certification that the apparatus fully complies with all requirements of this standard or alternatively, a Statement of Exceptions specifically describing each aspect of the completed apparatus that is not fully compliant with the requirements of this standard at the time of delivery.

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The Statement of Exceptions shall contain, for each noncompliant aspect of the apparatus or missing required item, the following information:

- 1) A separate specification of the section of the applicable standard for which compliance is lacking
- 2) A description of the particular aspect of the apparatus that is not in compliance therewith or required equipment that is missing
- 3) A description of the further changes or modifications to the delivered apparatus that must be completed to achieve full compliance
- 4) Identification of the entity that will be responsible for making the necessary post delivery changes or modifications or for supplying and installing any missing required equipment to the apparatus to achieve full compliance with this standard

Prior to or at the time of delivery of the apparatus, the Statement of Exceptions shall be signed by an authorized agent of the entity responsible for final assembly of the apparatus and by an authorized agent of the purchasing entity, indicating mutual understanding and agreement between the parties regarding the substance thereof.

CARRYING CAPACITY

The GAWR and the GCWR or GVWR of the chassis shall be adequate to carry the weight of the completed vehicle when loaded to its estimated in-service weight. The manufacturer shall establish the estimated in service weight during the design of the vehicle.

The estimated in-service weight shall include the following:

1. The chassis, body and tank(s)
2. Full fuel, lubricant, and other chassis or component fluid tanks or reservoirs
3. Full water and other agent tanks
4. *250 lb (114 kg) in each seating position
5. Fixed equipment such as pumps, aerial devices, generators, reels and air systems as installed
6. Ground ladders, suction hose, designed hose load in their hose beds and on their reels
7. An allowance for miscellaneous equipment that is the greatest of the following:
 - w) The values listed for items 1 - 8
 - x) A purchaser-provided list of equipment to be carried with weights
 - y) A purchaser-specified miscellaneous equipment allowance
8. If the apparatus is designed to accommodate SCBA, an additional 25 lb. (11.4 kg) per seating position shall be added to the miscellaneous equipment allowance.

The manufacturer shall engineer and design the fire apparatus such that the completed apparatus, when loaded to its estimated in-service weight, with all movable weights distributed as close as is practical to their intended in-service configuration, does not exceed the GVWR.

A final manufacturer's certification of the GVWR or GCWR, along with a certification of each GAWR, shall be supplied on a label affixed to the vehicle.

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 unequipped fire apparatus in feet and inches (meters), the length of the completed fire apparatus in feet and inches (meters), and the GVWR in tons (metric tons).

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.

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GVWR	Chassis		Storage Area		Equipment Weight		Ground Clearance	
	Apparatus Type	lb.	kg.	ft.3	m3	lb.	kg.	in.
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.

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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.

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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

MANUFACTURER PUMP CERTIFICATION

The apparatus upon completion shall be tested and certified by the manufacturer. The certification tests shall follow the guide lines outlined in NFPA 1901 "Standard for Fire Apparatus".

If the fire pump has a rated capacity of less than 750 gpm (3000 L/min), the pump shall be tested after the pump and all its associated piping and equipment have been installed on the apparatus.

The fire pump shall be tested and results certified to perform as listed below;

- 100% of rated capacity at 150 psi (1,000 kPa) net pressure
- 70% of rated capacity at 200 psi (1,400 kPa) net pressure
- 50% of rated capacity at 250 psi (1,700 kPa) net pressure

The test shall include at least the pumping test, the pumping engine overload test, the pressure control system test, the priming device tests, and the vacuum test.

The entire pump, both suction and discharge passages, shall be hydrostatically tested to a pressure of 500 psi (3,400 kPa).

The pump shall comply with the applicable requirements of "Standard for Fire Apparatus 1901, latest edition.

The pump shall be capable of producing fire streams that are free from objectionable pulsation under all normal operating conditions.

If the apparatus is equipped with a pump driven by the chassis engine designed for both stationary pumping and pump-and-roll, the test shall verify that the engine speed control at the pump operator's panel cannot be advanced when either of the following conditions exists:

- (1) The chassis transmission is in neutral, the parking brake is off, and the pump shift status in the driving compartment is disengaged.
- (2) The chassis transmission is in any gear other than neutral, the parking brake is on, and the pump shift in the driving compartment is in the "Pump Engaged" or the "OK to Pump-and-Roll" position.

A test plate shall be provided at the pump operator's panel that gives the rated discharges and pressures together with the speed of the engine as determined by the certification test for each unit, the position of the parallel/series pump as used, and the governed speed of the engine as stated by the engine manufacturer on a certified brake horsepower curve.

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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 City of Santa Fe NM, Santa Fe Fire Department 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.

UNDERCOAT WARRANTY

The body undercoating shall have a warranty provided by the manufacturer for the lifetime of the vehicle or twenty (20) years, whichever occurs first. The warranty shall be transferable between vehicle owners. Should the undercoating material applied to the underside of the body and wheel wells of the vehicle ever flake off, peel, chip or crack due to drying out, the damaged area shall be re-sprayed without charge to the vehicle owner.

PAINT LIMITED WARRANTY - TEN (10) YEARS

The body shall be free of bubbling or peeling as a result of a defect in the method of manufacture 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. **Pro-rated warranties will not be acceptable.**

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.

WATEROUS FIVE YEAR PUMP WARRANTY

The fire pump shall be warranted by Waterous for a period of five (5) years from the date of delivery to the City of Santa Fe NM, Santa Fe Fire Department.

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STAINLESS STEEL PLUMBING WARRANTY

The stainless steel plumbing shall be free of defects in material and 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.

The contractor shall supply details of their warranty information with their bid submission.

AKRON BRASS FIVE YEAR VALVE WARRANTY

The Akron Brass valves shall be warranted by Akron Brass for a period of ten (10) years from the date of delivery to the City of Santa Fe NM, Santa Fe Fire Department. The warranty for electronics shall be warranted by Akron Brass for a period of five (5) years from date of delivery to the City of Santa Fe NM, Santa Fe Fire Department.

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 three hundred sixty (360) 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 City of Santa Fe NM, Santa Fe Fire Department as to delays and to what extent these delays have in completing vehicle within the stated construction time period.

OVERALL HEIGHT REQUIREMENT

The overall height (OAH) of the vehicle shall be approximately 134" 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 326" (27' - 2").

OVERALL WIDTH

The overall width (OAW) of the body at drip rails shall be 100" (8' - 4"), and body shall be 98" (8' - 2").

ANGLE OF APPROACH

The angle of approach for this vehicle shall not be less than twenty (20) degrees when it is loaded to the estimated in-service weight as specified by the current edition of NFPA 1906.

ANGLE OF DEPARTURE

The angle of departure for this vehicle shall not be less than twenty (20) degrees when it is loaded to the estimated in-service weight as specified by the current edition of NFPA 1906.

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INSPECTION TRIPS

All required inspection trips shall be the financial responsibility of the City of Santa Fe NM, Santa Fe Fire Department, including but not limited to transportation, food and lodging.

DELIVERY AND DEMONSTRATION

The Contractor shall be responsible for the delivery of the completed unit to the City of Santa Fe NM, Santa Fe Fire Department'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 City of Santa Fe NM, Santa Fe Fire Department regarding the operation, care and maintenance of the apparatus and equipment supplied at City of Santa Fe NM, Santa Fe Fire Department location.

The Delivery Engineer shall set delivery and instruction schedule with the person appointed by City of Santa Fe NM, Santa Fe Fire Department.

After delivery of the apparatus, the City of Santa Fe NM, Santa Fe Fire Department shall be responsible for ongoing training of its personnel to proficiency regarding the proper and safe use of the apparatus and associated equipment.

CAB/CHASSIS SPECIFICATIONS

Vehicle Configuration

M2 108SD CONVENTIONAL CHASSIS
2019 MODEL YEAR SPECIFIED
SET BACK AXLE - TRUCK **4 X 4**

General Service

FIRE/EMERGENCY SERVICE
MEDIUM TRUCK WARRANTY
EXPECTED FRONT AXLE LOAD: 14000 lbs
EXPECTED REAR DRIVE AXLE LOAD: 24000 lbs
EXPECTED GROSS VEHICLE CAPACITY: 38000 lbs

Engine

CUM L9 380EV HP @ 2000 RPM, 2200 GOV RPM , 1150 LB/FT @ 1400 RPM FIRE/EMERGENCY

Engine Equipment

2016 ONBOARD DIAGNOSTICS/2010 EPA/CARB/GHG17
NFPA COMPLIANT EMBER SCREEN AND FIRE RETARDANT DONALDSON AIR CLEANER
DR 12V 275 AMP 40-SI BRUSHLESS PAD ALTERNATOR WITH REMOTE BATTERY VOLTAGE SENSE
(3) ALLIANCE MODEL 1031, GROUP 31, 12 VOLT MAINTENANCE FREE 2280 CCA THREADED STUD BATTERIES
SINGLE BATTERY BOX FRAME MOUNTED LH SIDE UNDER CAB
WIRE GROUND RETURN FOR BATTERY CABLES WITH ADDITIONAL FRAME GROUND RETURN
POSITIVE LOAD DISCONNECT WITH CAB MOUNTED CONTROL SWITCH MOUNTED OUTBOARD DRIVER
POSITIVE AND NEGATIVE POSTS FOR JUMPSTART LOCATED ON FRAME NEXT TO STARTER
CUMMINS TURBOCHARGED 18.7 CFM AIR COMPRESSOR WITH INTERNAL SAFETY VALVE
C-BRAKE BY JACOBS WITH LOW/OFF/HIGH BRAKING DASH SWITCH
RH MTD HORIZONTAL AFTERTREATMENT WITH RH MTD BRIGHT VERTICAL CURVED TAILPIPE
STAINLESS STEEL AFTERTREATMENT DEVICE TAILPIPE SHIELD

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HORTON DRIVEMASTER ADVANTAGE ON/OFF FAN DRIVE
AUTOMATIC FAN CONTROL WITHOUT DASH SWITCH
CUMMINS SPIN ON FUEL FILTER
COMBINATION FULL FLOW/BYPASS OIL FILTER
1200 SQUARE INCH ALUMINUM RADIATOR
ANTIFREEZE TO -34F, OAT (NITRITE AND SILICATE FREE) EXTENDED LIFE COOLANT
GATES BLUE STRIPE COOLANT HOSES OR EQUIVALENT
CONSTANT TENSION HOSE CLAMPS FOR COOLANT HOSES
PHILLIPS-TEMRO 1000 WATT/115 VOLT BLOCK HEATER WITH CHROME RECEPTACLE MOUNTED UNDER LH DOOR
ELECTRIC GRID AIR INTAKE WARMER
DELCO 12V 38MT HD STARTER WITH INTEGRATED MAGNETIC SWITCH

Transmission

ALLISON 3000 EVS AUTOMATIC TRANSMISSION WITH PTO PROVISION

Transmission Equipment

MAGNETIC PLUGS, ENGINE DRAIN, TRANSMISSION DRAIN, AXLE(S) FILL AND DRAIN
PUSH BUTTON ELECTRONIC SHIFT CONTROL, DASH MOUNTED
TRANSMISSION PROGNOSTICS - ENABLED 2013
WATER TO OIL TRANSMISSION COOLER
MERITOR MTC-4210 TRANSFER CASE W/ OIL COOLER
TRANSMISSION OIL CHECK AND FILL WITH ELECTRONIC OIL LEVEL CHECK

SYNTHETIC TRANSMISSION FLUID (TES-295 COMPLIANT)

Front Axle and Equipment

MX-14-120-EVO 14,000# 1790MM KPI SINGLE FRONT DRIVE AXLE
MXL 16T MERITOR EXTENDED LUBE FRONT STEERING AXLE DRIVELINE WITH HALF ROUND YOKES
MERITOR 16.5X5 Q+ MX DRIVE AXLE CAST SPIDER HEAVY DUTY CAM FRONT BRAKES
FIRE AND EMERGENCY SEVERE SERVICE, NON-ASBESTOS FRONT LINING
FRONT BRAKE DUST SHIELDS
MERITOR AUTOMATIC FRONT SLACK ADJUSTERS
TRW TAS-85 POWER STEERING
2 QUART SEE THROUGH POWER STEERING RESERVOIR
SYNTHETIC 75W-90 FRONT AXLE LUBE

Front Suspension

14,600# TAPERLEAF FRONT SUSPENSION
MAINTENANCE FREE RUBBER BUSHINGS
FRONT SHOCK ABSORBERS

Rear Axle and Equipment

RS-23-161 24,000# R-SERIES FIRE/EMERGENCY SERVICE SINGLE REAR AXLE
5.63 REAR AXLE RATIO 68 MPH TOP SPEED
IRON REAR AXLE CARRIER WITH STANDARD AXLE HOUSING
MXL 17T MERITOR EXTENDED LUBE MAIN DRIVELINE WITH HALF ROUND YOKES
DRIVER CONTROLLED TRACTION DIFFERENTIAL
MERITOR 16.5X7 Q+ CAST SPIDER CAM REAR BRAKES, DOUBLE ANCHOR HEAVY DUTY BRAKE AND SHOES
FIRE AND EMERGENCY SEVERE SERVICE NON-ASBESTOS REAR BRAKE LINING

City of Santa Fe NM, Santa Fe Fire Department

TYPE III Pumper SVI #1052

REAR BRAKE DUST SHIELDS
WABCO TRISTOP D LONGSTROKE 1-DRIVE AXLE SPRING PARKING CHAMBERS
MERITOR AUTOMATIC REAR SLACK ADJUSTERS
SYNTHETIC 75W-90 REAR AXLE LUBE

Rear Suspension

24,000# FLAT LEAF SPRING REAR SUSPENSION WITH HELPER, WITH RADIUS ROD, FOR
FIRE/EMERGENCY
FORE/AFT CONTROL RODS

Brake System

AIR BRAKE PACKAGE
WABCO 4S/4M ABS WITH TRACTION CONTROL & ESC
STANDARD AIR SYSTEM PRESSURE PROTECTION
BW AD-9 BRAKE LINE AIR DRYER WITH HEATER
CUSTOM STEEL AIR BRAKE RESERVOIRS
BW DV-2 AUTO DRAIN VALVE WITH HEATER - WET TANK

Electrical Connections

UPGRADED CHASSIS MULTIPLEXING UNIT
UPGRADED BULKHEAD MULTIPLEXING UNIT

Wheelbase & Frame

(177 INCH) WHEELBASE / (64.2 INCH) CA
11/32X3-1/2X10-15/16 INCH STEEL FRAME 120KSI
(63 INCH) REAR FRAME OVERHANG

Chassis Equipment

OMIT FRONT BUMPER, CUSTOMER INSTALLED SPECIAL BUMPER.
FRONT TOW HOOKS - FRAME MOUNTED
24 INCH INTEGRAL FRONT FRAME EXTENSION
GRADE 8 THREADED HEX HEADED FRAME FASTENERS
12 TON JACK & WHEEL WRENCH WITH HANDLE

Fuel Tanks

70 GALLON 23" DIAMETER ALUMINUM FUEL TANK - LH
6 GALLON DIESEL EXHAUST FLUID TANK
DETROIT FUEL/WATER SEPARATOR WITH WATER IN FUEL SENSOR
EQUIFLO INBOARD FUEL SYSTEM

Tires

MICHELIN XDS 12R22.5 16 PLY RADIAL FRONT TIRES
MICHELIN XDS 12R22.5 16 PLY RADIAL REAR TIRES

Hubs

MERITOR IRON FRONT HUBS
CONMET PRESET PLUS IRON REAR HUBS

Wheels

22.5X8.25 10-HUB PILOT 2-HAND HD STEEL DISC FRONT WHEELS PAINTED JOB COLOR
22.5X8.25 10-HUB PILOT 2-HAND HD STEEL DISC REAR WHEELS PAINTED JOB COLOR
22.5X8.25 10-HUB PILOT 2-HAND HD STEEL DISC SPARE WHEEL PAINTED JOB COLOR

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Cab Exterior

156 INCH BBC HIGH-ROOF ALUMINUM CONVENTIONAL AIR RIDE CREW CAB
NONREMOVABLE BUGSCREEN MTD BEHIND GRILLE
BOLT-ON MOLDED FLEXIBLE FENDER EXTENSIONS
NFPA COMPLIANT EXTERIOR GRAB HANDLES
STATIONARY BLACK GRILL WITH BRIGHT ACCENTS
FIBERGLASS HOOD WITH FIREWALL INSULATION
BRIGHT FINISH RAADIATOR SHELL/HOOD BEZEL
VALVE AND PLUMBING FOR CUSTOMER FURNISHED AIR HORN, PIPING CAPPED AT FIREWALL
DUAL LANYARD CONTROLS; DUAL ELECTRIC HORNS
HALOGENCOMPOSITE HEADLIGHTS WITH BRIGHT BEZELS AND DAYTIME RUNNING LIGHTS
LED AERODYNAMIC MARKER LIGHTS
PRE-WIRE FOR CUSTOMER SUPPLIED FOG LIGHTS
DUAL 102" WEST COAST BRIGHT FINISH HEATED MIRRORS WITH LH AND RH REMOTE
LH AND RH 8 INCH BRIGHT FINISH CONVEX MIRRORS MOUNTED UNDER PRIMARY MIRRORS
OMIT REAR WINDOW
TINTED DOOR GLASS LH AND RH WITH TINTED NON-OPERATING WING WINDOWS
TINTED WINDSHIELD
RH/LH ELECTRIC PWR WINDOWS & DOOR LOCKS
8 LITER WINDSHIELD WASHER RESERVOIR WITHOUT FLUID LEVEL INDICATOR, CAB MOUNTED

Cab Interior

MOLDED PLASTIC DOOR PANELS WITH ALUMINUM KICKPLATES LOWER DOORS
BLACK MATS WITH PREMIUM INSULATION
FORWARD ROOF MOUNTED CONSOLE WITH UPPER STORAGE COMPARTMENTS WITHOUT NETTING
IN DASH STORAGE BIN
(2) CUP HOLDERS LH AND RH DASH
HEATER, DEFROSTER AND AIR CONDITIONER
MAIN HVAC CONTROLS W/ RECIRCULATION SWITCH
SOLID-STATE CIRCUIT PROTECTION AND FUSES
12V NEGATIVE GROUND ELECTRICAL SYSTEM
OVERHEAD INSTRUMENT PANEL
DOOR ACTIVATED DOME/RED MAP LIGHTS, FORWARD LH AND RH AND REAR LH, RH AND CENTER
(1) 12V POWER SUPPLY (1) DUAL 2.1 AMP USB CHARGER IN DASH
SEATS INC 911 UNIVERSAL SERIES HIGH BACK AIR SUSPENSION DRIVER SEAT NFPA COMPLIANT
SEATS INC 911 UNIVERSAL SERIES HIGH BACK AIR SUSPENSION PASSENGER SEAT NFPA COMPLIANT
SEATS INC 911 UNIVERSAL SERIES HIGH BACK NON SUSPENSION LH AND RH REAR PASSENGER
LH AND RH INTEGRAL DOOR PANEL ARMRESTS
GRAY VINYL SEAT COVERS WITH GRAY CORDURA CLOTH BOLSTERS AND HEADRESTS
NFPA 1901-2009 HIGH VISIBILITY ORANGE SEAT BELTS
ADJUSTABLE TILT AND TELESCOPING STEERING COLUMN
4-SPOKE 18 INCH STEERING WHEEL
DRIVER AND PASSENGER INTERIOR SUN VISORS

City of Santa Fe NM, Santa Fe Fire Department

TYPE III Pumper SVI #1052

Instruments & Controls

GRAY INSTRUMENT PANELS
 BLACK GAUGE BEZELS
 LOW AIR PRESSURE INDICATOR LIGHT AND AUDIBLE ALARM
 2" PRIMARY & SECONDARY AIR PRESSURE GAUGES
 ENGINE COMPARTMENT MOUNTED AIR RESTRICTION INDICATOR WITH GRADUATIONS
 PRECO 1040 87 DB TO 112 DB AUTOMATIC SELF-ADJUSTING BACKUP ALARM
 ELECTRONIC CRUISE CONTROL WITH SWITCHES IN LH SWITCH PANEL
 IGNITION SWITCH WITH NON REMOVABLE KEY
 ICU3S, 132X48 DISPLAY WITH DIAGNOSTICS, 28 LED WARNING LAMPS AND DATA LINKED
 FIRE AND EMERGENCY SERVICE VEHICLES ENGINE WARNING
 2 INCH ELECTRIC FUEL GAUGE
 ELECTRICAL ENGINE COOLANT TEMPERATURE GAUGE
 2 INCH TRANSMISSION OIL TEMPERATURE GAUGE
 ENGINE AND TRIP HOUR METERS INTEGRAL WITHIN DRIVER DISPLAY AND HOBBS PTO
 OPERATION HOUR METER
 ELECTRIC ENGINE OIL PRESSURE GAUGE
 AM/FM/WB WORLD TUNER RADIO WITH AUXILIARY INPUT, J1939
 DASH MOUNTED RADIO
 (2) RADIO SPEAKERS IN CAB
 AM/FM ANTENNA MOUNTED ON FORWARD LH ROOF
 ELECTRONIC 3000 RPM TACHOMETER
 ELECTRONIC MPH SPEEDOMETER WITH SECONDARY KPH SCALE
 IGNITION SWITCH CONTROLLED ENGINE STOP
 PRE-TRIP LAMP INSPECTION, ALL OUTPUTS FLASH, WITH SMART SWITCH
 DIGITAL VOLTAGE DISPLAY INTEGRAL WITH DRIVER DISPLAY
 SINGLE ELECTRIC WINDSHIELD WIPER MOTOR WITH DELAY
 MARKER LIGHT SWITCH INTEGRAL WITH HEADLIGHT SWITCH
 ONE VALVE PARKING BRAKE SYSTEM WITH DASH VALVE
 SELF CANCELING TURN SIGNAL SWITCH WITH DIMMER, WASHER/WIPER AND HAZARD IN
 HANDLE
 INTEGRAL ELECTRONIC TURN SIGNAL FLASHER WITH HAZARD LAMPS OVERRIDING STOP
 LAMPS

Paint Design

TWO COLOR CUSTOM BASE/CLEAR COAT
 FLT- EMERGENCY 4 PAINT BREAK
 CAB COLOR A: L2978EB WHITE PIERCE #10 ELITE BC
 CAB COLOR B:L5040EB RED PIERCE #80 ELITE BC
 BLACK, HIGH SOLIDS POLYURETHANE CHASSIS PAINT

TOTAL VEHICLE SUMMARY

Weight Summary

	Weight Front	Weight Rear	Total Weight
Factory Weight ⁺	9341 lbs	4965 lbs	14306 lbs

(+) Weights shown are estimates only.

SHOP NOTES

Spec date 6/1/2018

City of Santa Fe NM, Santa Fe Fire Department

TYPE III Pumper SVI #1052

CAB TO AXLE DIMESION

Cab to axle will be 64".

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

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TYPE III Pumper SVI #1052

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.

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.

SEAT BELT WARNING - FAMA06/07

A safety sign FAMA06 shall be visible from each seat that is not equipped with occupant restraint and therefore not intended to be occupied while the vehicle is in motion.

A safety sign FAMA07, which warns of the importance of seat belt use, shall be visible from each seat that is intended to be occupied while the vehicle is in motion.

EQUIPMENT MOUNTING FAMA10

A safety sign FAMA10, which warns of the need to secure items in the cab, shall be visible inside the cab.

FIRE SERVICE TIRES - FAMA12

A safety sign FAMA12, which warns of the special requirements for fire service-rated tires, shall be visible to the driver entering the cab of any apparatus so equipped.

HELMET WARNING - FAMA15

A safety sign FAMA15, which warns not to wear helmets while the vehicle is in motion, shall be visible from each seat that is intended to be occupied while the vehicle is in motion.

CLIMBING METHOD - FAMA23

A safety sign FAMA23, which warns of the proper climbing method, shall be visible to personnel entering the cab and at each designated climbing location on the body.

REAR STEP CROSSWALK WARNING - FAMA24

A safety sign FAMA24, which warns personnel not to ride on the vehicle, shall be located at the rear step areas and at any cross walkways.

FINAL STAGE MANUFACTURER VEHICLE CERTIFICATION

A final stage manufacturer vehicle certification label shall be provided and installed in the driver cab door jamb area.

City of Santa Fe NM, Santa Fe Fire Department

TYPE III Pumper SVI #1052

FRONT BUMPER EXTENSION

The front bumper shall be fabricated of heavy duty steel "C" channel and shall be attached to chassis extended frame rails approximately 20" ahead of the cab. After fabrication of the bumper shall be primed and painted job color.

BUMPER GRAVEL SHIELD

The front bumper extension shall have a 3/16" NFPA compliant aluminum tread plate gravel shield. The gravel shield shall cover the full width of the front bumper to the front of the cab and the full height of the bumper on each end.

BUMPER PRE-CONNECT COMPARTMENT

The bumper extension shall have one (1) fire hose pre-connect compartment center of bumper. The compartment shall be as large as room allows. Compartment door shall be 1/8" NFPA compliant aluminum tread plate with stainless steel hinge wrapped with vinyl and chrome push release type latches. Door shall be notched to allow fire hose to be pre-connected to swivel located on streetside of front bumper. The compartment door shall have a gas shock type hold open device. This compartment shall not be watertight but shall include a compartment drain.

A safety sign FAMA22, which warns of the need to secure hose, shall be visible to personnel at each hose storage area.

If the bumper compartment is greater than 4 cu.ft. in volume and has an opening greater than 144 sq.in. it shall have sufficient compartment lighting to provide a minimum of 2 fc (20 lx) at any location on the floor of the compartment without any equipment in the compartment. There shall be one (1) 9" OnScene LED type ground light mounted below the bumper.

A flashing warning light signal shall be provided indicating when a compartment door is not in a closed position as required by NFPA 1901.

AIR HORN

One (1) Grover 24" Stuttertone chrome plated air horn shall be recessed mounted in the front bumper on the curbside side. An emergency air shut off valve shall be provided in the cab.

AIR HORN ACTIVATION

The air horn(s) shall be operated by chassis supplied lanyards at the cab ceiling for driver and officer positions.

BUMPER MOUNTED FOG LIGHTS

Two (2) rectangular PERLUX 500 Series fog lights with clear lens shall be mounted recessed in the front bumper.

FRONT TOW PLATE

A horizontal full frame width, 1/2" thick steel plate, center pull, front tow eye shall be furnished and installed through or below the front bumper. The tow eye plate shall be triangle shaped extended 6" beyond the front bumper with a 3" x 4" rectangle tow eye. The tow eye must be braced and gusseted to prevent frame rail or bumper damage and bolted to the front frame rail web with eight (8) 5/8" SAE Grade 8 frame bolts and lock nuts.

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TYPE III Pumper SVI #1052

AIR INTAKE SYSTEM

An air filter shall be provided in the engine's air intake system by the commercial cab/chassis manufacturer. Air inlet restrictions shall not exceed the engine manufacturer's recommendations. The air inlet shall be equipped with a means of separating water and burning embers from the air intake system.

In addition to the engine's air intake, the cab fresh air intake and/or outside cab vent shall be equipped with a means of separating water and burning embers from the air intake system

This requirement shall be permitted to be achieved by either of the following methods:

1. Provision of a device such that burning particulate matter larger than 0.039 in. (1.0 mm) in diameter cannot reach the air filter element.
2. Provision of a multi screen ember separator capable of meeting the test requirements defined in the Parker Hannafin, Racor Division, publication LF 1093-90, *Ember Separation Test Procedure*, or an equivalent test.

EXHAUST

The exhaust system shall be as provided by cab/chassis manufacturer. The tailpipe may require some modifications for proper ground clearances and fit with body.

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

Exhaust pipe discharge shall be directed away from any operator's position or entry doors on body.

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

EXHAUST SYSTEM WRAP

The exhaust system shall include a removable insulation high temperature wrap. The wrap shall be designed to encase the complete exhaust system under the cab to reduce heat transfer into the crew area.

BATTERY JUMPER STUDS

Two (2) battery jumper studs, one (1) positive with a red weather cover, and one (1) negative with a black weather cover shall be provided in the lower front portion of the driver step area. Jumper studs shall be identified with color coded label.

These studs shall allow this vehicle to be jump started due to a battery failure, or to allow easy access to assist another vehicle.

RADIO ANTENNA INSTALLATION

There shall be two (2) radio antenna mounts provided and installed on the roof of the cab/chassis. The end of each radio antenna shall be routed to the Center Console or where the Base Station will be mounted.

The Body Manufacturer shall provide the appropriate antenna base for each Radio installation. The Antenna Whip will need to be installed and tuned by the City of Santa Fe Fire Department or their Radio Dealer.

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TYPE III Pumper SVI #1052

RADIO INSTALLATION

Two (2) mobile radios, installation shall be provided. One (1) City of Santa Fe NM, Santa Fe Fire Department supplied 800 MHz Motorola XLT2500 radio and one (1) SVI supplied VHF Bendix-King DMH5992X radio with programmable microphone will be mounted in the center console between the two front seats of the cab. They will be connected into the vehicles FireCom system.

Radio shall be installed per Manufacturer's requirements and wired for proper 12 volt power and ground.

Each radio will be connected to its proper operating antenna on top of the cab

VHF RADIO SPEAKER

An interior cab ceiling mounted speaker box shall be provided that shall have adequate dimensions to allow for the flush mount installation of one VHF radio speaker.

A high quality VHF speaker (ref 2321-2017_EQ_Radio) shall be installed in the ceiling mounted speaker box, which shall be evenly spaced between the operator and front passenger seat. The speaker wiring shall run from the ceiling mounted speaker box to a position in the center console to facilitate ease of the VHF radio installation.

12 VDC ACCESSORY PLUG

There shall be four (4) 12 volt accessory plug(s) with protective rubber plug(s) provided and installed in the cab area, wired direct. Two (2) sockets shall be mounted between the rear passenger seats of the cab on the center storage compartment and two (2) on the front console per SFFD.

SCBA SEAT AIR PACK BRACKETS

No SCBA air pack bracket(s) shall be provided in specified commercial cab SCBA seats. City of Santa Fe NM, Santa Fe Fire Department will provide and install necessary bracket(s) after delivery.

SEAT BELT COLOR

Section 14.1.3.4 of the NFPA 1901 Standards, 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.

SEAT BELT WEB LENGTH - COMMERCIAL CAB

Sections 14.1.3.2 and 14.1.3.3 of the NFPA 1901 standards, 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.

City of Santa Fe NM, Santa Fe Fire Department

TYPE III Pumper SVI #1052

SEAT BELT MONITORING AND VEHICLE DATA RECORDER (VDR) SYSTEMS

SEAT BELT MONITORING

A Weldon 6204 series system with Occupant Restraint Indicator (ORI) display shall be provided and installed to allow the driver to know if all persons seated in the vehicle are secured with seat belts before moving the vehicle. Built-in smart seating logic shall detect if the correct sit and buckle sequence is not followed for all seats. System shall also provide an output for an external alarm. Weldon diagnostic port will be located under dash on driver side. System shall include the following features;

VEHICLE DATA RECORDER (VDR)

The vehicle data recorder shall have the following features;

- Recorded Data Includes: Vehicle Speed, Acceleration, Deceleration, Engine Speed, Engine Throttle Position, ABS Event, Seat Occupied Status, Seat Belt Status, Master Optical Warning Switch, Park Brake, Service Brake, Time, Date and Engine Hours.
- Password Protected by the customer
- Six (6) seat position inputs for occupied and belts buckled. Additional six (6) seat expansion module available.
- Easily interfaces with traditional wiring, or optional V-MUX™ or other multiplexing systems
- Data is extracted by a standard, mini USB cable
- Use in conjunction with the Occupant Restraint Indicator or optional V-MUX™ multiplex system

OCCUPANT RESTRAINT INDICATOR

The occupant restraint indicator shall have the following features;

- Supports commercial and custom cab seating layouts; up to 12 seats
- Built-in audible alarm
- Use in conjunction with Vehicle Data Recorder (VDR)

IGNITION KEY

The vehicle is specified to have an unremovable ignition key provided by chassis manufacturer.

SIX (6) – LED TIRE PRESSURE VISUAL INDICATORS

Each tire valve stem shall be equipped with an LED Tire Alert (or equal), heavy duty valve cap LED indicator that indicates proper tire pressure. The LED Tire Alert valve cap is self-calibrating. When the cap is mounted on the valve stem the first time, it will memorize that tire pressure, and can be set to recognize a drop in pressure as little as 6 psi. It can be checked for functionality and battery condition by simply unscrewing the cap. If it is in working condition, it will immediately start blinking.

HELMET STORAGE

No helmet storage is required in the cab driving area.

HELMET STORAGE

No helmet storage is required in the cab crew area.

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TYPE III Pumper SVI #1052

CAB CRASH TEST CERTIFICATION

A cab crash test certification from the fire apparatus manufacturer shall be provided with the equipment. A copy of this certification shall be included with the bid.

NOTE: There shall be no exception to any portion of the cab integrity certification requirements. Nonconformance shall lead to immediate rejection of bid.

The certification shall state that the cab does meet or exceed the requirements below:

- 1) European Occupant Protection Standard ECE Regulation No. 29.
- 2) SAE J2422 Cab Roof Strength Evaluation - Quasi-Static Loading Heavy Trucks.

CAB MIRRORS, DRIVER ADJUSTABLE

Section 14.3.5 of the NFPA 1901 Standards, 2009 edition, requires all primary rear view mirrors used by the driver to be adjustable from the driver's position.

PAINT WHEELS

The wheels shall be trimmed with silver paint.

CAB STEP OVERLAYS

CURBSIDE UNDER CAB COMPARTMENT

The stock cab upper and lower entry steps shall be overlaid with 1/8" NFPA compliant aluminum treadplate.

The maximum stepping height shall not exceed 18", with the exception of the ground to first step, which shall not exceed 24" when the vehicle is loaded to its estimated in-service weight. All steps shall have a minimum area of 35 sq in and shall be of such a shape that a 5" diameter disk does not overlap any side when placed on the step, and shall be arranged to provide a t least 8" of clearance between the leading edge of the step and any obstruction. All platforms shall have a minimum depth of 8" from the leading edge of the platform to any obstruction.

There shall be a aluminum compartment mounted beneath the crew door on the curbside of the cab. The compartment shall have approx. dimensions of 28" wide x 10" high x 22" deep. The clear door compartment dimensions shall be 28" wide x 10" high.

Door shall be a single pan design with the material being 12-gauge stainless steel. The horizontally hinged door shall have a polished stainless steel 1/4" piano hinge with a locking Eberhard latch, with a chrome "D" ring with a 5-degree bend for easier grasping of each door handle with gloved hands. The latch shall be provided with a keyed lock.

BATTERY CHARGING RECEPTACLE LOCATION

The specified battery charging receptacle and/or display panel shall be located below driver door area.

MUDFLAPS

There shall be 1/4" rubber mudflaps provided and installed behind each set of tires to prevent throwing road debris and lower road spray.

City of Santa Fe NM, Santa Fe Fire Department

TYPE III Pumper SVI #1052

AIR BRAKE SYSTEM QUICK BUILD-UP

There shall be one (1) Milton male quick connector type air shoreline inlet to provide air to the chassis air tanks from an external source compressed air shoreline hookup in order to maintain full operating air pressure while the vehicle is not running. Air inlet shall be located near driver's door. The female end of the connector shall be supplied by the City of Santa Fe NM, Santa Fe Fire Department.

The quick buildup system shall provide sufficient air pressure so that the apparatus has no brake drag and is able to stop under the intended operating conditions following the 60-second buildup time.

DRIVELINE GUARD

There shall be one (1) driveline guard provided per drive shaft. Driveline guards shall be a "U" bolt type driveline guard to provide protection in case of driveline or universal joint failure.

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) 2-1/2lb. ABC type vehicle fire extinguisher with bracket per DOT requirements shall be provided and mounted inside cab area.

ADDITIONAL EQUIPMENT

One (1) 33 MM wheel lug wrench and related handle; one (1) 20-ton bottle jack and related handle; and one (1) heavy-duty set of jumper cables shall be provided.

CAB INTERIOR CABINET - CENTER REAR WALL

There shall be one (1) storage cabinet provided in rear cab area, center at rear wall. The cabinet shall be fabricated from 1/8" smooth aluminum and finished with a dark gray hammer tone powder coat paint for a hard and durable finish. The cabinet shall be approximately 20" wide x 20" deep x high enough for top to be used as an armrest for rear crew seats.

The top of cabinet shall be provided with two (2) Cup Holders (one each side). The top center of cabinet shall be provided with a recessed storage area for personal items.

- There shall be two (2) 12 VDC power plug(s) provided and installed in the cab area, wired battery direct. The location of power plug(s) shall be one each side eof cabinet.
- Cabinet shall be provided with vertically mounted shallow aluminum Shelf-Trac for specified component installation.
- There shall be one (1) adjustable shelf/shelves in the above cabinet(s). Each shelf shall have a 1.25" vertical lip at front to contain items while vehicle is in motion.

SHOP NOTES

Delete shelf if necessary for room needed for cooler.

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TYPE III Pumper SVI #1052

- There shall be one (1) Austin Front Drawer Release (FDR) 400 lbs. slide-out tray(s) at base of storage cabinet for specified cooler. The tray shall be fabricated from 3/16" 3003 aluminum sheet with a 1" vertical lip and welded corners to form a box type tray surface. The sliding tracks shall extend 100% of the slide length.

Mounted in specified slide-out tray shall be a Koolatron model P27 12volt DC cooler (15.25" H x 16" W x 17.5" D) or equal.

- The above cabinet(s) shall have an open front face (no door).

DEF FLUID FILL

The DEF fluid fill shall be as supplied by commercial cab/chassis manufacturer.

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 City of Santa Fe NM, Santa Fe Fire Department 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 City of Santa Fe NM, Santa Fe Fire Department 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.

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TYPE III Pumper SVI #1052

EXTERIOR ALUMINUM BODY

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

The body compartment floors and exterior panels shall be constructed with not less than 1/8" (.125) aluminum 3003H-14 smooth plate. Interior compartment dividing walls 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, No Exceptions.

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

The door side frame openings shall be formed "C" channel design. An electrical wiring conduit raceway running the full length of exterior compartments shall be provided. This raceway shall contain all 12 volt wiring running to the rear of the apparatus, permitting easy accessibility to wiring.

Individual compartment modules, with dead air space voids between compartments, will not be an acceptable method of compartment construction.

The compartments shall be an integral part of the body construction. Compartment floors from front of body to ahead of rear axle, also from rear axle to rear of body shall be single one-piece sections. Compartment floors shall be preformed, then positioned in body and welded into final position.

Compartment floors shall have a "sweep-out" design with door opening threshold positioned lower than compartment floor, permitting easy cleaning of compartments. Angles, lips, or door moldings are not acceptable in the base of compartment door opening. 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 and caulked to prevent moisture from entering the 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.

DRIP RAILS

The body shall have drip rails over the side full height compartments. The drip rails shall be self-adhesive backed and bright dip anodized aluminum Extrusions.

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TYPE III Pumper SVI #1052

BODY SUBFRAME

The chassis frame rails shall be fitted with 1/4" custom extruded UHMW polyethylene rail cap to isolate the body frame members from direct contact with chassis frame rails.

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

The body subframe shall be fastened to the chassis frame with a minimum of four (4) spring loaded body mounts. Each mount shall be configured using a two-piece encapsulated slide bracket. The two (2) brackets shall be fabricated of heavy duty 1/4" thick steel and shall have a powder coat finish to prevent any corrosion. Each mounting assembly shall utilize two (2) 3/4" diameter x 6" long grade 8 bolts and two (2) heavy duty springs. The assembly design shall allow the body and subframe to act as one (1) component, separate from the chassis. As the chassis frame twists under driving conditions, the spring mounting system shall eliminate any stress from being transferred into the body. The spring loaded body mounts shall also prevent frame side rail or body damage caused by unevenly distributed stress and strains due to load and chassis movement.

Body mountings that do not allow relief from chassis movement will not be acceptable.

10" 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 10" 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 body. The tow eyes shall be fabricated from 3/4" thick steel plate with a 3" diameter opening. Tow eyes shall have a black powder coat finish.

GROUND LIGHTS

There shall be two (2) OnScene 8" Access LED lights 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.

REAR BUMPER STEPS;

Two utility cable style steps shall be provided at rear bumper.

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TYPE III Pumper SVI #1052

SPARE TIRE CARRIER

A ratchet type cable lift spare tire carrier shall be provided and installed under the chassis frame aft of the rear axle. The use of the vehicle's lug wrench shall be the mechanism to raise and lower the spare tire. The spare tire shall be secured to the body assembly in the raised position with four (4) "right hand thread" wheel studs and supplied lug nuts of the same OEM type and style that match the vehicle. Access to the ratchet assembly shall be at the rear of the vehicle. An access door cover shall be provided to cover and protect the ratchet assembly.

WHEEL WELL EXTERIOR PANEL

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

RUBBER BODY FENDERS

The body wheel well openings shall be provided with round radius, rubber fenderettes. The fenderettes shall be bolted and easily replaceable if damaged. The fenderettes shall be installed using stainless steel fasteners with plastic isolators to help prevent corrosion.

WHEEL WELL LINERS

The wheel wells shall be provided with an easily removable polymer, circular inner fender liner. The inner liner shall be bolted to the wheel well with stainless steel bolts and spaced away from the wheel well so the liner will not accumulate dirt or water.

SCBA CYLINDER COMPARTMENTS

There shall be four (4) SCBA cylinder storage compartments, two (2) on each side of body in the rear wheel well area. Each compartment shall have a Cast Products aluminum door assembly with a positive catch latch. Each compartment shall have a 8" diameter aluminum tube behind the wheel well panel attached to the Cast Products door assembly. Each compartment shall allow the storage of an SCBA cylinder or a fire extinguisher up to 7-3/4" in diameter. The door shall activate the "Hazard Warning Light" in the cab when not in the closed position.

WHEEL WELL COMPARTMENT

Directly above rear axle and below specified S1 compartment shall be a plumbing fitting compartment.

The interior useable compartment width shall be approximately 49.0" wide x 6" high.

- This compartment shall have a flush fitting horizontally hinged, drop-down style compartment door. The door exterior shall be painted job color.
- The interior door panel shall have a smooth un-painted aluminum panel.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- The hinged door(s) shall have a stainless steel 6" offset bent D-ring non-locking handle. A gasket shall be placed between handle and door. Door latches shall be a two-point rotary slam, double-catch latch, recessed inside the double panel door with striker plate.

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COMPARTMENT LAYOUT

- There shall be one (1) Austin Front Drawer Release (FDR) 400 lbs. slide-out tray(s) approximately 24" deep and as wide as the compartment layout or door opening permits. The tray top shall be fabricated from 3/16" 3003 aluminum sheet with a 3" vertical lip and welded corners to form a box type tray surface. The sliding tracks shall extend 100% of the slide length.
 - The above component(s) shall have a smooth un-painted finish.

BODY PAINT SPECIFICATIONS

BODY PAINT PREPARATION

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

The exterior (and interior, if painted) 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.

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.

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 the following paint process;

- 1) Clean bare metal with a wax and grease remover using low lint rags.
- 2) Inspect, straighten, and hammer high points, grind all seams, sharp edges, and welds. DA sand entire paintable surfaces using 24-180 grit dry paper. Plastic fill all low spots and DA sand fill areas using 36-180 grit dry paper. Apply pinhole filler and DA sand areas using 80-180 grit dry paper.
- 3) Re-clean bare metal using a wax and grease remover and low lint rags.
- 4) Within 24 hours, a PPG Delfleet® epoxy color primer with proper hardener for corrosion resistance using a pressure pot spray gun and applying 2-5 full wet coats or 1.5-8.0 dry mils max. achieving full hiding and allow to air dry 60 minutes @ 70°F or bake for 45 minutes @ 140°F degree.
- 5) Inspect, putty fill, and dry guild coat entire body surface and DA sand using 180-400 grit dry paper.
- 6) Re-clean bare metal using a wax and grease remover using low lint rags.
- 7) A PPG Delfleet® primer sealer with proper hardener and thinner shall be sprayed using a pressure pot spray gun and applying 1 full wet coat or 1.0-2.0 dry mils achieving full hiding and allow to flash off in spray booth for minimum of 60 minutes @ 70°F.
- 8) A PPG Delfleet® FBCH basecoat (color) with proper hardener and dry additive shall then be sprayed using a pressure pot set @ 45-60 PSI and achieving full hiding or 1.5-2.0 wet mils and allow to flash off in spray booth 45-60 minutes before applying clearcoat.
- 9) A PPG Delfleet® clearcoat with proper hardener and thinner shall be sprayed using a pressure pot spray gun and applying 2-3 full wet coats or 5.0 wet mils for a uniform gloss and allow to flash off in spray booth 10 minutes and bake for 120-140 minutes @ 125°F (surface temp.).
- 10) After cooling, DA sand heavy orange peel or runs using 1000 grit dry sand paper and final DA sand using 1500-2000 grit dry sand paper. Wipe off all surfaces to remove dust and debris. Buff unit as needed using 3M rubbing compound and a white wool pad and inspect until all sand scratches are removed.

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TYPE III Pumper SVI #1052

- 11) Polish as needed using 3M Perfect-It-Polish and a black foam pad, repeat as necessary and inspect until all sand scratches are removed.

PAIN - 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.

FASTENERS

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

ELECTROLYSIS CORROSION CONTROL

The vehicle shall be assembled using ECK brand or similar corrosion control compound on all high corrosion potential areas.

ECK protects aluminum and stainless steel against electrolytic reaction, isolates dissimilar metals and gives bedding protection for hardware and fasteners. ECK contains anti-seizing lubricant for threads. ECK is dielectric and perfect for use with electrical connectors.

PAIN FINISH - SINGLE COLOR

The body shall be painted with a single color of PPG Delfleet® Evolution per City of Santa Fe NM, Santa Fe Fire Department approved paint spray out provided.

A small touch-up bottle of paint shall be provided with completed vehicle.

- Paint Color: Match cab/chassis supplied paint color.

BODY UNDERCOATING

The entire underside of body shall be sprayed with black automotive undercoating. Undercoating shall cover all areas underside of body and wheel well area to help prevent corrosion under the vehicle.

UNDERCOAT WARRANTY

The body undercoating shall have a warranty provided by the manufacturer for the lifetime of the vehicle or twenty (20) years, whichever occurs first. The warranty shall be transferable between vehicle owners. Should the undercoating material applied to the underside of the body and wheel wells of the vehicle ever flake off, peel, chip or crack due to drying out, the damaged area shall be re-sprayed without charge to the vehicle owner.

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PAINT WARRANTY

The vehicle shall be provided with a ten (10) year non-prorated warranty to the original owner. Warranty is provided by PPG Inc. A warranty sheet with all conditions and maintenance procedures shall be provided with the delivered vehicle. **Pro-rated warranties will not be acceptable.**

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 retro-reflection 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 City of Santa Fe NM, Santa Fe Fire Department prior to installation. The graphics proof shall be submitted to City of Santa Fe NM, Santa Fe Fire Department 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.

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TYPE III Pumper SVI #1052

REFLECTIVE STRIPE - CAB SIDE

The reflective stripe material shall be 6" wide, 3M Scotchcal 680 series.

- This reflective stripe shall be white in color.

There shall be a 1" Scotchcal reflective stripe located 1" above and a second 1" Scotchcal reflective stripe located 1" below the main stripe.

- This reflective stripe shall be white in color.

CHEVRON STRIPE - CAB BUMPER

A reflective stripe shall be affixed to the cab front bumper. The stripe or combination of stripes shall be a minimum of 4 in. (100 mm) in total width.

The stripe material shall be 3M Scotchlite Diamond Grade.

All retroreflective materials required 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.

- 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 6" wide, 3M Scotchcal 680 series.

- This reflective stripe shall be white in color.

There shall be a 1" Scotchcal reflective stripe located 1" above and a second 1" Scotchcal reflective stripe located 1" below the main stripe.

- This reflective stripe shall be white in color.

The stripe shall extend from the front of cab in a straight line, then just ahead of the rear wheels the stripe shall angle up and extend straight back to the rear of the body.

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TYPE III Pumper SVI #1052

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 of the body on each side of a rear stairway or compartment shall have a chevron style reflective stripe, extending from bumper height up to side compartment drip rail height. 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 City of Santa Fe NM, Santa Fe Fire Department prior to installation. The graphics proof shall be submitted to City of Santa Fe NM, Santa Fe Fire Department 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 four (54) 3" high 22K gold letters provided and installed on the vehicle. Lettering shall have a clear 3M UV protective overlamine applied before installation.

Final design and layout shall be determined prior to construction.

Cab crew doors;
"CITY of SANTA FE"
"FIRE"
"DEPARTMENT"

UPPER BODY SIDE LETTERING

There shall be twelve (12) 6" high 22K gold letters provided and installed on the vehicle. Lettering shall have a clear 3M UV protective overlamine applied before installation.

Final design and layout shall be determined prior to construction.

"ENGINE"

There shall be four (4) 10" high reflective letters furnished and installed on the vehicle.

- This reflective lettering shall be white in color.

"39" centered in upper body "ENGINE".

City of Santa Fe NM, Santa Fe Fire Department

TYPE III Pumper SVI #1052

REAR BODY LETTERING

There shall be six (6) 5" high reflective letters furnished and installed on the vehicle.

- This reflective lettering shall be white in color.

On rear compartment door, arched "ENGINE"

There shall be fifteen (15) 3" high reflective letters furnished and installed on the vehicle.

- This reflective lettering shall be white in color.

Bottom of rear compartment door "KEEP BACK 500 FEET"

There shall be two (2) 22" high reflective letters furnished and installed on the vehicle.

- This reflective lettering shall be white in color.

On rear compartment door below ENGINE, "39".

CAB ROOF LETTERING

There shall be three (3) 30" high reflective letters furnished and installed on the vehicle.

There shall be the identifier "E39" on the roof of the cab, not to be obstructed by the light bar and be oriented to be read correctly as if you were standing on the hose bed facing the cab.

- This reflective lettering shall be red in color.

CUSTOM DECAL LOGO - 12" -18"

City of Santa Fe Fire Department's Badge Logo on forward cab doors. Provided in 22k gold leaf (not the "super gold") approximate size is 16"h x 14"w.

Santa Fe Fire "Wildland" logo on compartment S3 & C3 doors.

Two (2) copy of the above custom logo shall be provided and located on the completed vehicle as directed by City of Santa Fe NM, Santa Fe Fire Department.

City of Santa Fe NM, Santa Fe Fire Department

TYPE III Pumper SVI #1052

FLUSH FITTING HINGED DOOR CONSTRUCTION

The exterior compartment doors shall be a flush style, 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. (self-adhesive)

Each door shall be capable of being opened or closed without unlatching. Gas Struts shall be bolted to the upper compartment door header and the box pan of the door.

Vertically hinged door openings up to 32" wide shall be single door construction. Door openings over 32" shall be double door construction with the forward first opening door overlapping the second opening door.

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TYPE III Pumper SVI #1052

STREETSIDE COMPARTMENT - ABOVE REAR WHEELS (S1)

The interior useable compartment width shall be approximately 54.0" wide.

The compartment door opening shall be approximately 47.5" wide.

- This compartment shall have flush fitting vertically hinged compartment door. The door exterior shall be painted job color.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- The hinged door(s) shall have a stainless steel 6" offset bent D-ring locking handle. A gasket shall be placed between 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 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 compartment door header and the box pan of the door.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

COMPARTMENT LAYOUT

- There shall be vertically mounted aluminum Shelf-Trac for specified component installation. Shelf-Trac extrusion shall have side extruded channels for use in mounting or securing special ancillary items, without need for drilling into body. The Shelf-Trac shall be mounted on the side and rear walls for shelving and tool board installation.
- There shall be one (1) adjustable shelf/shelves approximately 22" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edge.
 - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front face of the shelf. The striping shall be red/white in color.
- Two (2) OnScene Access LED, full height compartment lights, vertically mounted.

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TYPE III Pumper SVI #1052

STREETSIDE COMPARTMENT - REAR (S2)

The interior useable compartment width shall be approximately 47.0" wide.

The compartment door opening shall be approximately 42.0" wide.

- This compartment shall have flush fitting vertically hinged compartment door. The door exterior shall be painted job color.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- The hinged door(s) shall have a stainless steel 6" offset bent D-ring locking handle. A gasket shall be placed between 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 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 compartment door header and the box pan of the door.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

COMPARTMENT LAYOUT

- There shall be vertically mounted aluminum Shelf-Trac for specified component installation. Shelf-Trac extrusion shall have side extruded channels for use in mounting or securing special ancillary items, without need for drilling into body.
- There shall be three (3) adjustable shelf/shelves approximately 22" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edge.
 - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front face of the shelf. The striping shall be red/white in color.
- Two (2) OnScene 64" Access LED compartment lights, vertically mounted.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

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TYPE III Pumper SVI #1052

CURBSIDE COMPARTMENT - ABOVE REAR WHEELS (C1)

The interior useable compartment width shall be approximately 54.0" wide.

The compartment door opening shall be approximately 47.5" wide.

- This compartment shall have flush fitting vertically hinged compartment door. The door exterior shall be painted job color.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- The hinged door(s) shall have a stainless steel 6" offset bent D-ring locking handle. A gasket shall be placed between 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 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 compartment door header and the box pan of the door.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

COMPARTMENT LAYOUT

- There shall be vertically mounted aluminum Shelf-Trac for specified component installation. Shelf-Trac extrusion shall have side extruded channels for use in mounting or securing special ancillary items, without need for drilling into body. The Shelf-Trac shall be mounted on the side and rear walls for shelving and tool board installation.
- There shall be two (2) adjustable shelf/shelves approximately 10" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edges.
 - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front face of the shelf. The striping shall be red/white in color.
- The back wall of compartment shall be covered with PAC Trac single face model 7000 aluminum extrusion with the tracks in a horizontal orientation.
- Two (2) OnScene 28" Access LED compartment lights, vertically mounted.

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TYPE III Pumper SVI #1052

CURBSIDE COMPARTMENT - REAR (C2)

The interior useable compartment width shall be approximately 47.0" wide.

The compartment door opening shall be approximately 42.0" wide.

- This compartment shall have flush fitting vertically hinged compartment door. The door exterior shall be painted job color.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- The hinged door(s) shall have a stainless steel 6" offset bent D-ring locking handle. A gasket shall be placed between 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 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 compartment door header and the box pan of the door.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

COMPARTMENT LAYOUT

- There shall be vertically mounted aluminum Shelf-Trac for specified component installation. Shelf-Trac extrusion shall have side extruded channels for use in mounting or securing special ancillary items, without need for drilling into body.
- There shall be two (2) adjustable shelf/shelves approximately 10" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edges.
 - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front face of the shelf. The striping shall be red/white in color.
- There shall be one (1) adjustable shelf/shelves approximately 22" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edge.
 - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front face of the shelf. The striping shall be red/white in color.
- The back wall of compartment shall be covered with PAC Trac single face model 7000 aluminum extrusion with the tracks in a horizontal orientation.
- Two (2) OnScene 64" Access LED compartment lights, vertically mounted.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

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TYPE III Pumper SVI #1052

REAR COMPARTMENT - CENTER (RC1)

The rear center compartment shall start at the top of the body sub-frame and be as high as the side compartments, unless specified otherwise.

The interior useable compartment width shall be approximately 50.0" wide.

The compartment door opening shall be approximately 48.0" wide.

- This compartment shall have flush fitting vertically hinged compartment door. The door exterior shall be painted job color.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- The hinged door(s) shall have a stainless steel 6" offset bent D-ring locking handle. A gasket shall be placed between 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 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 compartment door header and the box pan of the door.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

COMPARTMENT LAYOUT

- There shall be vertically mounted aluminum Shelf-Trac for specified component installation. Shelf-Trac extrusion shall have side extruded channels for use in mounting or securing special ancillary items, without need for drilling into body.
- There shall be one (1) adjustable shelf/shelves approximately 25" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edge.
 - 3M™ Diamond Grade™ Conspicuity striping shall be provided on the front face of the shelf. The striping shall be red/white in color.
- There shall be two (2) aluminum handrail sections with brackets assembled under the hose bed extension step. Brackets shall be designed to hold the handrails in position with a quick pin to hold in place for operation. Inside the right rear ladder compartment door shall be a storage bracket to hold the handrails when not in use. The I-Zone brackets are provided to lace the hose between when moving from house to house during structure fire protection operations.
- Two (2) OnScene 64" Access LED compartment lights, vertically mounted.
- One (1) booster hose reel(s) shall be located in this compartment area.

City of Santa Fe NM, Santa Fe Fire Department

TYPE III Pumper SVI #1052

PLASTIC FLOOR AND SHELF TILE

All compartment floors, shelves, and trays shall be covered with Turtle Tile plastic interlocking grating.

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

ROPE ANCHOR OR PORTABLE WINCH RECEIVERS

The completed unit shall have an integrated receiver or anchor system for use with removable rope anchor point and/or a portable electric winch, when specified.

Receivers or anchors installed at any location on the apparatus for use as removable winch anchors shall be designed and affixed to provide at least a 2.0 to 1 straight line pull no-yield safety factor over the load rating of the removable winch.

Receivers or anchors installed at any location on the apparatus for use with rope operations shall be designed and affixed to the apparatus to provide at least a 9,000 lbf (40,000 N) no-yield condition with a straight line pull.

A safety sign FAMA28 shall be located on or near each receiver or anchor stating the maximum straight line pull rating.

Side receiver(s) (if specified) shall have the following load rating:

	<u>STRAIGHT PULL</u>	<u>SAFETY FACTOR</u>
Rope Tie Off:	600 Lbs.	15:1
Winch:	5,000 Lbs.	2:1

Front and/or rear receiver(s) (if specified) shall have the following load rating:

	<u>STRAIGHT PULL</u>	<u>SAFETY FACTOR</u>
Rope Tie Off:	600 Lbs.	15:1
Winch:	Winch Load Rating (9,000 Lbs. Max)	2:1

The following items shall be provided to accomplish rope rescue and/or portable winch operation;

- There shall be one (1) 2" x 2" x 1/4" wall steel receiver tube(s) located at the rear bumper for use with removable rope anchor point and/or a portable electric winch (when specified) and/or a removable hose roller.
 - There shall be one (1) 12 VDC plug(s) with quick connect provided to power a Warn portable winch. All 12 VDC cables to be sized according to Warn and installation for intended use.
 - The receiver(s) shall have one (1) rubber cover(s) provided.

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LADDER / EQUIPMENT STORAGE, REAR CURBSIDE

There shall be a ladder and/or equipment storage compartment located on the rear curbside of vehicle. The bottom of compartment shall be located at approximate top of fender height extending thru body behind the streetside compartments and the booster tank.

Access to the compartment shall be from a rear facing vertically hinged compartment door. The door shall be fabricated from 3/16" smooth aluminum with full length 14 gauge stainless steel hinge, with 1/4" stainless steel pin, a 6" stainless steel locking "D" ring handle. A polyester barrier film gasket shall be placed between stainless steel hinge and any dissimilar metals as necessary to prevent corrosion. Door shall overlap body surface to prevent entry of moisture and sealed with automotive type rubber molding to provide a weather resistant seal.

Compartment shall have a flush mounted OnScene LED light near door opening that shall be automatically activated when door is opened, and wired to compartment door ajar warning light provided in cab.

Devices to secure equipment, compartment dividers, or UHMW plastic angles, or sheeting shall be used for storage of specified equipment as required to prevent damage to equipment.

Storage shall be provided for the following ladders and equipment with proper labeling;

- One (1) 20' 3-section ladder(s). Manufacturer, model number of the ladder shall be provided in equipment section of specification, or at pre-construction meeting when provided by City of Santa Fe NM, Santa Fe Fire Department.
- One (1) pike pole(s). Manufacturer, model number of the pike pole shall be provided in equipment section of specification, or at pre-construction meeting when provided by City of Santa Fe NM, Santa Fe Fire Department.

REAR BODY HANDRAILS

There shall be two (2) 24" vertical handrails on the rear of the body. Handrails shall be NFPA compliant 1-1/4" knurled 304 stainless steel with welded end stanchions.

REAR BODY HANDRAILS

There shall be two (2) 24" horizontal handrails on the rear of the body. Handrails shall be NFPA compliant 1-1/4" knurled 304 stainless steel with welded end stanchions.

PUMP MODULE HANDRAILS

There shall be two (2) 24" handrails, one (1) each side of pump module for access to upper dunnage area. Handrails shall be NFPA compliant 1-1/4" knurled 304 stainless steel with welded end stanchions.

FOLDING STEP(S)

There shall be six (6) Innovative Controls polished cast aluminum folding step(s) provided and installed on completed vehicle. Each step shall be heavy duty with stainless steel spring and textured step surface meeting NFPA standards. Each step shall include an LED light.

Folding steps located;

Four (4) on rear body panel (2 each side).

Two (2) on curbside front of body.

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REAR STEP SCUFF PLATES

The apparatus shall be outfitted with individual rear step scuff plates. The stainless steel scuff plates shall be provided behind each step and extend upward in the toe kick area to protect the rear body finish. The guards shall be constructed of brushed stainless steel, and be replaceable in case of damage.

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.

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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 over-current protective devices. Such devices shall be readily accessible and protected against heat in excess of the over-current 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:

- 1) SAE J156, *Fusible Links*
- 2) SAE J553, *Circuit Breakers*
- 3) SAE J554, *Electric Fuses (Cartridge Type)*
- 4) SAE J1888, *High Current Time Lag Electric Fuses*
- 5) 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
- 2) All legally required clearance and marker lights, headlights, and other electrical devices except windshield wipers and four-way hazard flashers
- 3) 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)
- 4) 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
- 5) The minimum optical warning system, where the apparatus is blocking the right-of way
- 6) The continuous electrical current required to simultaneously operate any fire pumps, aerial devices, and hydraulic pumps
- 7) 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.

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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.

The 12 volt distribution panel shall utilize printed circuit boards mounted in high strength enclosure. Each printed circuit board shall be provided with twelve (12) heavy duty independent switching relays. Each relay shall have the ability to be configured either normally open or normally closed and be protected by a 20 amp automatic reset breaker. Each circuit will be provided with a LED for visual diagnostic.

Power distribution panel shall be located in apparatus body within a protected enclosure with removable or hinged cover.

CAB CONSOLE

A storage console shall be installed between the two front seats in the cab of the vehicle, and made of formed aluminum and finished with black powder coating. The console shall have a removable top and front panel. The console shall be vented to allow heat dissipation from the electrical components mounted within. The electrical fuse/breaker panel shall be mounted to the front side of the console and be provided with a protective lid that contains a legend for the breaker functions. The console shall be the maximum size that will fit between the front bucket seats, while ensuring allowances for seat belt access and rear seat leg room. The overall height shall not exceed the height of the front seat cushions.

The console shall have a form/map box storage area approximately 13-1/2" deep x 20-3/4" wide x 14" front to back. This open area is sized to utilize the maximum space available and that is deep enough to house 8½" X 11" binders with two (2) full length adjustable dividers.

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A four (4) position "handi-talki" holder/charger shall be mounted on the rear side of the center console. Bracket for holder shall be powder coated black to match the console and be mounted low enough so the "handi-talki" body does not protrude above the top surface of the center console.

The following components shall be recessed mounted in the cab console top panel:

- PTO Pump Shift Control, indicator light and identification tag
- Water Tank Level Gauge
- Siren
- Whelen Rear Lightstick Controller
- Foam System Remote Control
- Diesel Pump Remote Control Panel

Mounted to the center of the console on the front side shall be the Intercom Control

There shall be six (6) 20 amp fused spare circuits connected to a terminal strip inside the console for use by the end user.

ROCKER SWITCH PANEL

The 12 volt switch control shall be supplied through the specified siren control head system.

ELECTRICAL SYSTEM MANAGER

LOAD MANAGEMENT

If the total continuous electrical load exceeds the minimum continuous electrical output rating of the installed alternator(s), an Innovative Controls 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.

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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.

An onboard battery conditioner or charger or a polarized inlet shall be provided for charging all batteries. Where an onboard conditioner or charger is supplied, the associated line voltage electrical power system shall be installed in accordance with Chapter 22.

One of the following master disconnect switches shall be provided:

- 1) A master body disconnect switch that disconnects all electrical loads not provided by the chassis manufacturer
- 2) A master load disconnect switch that disconnects all electrical loads on the apparatus except the starter

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 disconnect on" indicator light that is visible from the driver's position shall be provided.

Rechargeable hand lights, radios, and other similar devices shall be permitted to be connected to the electrical system ahead of the master disconnect switch.

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.

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BATTERY SWITCH

One (1) battery "On/Off" switch in cab located within easy reach of Driver with green "BATTERY ON" pilot light that is visible from the driver's position shall be provided.

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 091-9-1000 Pump-Plus 1000, single battery charger/air compressor, with 120 VAC input, and 15 amp 12 VDC amp output battery conditioner with a 12 volt, 80 psi air compressor shall be provided and installed. This system shall monitor the condition of battery(s) and provide an electrical current at variable rates to overcome battery failure. The air compressor shall maintain air pressure in the chassis air brake system. A Kussmaul bar graph type indicator panel shall be provided for showing status of battery conditioner.

SHORE POWER INLET

One (1) Kussmaul 120 VAC, 20 amp Super Auto-Eject shore power inlet(s) shall be provided. The shore power connection shall automatically disengage from vehicle when chassis ignition is engaged.

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 near the Driver door area.

ENGINE COMPARTMENT LIGHT

There shall be one (1) OnScene Severe Service LED 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".

MAP LIGHT

There shall be one (1) LED goose neck 12 VDC map light(s) provided and installed on the officer side dash area.

CAB SPOTLIGHT

There shall be one (1) NovaTech hand held 100,000 candle power (50w halogen) spotlight provided with completed vehicle. Includes a momentary switch, with a 2-1/2' stretchable 18 gauge SVO coiled cord.

Fabricate Bracket for cab spot light (NO J-Hook)

CHASSIS HEADLIGHT WIG/WAG

A chassis headlight wig/wag flashing unit shall be provided. The headlight flasher shall shut down when the parking brake is engage for "Blocking Mode".

The lights shall be controlled at the specified siren control head in the cab.

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CAB HAZARD WARNING LIGHT

A Truck-Lite red LED flashing light shall be provided and located in the driving compartment and 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 an automatic sound sensing electronic back-up alarm. The back-up alarm shall actuate automatically when the transmission gear selector is placed in reverse. The alarm automatically adjusts its sound output, maintaining a minimum of ten dB(A) above noise level, up to maximum rated output of 112 dB(A).

REAR VIEW CAMERA

There shall be one (1) ASA Voyager rear observation camera system provided and installed on completed unit. The system shall include one (1) model VCC150 high resolution CCD color camera installed on the rear body.

The camera image shall be displayed on a model AOM713, 7" color flat panel display (up to 3 camera inputs) located within the driver's range of view.

Rear view camera display to be located high on driver "A" post, similar to SVI #888 (Dallas).

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 amber LED 600 Series 60A00TAR turn signal lights
- Two (2) Whelen red LED 600 Series 60BTT stop/tail lights
- Two (2) Whelen LED 600 Series 60C00WCR maximum intensity back-up lights with clear lens

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

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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.

CAB STEP LIGHTS / GROUND LIGHTS

There shall be four (4) OnScene 8" Access LED 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 from the 12 volt control panel in the cab and a switch on the pump operators panel, but activated automatically when the exit doors are opened.

LICENSE PLATE LIGHT

One (1) Arrow #437 chrome plated LED license plate light shall be installed on the rear of the body. License plate light shall be wired to the headlight circuit of chassis. A fastener system shall be provided for license plate installation.

ELECTRONIC SIREN

One (1) Whelen model 295SLSA1 electronic siren control with selectable 100 or 200 watt output, hands-free operation, user selectable siren tones, park kill, and standard hard wired microphone shall be provided and installed in cab within easy reach of Driver. Siren power shall be wired through the master warning light switch.

SIREN SPEAKER

One (1) Whelen model SA314A 100 watt aluminum, 6.4" x 6.1" x 3.1" deep siren speaker shall be provided behind the front bumper. The solid state siren speaker shall be vibration resistant. The SA314A shall comply with California Title XIII, Class A, and SAE J1849 requirements and with OSHA 1910.95 Guidelines regarding "Permissible Noise Exposure". All mounting hardware shall be stainless steel and covered by a two year factory warranty.

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

SIDE LED SCENE LIGHTS

There shall be four (4) Whelen M6 Series Model M6ZC, 6" x 4" surface mounted scene light(s) provided on the upper body. Light quantity shall be divided equally per side. The M6ZC configuration shall consist of 12 clear Super-LEDs and a clear gradient optic polycarbonate lens with chrome flange. The scene light is covered by a five year factory warranty.

Two (2) switches shall be provided, one (1) for the streetside scene lights, and one (1) for the curbside scene lights.

The lights shall be controlled at the switch panel in cab.

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REAR LED SCENE LIGHTS

Two (2) Whelen M6 Series Model M6ZC, 6" x 4" surface mounted scene light(s) shall be provided on the upper rear body to light the work area immediately behind the vehicle. The M6ZC configuration shall consist of 12 clear Super-LEDs and a clear gradient optic polycarbonate lens with chrome flange. The scene light is covered by a five year factory warranty.

The above scene lights shall light to a level of at least 3 fc (30 lx), measured at 25 equally spaced points on a 2.5 ft (750 mm) grid with in a 10 ft x 10 ft (3 m x 3m) square to the rear of vehicle.

The lights shall be controlled at the switch panel in cab and streetside pump panel..

The rear scene lights shall also be activated when the apparatus is in reverse.

TRAFFIC ADVISOR LIGHTS

Traffic Advisor lights shall be comprised of six (6) Whelen ION series amber Wide Angle Super-LED lights with clear lens. Lights shall be individually mounted with chrome bezels to the rear face of the vehicle and evenly distributed, if split by a hose bed, or walkway.

The lights shall be controlled by a Whelen TACTL5 control located in cab dash or center console area and provide; Left Arrow, Right Arrow, Center Out, and Wig-Wag patterns. The LED display on the control head shall replicate the Traffic Advisor's directional sequence. The TACTL5 shall have a rear panel dip switch for the ability to set eight additional Scan-Lock™ flash patterns. The wig-wag light pattern shall be activated with the E-Master and can be switched to the other patterns at any time through the control panel.

FIRECOM INTERCOM SYSTEM

The following Firecom intercom system shall be provided and installed to improve the safety of firefighters and rescue professionals through enhanced communication and hearing protection. System shall have the following major components as minimum;

- One (1) 5200D digitl intercom base system for dual radio interface.
- Two (2) mobile radio connection cables.
- Five (5) HM10 headset modules, (4) in cab and (1) wheel well compartment.
- Three (3) UH51intercom headsets, PTT radio transmit, Driver/Officer/PP
- Two (2) UH52 intercom headsets, intercom only, Rear Crew
- Four (4) headset hangers (108-0678-00)

INTERCOM SYSTEM INSTALLATION

The above listed intercom system shall be installed in the cab locations as follows;

Front of Cab

- Driver's – Mounted above the right shoulder position on ceiling.
- Officer's – Mounted above the left shoulder position on ceiling.

Rear Crew Area

- Driver's side forward facing – Above the right shoulder on the rear wall or ceiling.
- Officer's side forward facing – Above the left shoulder on the rear wall or ceiling.

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Pump Panel

- Pump panel headset jack located in full width wheel well drawer compartment.

SHOP NOTES

5th Headset-store in S1 compartment or S1 Lower.

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.

Steadily burning, non flashing optical sources shall be permitted to be used.

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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 54" Legacy model GB2DDDD LED lightbar permanently mounted to the cab roof. The lightbar configuration shall be as follows;

- Two (2) Short DUO+ LED Side Warning Lights (RED)
- Four (4) Corner DUO+ LED Corner Warning Lights (RED)
- Eight (8) Long DUO+Series LED Flasher Front Facing, (White/Red)

Photocell option provided to automatically dim at night and still meet SAE Class 1 requirements in low power mode.

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

WeCAD on file.

The lightbar(s) shall be separately controlled at switch panel in the cab.

ZONES B AND D - SIDE WARNING LIGHTS

UPPER REAR CORNER WARNING LIGHTS

There shall be two (2) Whelen M6 series red linear Super-LED lights (M6RC) provided, one (1) each side. Each light shall have a clear lens and chrome flange.

The lights shall be controlled at the switch panel in cab.

ZONE C - REAR WARNING LIGHTS

There shall be two (2) Whelen M6 series red linear Super-LED lights (M6RC) provided, one (1) each side. Each light shall have a clear lens and chrome flange.

The lights shall be controlled at the switch panel in cab.

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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 1600 mm) above level ground.

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 ION V-Series Super-LED surface mount lights (IONSV3RC) with combination 180° warning and puddle lights provided, one (1) each side. Puddle lights will be turned on with specified scene lighting. Each light shall have a clear lens and chrome die cast flange.

The lights shall be controlled at the switch panel in cab.

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

There shall be two (2) Whelen M6 series Red Linear Super-LED lights (M6RC) provided, one (1) each side. Each light shall have a clear lens and chrome flange.

The lights shall be controlled at the switch panel in cab.

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

There shall be four (4) Whelen ION V-Series Super-LED surface mount lights (IONSV3RC) with combination 180° warning and puddle lights provided, two (2) each side. Puddle lights will be turned on with specified scene lighting. Each light shall have a clear lens and chrome die cast flange.

The lights shall be controlled at the switch panel in cab.

ZONES B AND D - BODY INTERSECTOR LIGHT (BODY REAR CORNERS)

There shall be two (2) Whelen ION V-Series Super-LED surface mount lights (IONSV3RC) with combination 180° warning and puddle lights provided, one (1) each side. Puddle lights will be turned on with specified scene lighting. Each light shall have a clear lens and chrome die cast flange.

The lights shall be controlled at the switch panel in cab.

ZONE C - REAR WARNING LIGHTS (LOWER REAR CORNERS)

There shall be two (2) Whelen M6 series Red Linear Super-LED lights (M6RC) provided, one (1) each side. Each light shall have a clear lens and chrome flange.

The lights shall be controlled at the switch panel in cab.

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TYPE III Pumper SVI #1052

LINE VOLTAGE ELECTRICAL SYSTEM

INVERTER

A Kussmaul inverter model SP-1500 shall be provided and installed on completed vehicle. The Kussmaul SP-1500 is an advanced true sine wave power inverter perfect for operating equipment requiring up to 1500 continuous watts. Delivering high surge power to start motor loads and appliances makes it a great AC power source for emergency and commercial vehicles. Unit shall have following features;

- 1500 watt Continuous / 2650 watt surge
- True Sine Wave AC power
- High Surge Power
- Built in Safety Protection
- Power Saving Mode
- Lightweight and Compact Design
- Remote Control Capabilities
- 3 Year Warranty

LINE VOLTAGE ELECTRICAL SYSTEM

GENERAL REQUIREMENTS

Stability

Any fixed line voltage power source producing alternating current (ac) shall produce electric power at 60 Hz, ± 3 Hz when producing power at all levels between no load and full rated power. Any fixed line voltage power source shall produce electric power at the rated voltage ± 10 percent when producing power at all levels between no load and full rated power.

The maximum voltage supplied to portable equipment shall not exceed 275 volts to ground. Higher voltage shall be permitted only when used to operate fixed wired, permanently mounted equipment on the apparatus.

Conformance with National Electrical Code

All components, equipment, and installation procedures shall conform to *NFPA 70, National Electrical Code*, except where superseded by the requirements of this chapter. Where the requirements of this chapter differ from those in *NFPA 70*, the requirements in this chapter shall apply.

Where available, line voltage electrical system equipment and materials included on the apparatus shall be listed and used only in the manner for which they have been listed. All equipment and materials shall be installed in accordance with the manufacturer's instructions.

Location Ratings

Any equipment used in a dry location shall be listed for dry locations. Any equipment used in a wet location shall be listed for wet locations.

Any equipment, except a PTO-driven generator, used in an underbody or under chassis location that is subject to road spray shall be either listed as Type 4 or mounted in an enclosure that is listed as Type 4.

If a PTO-driven generator is located in an underbody or under chassis location, the installation shall include a shield to prevent road spray from splashing directly on the generator.

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TYPE III Pumper SVI #1052

Grounding

Grounding shall be in accordance with 250.34(A) and 250.34(B) of *NFPA 70*. Ungrounded systems shall not be used.

Only stranded or braided copper conductors shall be used for grounding and bonding.

The grounded current-carrying conductor (neutral) shall be insulated from the equipment-grounding conductors and from the equipment enclosures and other grounded parts.

The neutral conductor shall be colored white or gray in accordance with 200.6, "Means of Identifying Grounded Conductors," of *NFPA 70*.

Any bonding screws, straps, or buses in the distribution panel board or in other system components between the neutral and equipment-grounding conductor shall be removed and discarded.

Bonding

The neutral conductor of the power source shall be bonded to the vehicle frame. The neutral bonding connection shall occur only at the power source. In addition to the bonding required for the low voltage return current, each body and each driving or crew compartment enclosure shall be bonded to the vehicle frame by a copper conductor.

The conductor shall have a minimum ampere rating, as defined in 310.15, "Ampacities for Conductors Rated 0–2000 Volts," of *NFPA 70*, of 115 percent of the rated ampere on the power source specification label.

A single conductor that is sized to meet the low voltage and line voltage requirements shall be permitted to be used.

Ground Fault Circuit Interrupters

In special service vehicles incorporating a lavatory, sink, toilet, shower, or tub, 120 V, 15 or 20 A receptacles within 6 ft (1.8 m) of these fixtures shall have ground fault circuit interrupter (GFCI) protection. GFCIs integrated into outlets or circuit breakers or as stand-alone devices shall be permitted to be used in situations.

Power Source General Requirements

All power source system mechanical and electrical components shall be sized to support the continuous duty nameplate rating of the power source.

The power source shall be shielded from contamination that would prevent the power source from operating within its design specifications.

Power Source Rating

For power sources of 8 kW or larger, the power source manufacturer shall declare the continuous duty rating that the power source can provide when installed on fire apparatus according to the manufacturer's instructions and run at 120°F (49°C) air intake temperature at 2000 ft (600 m) above sea level.

The rating on the power source specification label shall not exceed the declared rating from the power source manufacturer.

Access shall be provided to permit both routine maintenance and removal of the power source for major servicing. The power source shall be located such that neither it nor its mounting brackets interfere with the routine maintenance of the fire apparatus.

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TYPE III Pumper SVI #1052

Instrumentation

If the power source is rated at less than 3 kW, a "Power On" indicator shall be provided. If the power source is rated at 3 kW or more but less than 8 kW, a voltmeter shall be provided.

If the power source is rated at 8 kW or more, the following instrumentation shall be provided at an operator's panel:

- 1) Voltmeter
- 2) Current meters for each ungrounded leg
- 3) Frequency (Hz) meter
- 4) Power source hour meter

The instrumentation shall be permanently mounted at an operator's panel. The instruments shall be located in a plane facing the operator. Gauges, switches, or other instruments on this panel shall each have a label to indicate their function.

The instruments and other line voltage equipment and controls shall be protected from mechanical damage and not obstructed by tool mounting or equipment storage.

An instruction plate(s) that provides the operator with the essential power source operating instructions, including the power-up and power-down sequence, shall be permanently attached to the apparatus at any point where such operations can take place.

Operation

Provisions shall be made for placing the generator drive system in operation using controls and switches that are identified and within convenient reach of the operator.

Where the generator is driven by the chassis engine and engine compression brakes or engine exhaust brakes are furnished, they shall be automatically disengaged for generator operations.

Any control device used in the generator system power train between the engine and the generator shall be equipped with a means to prevent unintentional movement of the control device from its set position in the power generation mode.

If there is permanent wiring on the apparatus that is designed to be connected to the power source, a power source specification label that is permanently attached to the apparatus at the operator's control station shall provide the operator with the information required.

The power source, at any load, shall not produce a noise level that exceeds 90 dBA in any driving compartment, crew compartment, or onboard command area with windows and doors closed or at any operator's station on the apparatus.

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TYPE III Pumper SVI #1052

Power Supply Assembly

The conductors used in the power supply assembly between the output terminals of the power source and the main over current protection device shall not exceed 12 ft (4 m) in length.

All power supply assembly conductors, including neutral and grounding conductors, shall have an equivalent ampere rating and shall be sized to carry not less than 115 percent of the ampere of the nameplate current rating of the power source.

If the power supply assembly connects to the vibrating part of a generator (not a connection on the base), the conductors shall be flexible cord or other fine-stranded conductors enclosed in metallic or nonmetallic liquid tight flexible conduit rated for wet locations and temperatures not less than 194°F (90°C).

Over-current Protection

Manually re-settable over current devices shall be installed to protect the line voltage electrical system components.

Power Source Protection

A main over current protection device shall be provided that is either incorporated in the power source or connected to the power source by a power supply assembly.

The size of the main over current protection device shall not exceed 100 percent of the rated ampere stated on the power source specification label or the rating of the next larger available size over current protection device, where so recommended by the power source manufacturer.

If the main over current protection device is subject to road spray, the unit shall be housed in a Type 4-rated enclosure.

Branch Circuit Over-current Protection

Over current protection devices shall be provided for each individual circuit and shall be sized at not less than 15 amps in accordance with 240.4, "Protection of Conductors," of *NFPA 70*.

Any panel board shall have a main breaker where the panel has six or more individual branch circuits or the power source is rated 8 kW or larger.

Each over current protection device shall be marked with a label to identify the function of the circuit it protects.

Dedicated circuits shall be provided for any large appliance or device (air conditioning units, large motors, etc.) that requires 60 percent or more of the rated capacity of the circuit to which it is connected, and that circuit shall serve no other purpose.

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TYPE III Pumper SVI #1052

Panelboards

All fixed power sources shall be hardwired to a permanently mounted panel board unless one of the following conditions exists:

- 1) All line voltage power connections are made through receptacles on the power source and the receptacles are protected by integrated over current devices.
- 2) Only one circuit is hardwired to the power source, which is protected by an integrated over current device.

The panel shall be visible and located so that there is unimpeded access to the panel board controls. All panel boards shall be designed for use in their intended location. The panel(s) shall be protected from mechanical damage, tool mounting, and equipment storage.

Where the power source is 120/240 V and 120 V loads are connected, the apparatus manufacturer or line voltage system installer shall consider load balancing to the extent that it is possible.

Wiring Methods

Fixed wiring systems shall be limited to the following:

- 1) Metallic or nonmetallic liquid tight flexible conduit rated at temperatures not less than 194°F (90°C) with stranded copper wire rated for wet locations and temperatures not less than 194°F (90°C)
- 2) Type SOW, SOOW, SEOW, or SEOOW flexible cord rated at 600 V and at temperatures not less than 194°F (90°C)

Electrical cord or conduit shall not be attached to chassis suspension components, water or fuel lines, air or air brake lines, fire pump piping, hydraulic lines, exhaust system components, or low voltage wiring and shall be arranged as follows:

- 1) Separated by a minimum distance of 12 in. (300 mm) from exhaust piping or shielded from such piping
- 2) Separated from fuel lines by a minimum distance of 6 in. (150 mm)

A means shall be provided to allow "flexing" between the driving and crew compartment, the body, and other areas or equipment whose movement would stress the wiring.

Electrical cord or conduit shall be supported within 6 in. (150 mm) of any junction box and at a minimum of every 24 in. (600 mm) of run.

Supports shall be made of nonmetallic materials or of corrosion-resistant or corrosion-protected metal. All supports shall be of a design that does not cut or abrade the conduit or cord and shall be mechanically fastened to the apparatus.

Only fittings and components listed for the type of cord or conduit being installed shall be used.

Splices shall be made only in a listed junction box.

Additional Requirements for Flexible Cord Installations

Where flexible cord is used in any location where it could be damaged, it shall be protected by installation in conduit, enclosures, or guards.

Where flexible cord penetrates a metal surface, rubber or plastic grommets or bushings shall be installed.

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Wiring Identification

Each line voltage circuit originating from the main panel board shall be identified.

The wire or circuit identification either shall reference a wiring diagram or wire list or shall indicate the final termination point of the circuit.

Where pre-wiring for future power sources or devices exists, the un-terminated ends shall be marked with a label showing their wire size and intended function.

Wiring System Components

Only stranded copper conductors with an insulation rated for temperatures of at least 194°F (90°C) and wet locations shall be used. Conductors in flexible cord shall be sized in accordance with Table 400.5(A) of *NFPA 70*. Conductors used in conduit shall be sized in accordance with 310.15, "Ampacities for Conductors Rated 0–2000 Volts," of *NFPA 70*. Aluminum or copper-clad aluminum conductors shall not be used.

All boxes shall conform to and be mounted in accordance with Article 314, "Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; Fittings; and Manholes," of *NFPA 70*. All boxes shall be accessible using ordinary hand tools. Boxes shall not be permitted behind welded or pop-riveted panels.

The maximum number of conductors permitted in any box shall be in accordance with 314.16, "Number of Conductors in Outlet, Device, and Junction Boxes, and Conduit Bodies," of *NFPA 70*.

All wiring connections and terminations shall provide a positive mechanical and electrical connection. Connectors shall be installed in accordance with the manufacturer's instructions. Wire nuts or insulation displacement and insulation piercing connectors shall not be used.

Each switch shall indicate the position of its contact points (i.e., open or closed) and shall be rated for the continuous operation of the load being controlled. All switches shall be marked with a label indicating the function of the switch. Circuit breakers used as switches shall be "switch rated" (SWD) or better. Switches shall simultaneously open all associated line voltage conductors. Switching of the neutral conductor alone shall not be permitted.

Line voltage circuits controlled by low voltage circuits shall be wired through properly rated relays in listed enclosures that control all non-grounded current-carrying conductors.

Receptacles and Inlet Devices

Wet and Dry Locations

All wet location receptacle outlets and inlet devices, including those on hardwired, remote power distribution boxes, shall be of the grounding type, provided with a wet location cover, and installed in accordance with Section 406.8, "Receptacles in Damp or Wet Locations," of *NFPA 70*.

All receptacles located in a wet location shall be not less than 24 in. (600 mm) from the ground. Receptacles on off road fire apparatus shall be a minimum of 30 in. (750 mm) from the ground. All receptacles located in a dry location shall be of the grounding type and shall be at least 12 in. (300 mm) above the interior floor height. No receptacle shall be installed in a face-up position.

The face of any wet location receptacle shall be installed in a plane from vertical to not more than 45 degrees off vertical.

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Receptacle Label

Each receptacle shall be marked with a label indicating the nominal line voltage (120 volts or 240 volts) and the current rating in amps of the circuit. If the receptacle is DC or other than single phase, that information shall also be marked on the label.

All receptacles and electrical inlet devices shall be listed to UL 498, *Standard for Safety Attachment Plugs and Receptacles*, or other recognized performance standards.

Receptacles used for DC voltages shall be rated for DC service.

Wiring Schematics

An "As-Built" Wiring diagrams for line voltage systems shall be provided 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
- One (1) 120 volt exterior outlet, rear of body, streetside.
 - The outlet receptacle(s) shall be 20 amp, twist-lock (NEMA L5-20R).
 - Outlet(s) shall be powered through the on-board inverter.
 - There shall be one (1) 120 VAC outlet(s) located on side of module in cab between rear crew seats.
 - The outlet receptacle(s) shall be 20 amp, straight-blade (NEMA 5-20R).
 - Outlet(s) shall be powered through the on-board inverter system.

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TYPE III Pumper SVI #1052

WILDLAND SIDE MOUNT PUMP MODULE

The 74" (measured laterally across vehicle width) x 29" wide side mount pump enclosure shall be removable and supported from the chassis frame rails with spring type body mounts. This enclosure shall allow independent flexing of the pump enclosure from the body and allow for quick removal. The support structure shall be constructed of extruded aluminum tubing and angle.

All pump suction and discharge controls are to be mounted on the driver side pump operator's panel so as to permit operation of the pump from a central location. The fire pump, valves and controls shall be accessible for service and maintenance as required by applicable sections of NFPA standards.

The "master" gauges shall be suitably enclosed and mounted on a full pump compartment width "hinged" gauge panel constructed of the same material as the pump operators control panel, allowing access to the backside of all gauges and gauge lines. The individual gauges shall be mounted inline with the control handle or adjacent to the control handle. Panel is to include a stainless steel piano hinge, flush mounted chrome plated trigger latch, and stainless steel cable end stops. Electrical wiring and all gauge lines shall be properly tie wrapped to prevent kinking or cutting of the lines when the panel is opened.

The following controls and equipment shall be provided on the pump panel or within the pump enclosure:

- 1) Electric primer.
- 2) Pump and plumbing area service lights.
- 3) Pressure control device and throttle control.
- 4) Fire pump and engine instruments.
- 5) Pump intakes and discharge controls.
- 6) Master intake and discharge gauges.
- 7) Tank fill control.
- 8) Tank suction control.
- 9) Water tank level gauge.
- 10) Pump panel lights.
- 11) Air horn switch.
- 12) Side and rear work light switches.
- 13) Ground light switch.
- 14) Hose bed light switch.

PUMP PANEL - SIDE MOUNT

The pump operator's panel, along with the lower streetside and curbside pump panels shall be constructed 3/16" smooth aluminum, fastened to the pump enclosure with 1/4" stainless steel bolts.

The instrument area shall have a stainless steel continuous hinge that shall swing towards the front of the module for easy access to gauges.

STREETSIDE PUMP PANEL - BOLTED

The streetside pump panel shall be fastened to the pump enclosure with 1/4" stainless steel bolts and nutserts.

LOWER CURBSIDE PUMP PANEL - BOLTED

The curbside pump panel shall be fastened to the pump enclosure with 1/4" stainless steel bolts and nutserts.

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TYPE III Pumper SVI #1052

PUMP MODULE EQUIPMENT STORAGE COMPARTMENT

There shall be one (1) equipment compartment located on the upper curbside of the pump module. It shall have dimensions of 22" wide x 26" high. The clear door compartment dimensions shall be 20.5" wide x 23" high x 12" deep with the door closed. An OnScene LED light shall illuminate the interior of the compartment when the door is open.

The equipment compartment shall be provided with a flush style hinged door. The doors shall be provided with a high quality, continuous double seal type weather stripping to prevent moisture and dust from entering the exterior compartment. The door shall be double pan design with the outer door material being 1/8" aluminum door with a 1/8" aluminum removable inner liner that shall have a natural finish to provide reflective qualities during night operations. The vertically hinged door shall have a gas shock and polished stainless steel 1/4" piano hinge.

The door latch shall be an Eberhard locking slam latch, with a chrome "D" ring with a 5-degree bend for easier grasping of each door handle with gloved hands. The door shall be provided with a keyed lock.

The exterior of the door shall be painted to match the lower job color. The interior shall be painted to match the compartment interior paint specified.

There shall be two (2) large removable panels provided on the inside of the compartment. These panels shall provide an opening for service access to the right side of the interior of the pump module and to the bottom side of the diesel pump.

WHEEL CHOCK COMPARTMENT

Below the equipment storage compartment shall be a wheel chock compartment. This compartment shall be equipped with a plate lap style 1/8" aluminum door mounted on a piano hinge with a push latch. The compartment shall have clear door dimensions of 8.3" wide x 13.5" high x 13-.5" deep with the door closed.

PUMP COMPARTMENT TOP OVERLAY

The top of the pump compartment shall be overlaid with materials of a non slip 1/8" NFPA compliant aluminum treadplate.

DUNNAGE AREA

A single wall 3/16" aluminum diamond plate dunnage area shall be provided above the pump house compartment for equipment mounting and storage space. The dunnage area shall be as wide as possible from side to side, and as deep as allowed with the available space.

Dunage area shall be provided with a lift-up aluminum tread plate door.

STREETSIDE RUNNING BOARD - SIDE MOUNT PANEL

The streetside pump panel shall be equipped with a side running board. The running board shall extend along the width of the pump module.

The running board stepping surface shall be constructed of aluminum NFPA compliant tread plate, bolted in place with stainless steel fasteners.

Running board surface shall be provided with one (1) aluminum Grip-Strut insert(s) for improved slip resistance.

- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.

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TYPE III Pumper SVI #1052

CURBSIDE RUNNING BOARD - SIDE MOUNT PANEL

The curbside pump panel shall be equipped with a side running board. The running board shall extend along the width of the pump module.

The running board stepping surface shall be constructed of aluminum NFPA compliant tread plate, bolted in place with stainless steel fasteners.

Running board surface shall be provided with one (1) aluminum Grip-Strut insert(s) for improved slip resistance.

- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.

PUMP MODULE FINISH

The pump module framework shall be painted body color choice.

CROSS LAY

The specified pump module shall have one (1) cross lay(s). The cross lay hose bed(s) shall be located in the upper portion of the pump module.

The cross lay area shall be located at the front of side control pump module and at the rear of top control module. The cross lay area shall span the entire width of the pump module.

CROSS LAY TRIM

Brushed stainless steel trim shall be installed at the openings on each side of the cross lay hose bed area. The trim shall reduce the chaffing of the hose jacket on the edges of the bay area.

If divider(s) are required between the hose bed areas they shall be fabricated from 3/16" smooth aluminum and mounted in a channel on each end for adjustability.

Removable slotted aluminum flooring shall be provided for the hose bed area.

Each end of hose bed shall have a 2" black nylon covered with black 14 oz. vinyl style webbing covers. The covers will be mechanically fastened at the sides of the hose bed and secured using yellow pulls with reflective bungess and shoulder bolts.

Safety sign FAMA22, which warns of the need to secure hose, shall be visible to personnel at each side of hose storage area.

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TYPE III Pumper SVI #1052

WATEROUS CPK 500 GPM TWO-STAGE FIRE PUMP

A Waterous Model CPK-3 fire pump shall be midship mounted and shall comply with all applicable requirements of the latest standards for automotive fire apparatus of the National Fire Protection Association, NFPA 1901, and shall have a rated capacity of 500 GPM.

The CPK-3 is capable of supplying volumes of 500 GPM (2000 L/min) @ 150 psi (10.3 bar) or pressures of 800 psi (55 bar) @ 60 GPM (227 L/min). When installed in vehicle, complete with proper intake piping, CPK meets NFPA 1901 for a 500 GPM rating.

Casing

One-piece, high-tensile, close-grained iron body.

Impeller

Bronze, hydraulic and mechanically balanced rotation.

Wear Rings

Bronze replaceable wear rings.

Separable Impeller Shaft

Allows separation of pump from transmission for ease of serviceability.

Intake

4.0" (10.1 cm) NPT tee adapter.

Discharge

(2) 2.0" (5 cm) NPT or 2.5" (6.3 cm) NPT tee adapter.

Discharge Positions

Available in either rotation with four discharge positions; gear case can be mounted horizontally, vertically, or inverted.

Bearings

All bearings are oil or grease lubricated, ball type, located outside the pump casting to accurately align and support the impeller shaft assembly. Ball bearings are deep-grooved type designed to carry both radial and axial thrust.

Transmission

K Series, close-grained, gray iron with the proper gear ratio to provide required impeller speeds at available input speeds, whether pumping from tank, draft, or in relay operation.

Transmission Gears

Helical, precision cut, crown shaved for proper load distribution and quiet operation.

Pump Anodes

There shall be two (2) anodes provided to protect the components that come in contact with the water system from corrosion and deterioration. One (1) anode shall be installed in the inlet (suction) side of system, and one (1) shall be installed in the pressure (outlet) side of the PTO pump.

PAINT FINISH

The paint finish will be red primer from pump manufacturer.

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TYPE III Pumper SVI #1052

PUMP DRIVE SYSTEM

The water system pump shall be driven by a Chelsea "Hot-Shift" transmission PTO and mounted directly to the transmission of the chassis. The drive line shall be hollow tube type, with heavy duty universals and splined shaft to allow movement of the chassis components and pump.

The engagement of the PTO shall be in the chassis cab with a rocker switch and red pilot light to note engagement of the PTO.

The power supply to the PTO engagement control shall be wired to a neutral position transmission switch to prevent engagement unless the vehicle is in neutral with the parking brake set.

Two (2) green indicator lights shall be supplied in the chassis cab. One (1) light shall be energized when the chassis transmission is in neutral and shall be labeled "OK TO PUMP", the second light shall engage when the pump drive (PTO) has been engaged and shall be labeled "PUMP ENGAGED".

One (1) green indicator light shall be supplied at the Pump Operator's panel adjacent to the engine hand throttle. The green light shall be energized when both the chassis transmission is in neutral and the pump drive (PTO) has been engaged. Green light shall be labeled "OK TO PUMP".

Model part number shall be Chelsea 280GMFJP-B5XV, 129% Ratio.

Double check the model number and ratio with engineering before ordering the PTO on the chassis.

MECHANICAL SEALS

The pump shall be equipped with self-adjusting, maintenance free mechanical shaft seals that shall not require manual adjustment. These seals shall be designed in a manner such that they shall remain functional enough to permit continued use of the pump in the unlikely event of a seal failure.

TWO-STAGE FIRE PUMP

The pump shall be a Waterous CPK-3 two-stage centrifugal fire pump, designed specifically for the fire service.

TWO-STAGE TRANSFER VALVE

The transfer valve shall be of the latest ball type design. The valve shall be all bronze construction and incorporate a hydraulically balanced seal to minimize leakage around the ball and assure maximum pump efficiency. The transfer valve shall operate smoothly without sticking, even when it is exposed to sandy or dirty water.

The transfer valve shall be operated by a push-pull actuator that will be controlled on the pump operator's panel. There shall be two (2) indicator lights to show when the pump is operating in pressure or volume mode.

City of Santa Fe NM, Santa Fe Fire Department

TYPE III Pumper SVI #1052

THERMAL PROTECTION DEVICE

A Hale TRV 120-L thermal protection device shall be included on the pump that monitors pump water temperature and opens to relieve water to cool the pump.

The thermal protection device shall be set to relieve water when the temperature of the pump water exceeds 120 degrees F (49 C).

The components of the thermal protection device shall be manufactured of brass and stainless steel and be compatible with most foam concentrates.

The thermal protection device shall have 1-1/4" NPT threads for easy adaptability to existing pump discharge openings. The discharge line shall be 3/8" diameter tubing vented to atmosphere or back to the booster tank.

The thermal protection device shall have a hydrostatic test rating of 600 PSIG.

1/2" PUMP COOLER LINE

There shall be a 1/2" line installed from the discharge side of the pump to the water tank. The line shall be used to cool the pump during long periods of pumping when water is not being discharged. The pump cooler shall be controlled with a quarter-turn ball valve on main pump panel, and shall be clearly labeled "Pump Cooler".

PUMP COOLER CHECK VALVE

There shall be a check valve installed in the pump cooler line to prevent tank water from back flowing into the pump when it is not in use.

WATEROUS FIVE YEAR PUMP WARRANTY

The fire pump shall be warranted by Waterous for a period of five (5) years from the date of delivery to the City of Santa Fe NM, Santa Fe Fire Department.

MANUFACTURER FIRE PUMP TEST

The pump shall undergo a manufacturer's test per applicable sections of NFPA 1901 standards, prior to delivery of the completed apparatus.

The test shall include at least the pumping test, the pumping engine overload test, the pressure control system test, the priming device tests, and the vacuum test.

The entire pump, both suction and discharge passages, shall be hydrostatically tested to a pressure of 500 psi (3400 kPa) for a minimum for 10 min. The pump shall be fully tested at the pump manufacturer's factory to the performance specifications as outlined by applicable NFPA 1901 standards.

The results of this test shall be furnished with the vehicle on delivery.

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TYPE III Pumper SVI #1052

FIRE PUMP TEST LABEL

A test plate shall be provided at the pump operator's panel that gives the rated discharges and pressures together with the speed of the engine as determined by the certification test for each unit, the position of the parallel/series pump as used, and the governed speed of the engine as stated by the engine manufacturer on a certified brake horsepower curve

The pump shall comply with the applicable requirements of "Standard for Fire Apparatus 1901, latest edition.

The pump shall be capable of producing fire streams that are free from objectionable pulsation under all normal operating conditions.

SAFETY SIGN

A safety sign FAMA25, which warns of the need for training prior to operating the apparatus, shall be located on the pump operators panel.

ALTITUDE REQUIREMENT

The apparatus shall be designed to meet the specified rating at 7000 feet altitude.

PUMP DRAIN VALVE

A manifold drain valve assembly shall be supplied. This drain shall provide the capability to drain the entire pump by pulling a single control. The valve assembly shall consist of a stainless steel plunger in a bronze body with multiple ports.

PUMP DRAIN CONTROL

The pump drain shall be controlled at the pump operator's panel and identified as "Pump Drain". The control shall be provided in the form of a "T" handle control that is easily actuated with a gloved hand.

AIR PRIMING PUMP CONTROL AT PUMP PANEL

The priming pump shall be a Trident Emergency Products compressed air powered, high efficiency, multi-stage venturi based AirPrime System.

The priming pump shall be rigidly attached to the pump transmission and utilizes air supplied from the chassis air system to operate the pump primer. The AirPrime is more efficient and reliable than the conventional electric motor driven primers, and virtually eliminates the impact load on the vehicles electrical system improving the reliability of the vehicle. AirPrime also improves performance in the elapsed time for establishing water supply resulting in improved fire ground operations and safety.

A manual rocker switch with Auto-Prime / Off / Manual-Prime shall be provided on main pump operator's panel.

The primer shall be capable of priming the pump through a 20' section of suction hose with a 10' lift within 30 seconds for pumps less than 1,500 gpm, and 45 seconds for pumps 1,500 gpm and larger.

DISCHARGE RELIEF VALVE

The discharge pressure relief shall be controlled by the electronic engine controlled device as specified.

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4" SUCTION INLET - STREETSIDE

One (1) 4" (100 mm) un-gated suction intake shall be installed on the streetside pump panel to supply the fire pump from an external water supply. The threads shall be 4" NH male threads.

The intake shall be provided with a removable screen.

HEAT EXCHANGER

A heat exchanger shall be provided on the pump driving engine cooling system that uses water from the discharge side of the pump to cool the engine coolant through the use of a closed heat exchanger. The water from the pump and the engine coolant shall not be intermixed. This cooling system shall be controlled by a 1/4 turn valve on the pump operator's panel.

INTAKE RELIEF VALVE

There shall be a Task Force Tips model A18 series brass intake relief valve installed on the suction side of the pump. The system shall be incrementally adjustable from 90 to 300 PSI and include an off position. Valve shall be designed to prevent vibration from altering the setting of the valve. The system shall be factory set at 150 PSI prior to delivery.

The relief outlet shall be directed below the pump with the discharge terminating in a 2-1/2" NSTM connection. The discharge shall be away from the pump operator and labeled "DO NOT CAP".

AUXILIARY DIESEL PUMP

There shall be a Waterous model E511-C diesel engine auxiliary pump provided above the pump compartment. The pump shall be plumbed in common with that of the main pump for pump and roll applications. The pump shall have a minimum rated capacity of 240 GPM @ 100 PSI.

PUMP INTAKE

The pump shall have a 3" female NPT intake that is plumbed directly into the tank.

PUMP DISCHARGE

The pump shall have a 2" female NPT discharge that is plumbed directly into the suction side of the main pump. There shall be a check valve provided in this line to keep the main pump from pressurizing the auxiliary pump.

PUMP CONSTRUCTION

High-strength aluminum alloy protected by a proprietary dual anodizing and sealing process for superior corrosion protection and resistance to acids and alkaline solutions.

IMPELLER

The impeller shall be a high strength corrosion resistant bronze, fully enclosed, double hubbed to balance hydraulic thrust, and mechanically balanced to eliminate vibration.

IMPELLER SHAFT

Integral driven gear and shaft made of hardened steel, nickel-plated for wear and corrosion resistance. Wear Rings: Long wearing bronze. Easy to replace when required to restore original pump efficiency.

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TYPE III Pumper SVI #1052

DRIVE SHAFT AND GEAR

High-strength stainless steel shaft and a heat-treated ductile iron gear.

SHAFT SEAL

Spring-loaded mechanical type. Wear and heat resistant silicon-carbide.

GEAR CASE

Two-gear speed increaser utilizing high-strength aluminum alloy case. Helical cut gears for reduced wear and noise and anti-friction bearings throughout.

Dimensions and Weights:

Model	Length (in/cm)	Width (in/cm)	Height* (in/cm)	Weight (lb/kg)
E511-C	35.28 (89.6)	20.8 (52.8)	25 (63.5)	237 (108)

DIESEL ENGINE

Kubota, Model D902-E3B, Super Mini Series, in-line 3-cylinder, water-cooled, naturally aspirated delivering a maximum output of 24.8 hp (18.5 kW) @ 3600 RPM, 54.8 cu. in. (898 cc) displacement, 4-cycle, diesel fueled. The fuel system shall be connected to the chassis fuel system.

LUBRICATION

A pressure feed oil system with a spin on filter, shall lubricate the pump engine.

EMISSION REGULATION

Tier 4

STARTER

The engine shall be supplied with a 12 volt electric starter. Starter system shall be connected to chassis battery system.

ALTERNATOR

There shall be a 12 VDC, 40 amp alternator provided on the engine.

CONTROLS ON THE PUMP PANEL

There shall be one (1) control panel provided with the auxiliary pump. The control panel shall be mounted on the pump panel.

REMOTE CONTROLS IN THE CAB

There shall be an additional control console provided in the cab. The console shall have a remote start, throttle control, master pressure gauge, and a remote primer control. The console shall be mounted on the drivers side of the engine tunnel.

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AUXILIARY PUMP COVER

A treadplate cover shall be installed over the auxiliary pump. The cover shall be designed in such a manner as to allow for easy access to the auxiliary pump when performing routine maintenance. The cover shall also be designed in compliance with the engine manufacturer's air flow requirements.

FOAM SYSTEMS

There shall be a FoamPro 1600 foam system with a 12 volt, 1/3 hp electric motor driven positive displacement piston type foam concentrate pump with a rated capacity of .01 to 1.7 gpm @ 200 psi, with operating pressures up to 400 psi. The system will draw a maximum of 30 amps @ 12 VDC.

The apparatus shall be equipped with an electronic, fully automatic, variable speed, direct injection, and discharge side foam proportioning system. The system shall be capable of handling Class A foam concentrate. The foam proportioning operation shall be based on direct measurement of water flows, and remain consistent within the specified flows and pressures. System must be capable of delivering accuracy to within 5% of calibrated settings over the advertised operation range when installed according to factory standards. The system shall be equipped with a control module suitable for installation on the pump panel. Incorporated within the motor driver shall be a microprocessor that receives input from the system flowmeter, while also monitoring foam concentrate pump output. This compares values to ensure that the operator's preset is proportional to the amount of foam concentrate injected into the discharge side of the fire pump.

A paddlewheel-type flowmeter shall be installed in the discharge system specified to be "foam capable." A simulated flow feature shall be incorporated into the motor driver to simulate an approximate flow value of 100 gpm. This feature is to be engaged or disengaged with a momentary switch and will automatically disengage when the main system switch is turned off.

The control module shall enable the pump operator to:

- Activate the foam proportioning system
- Select proportioning rates from 0.1% to 1.0%
- See a "low concentrate" warning light flash when the foam tank runs low and in two minutes, if foam concentrate is not added to the tank, shut the foam concentrate pump down

A 12 or 24-volt electric motor driven positive displacement plunger pump shall be provided. The pump capacity shall be from 0.1 gpm (0.38 L/min) to 1.7 gpm (6.4 L/min) at 200 psi (13.8 BAR) with a maximum operating pressure up to 400 psi (27.6 BAR). The pump shall have the capability to draw 3 foot of lift. The system will draw a maximum of 30 amps @ 12 VDC or 15 amps @ 24 VDC. The motor shall be controlled by the microprocessor (mounted to the base of the pump). It shall receive signals from the control module and power the 1/3 hp (.25 kW) electric motor in a variable speed duty cycle to ensure that the correct proportion of concentrate is injected into the water stream. A full flow check valve shall be provided in the discharge piping to prevent foam contamination of fire pump and water tank. A 12 psi (.83 BAR) opening pressure check valve shall be provided in concentrate line.

Components of the complete proportioning system as described above shall include:

• Operator control module	• Low level tank switch
• Paddlewheel flowmeter	• Foam tank
• Pump and electric motor/motor driver	• Foam injection check valve
• Wiring harnesses	• Main waterway check valve

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An installation and operation manual shall be provided for the unit, along with a one-year limited warranty by the manufacturer. The system must be installed and calibrated by a Certified FoamPro Dealer. The system design shall have passed environmental testing which simulates heavy use on off-road mobile apparatus. Testing shall have been conducted in accordance to SAE standards.

A means shall be provided to prevent water back flow into the foam proportioning system and the foam concentrate storage tank.

A remote start/stop feature shall be available to be incorporated into the 1600 series proportioners. This option shall allow the operator to start and/or stop the operation of the proportioner from more than one location on the apparatus. Included in this option are a special control module, a local start/stop switch with LED lamp for mounting near the control module, a remote start/stop switch with LED lamp for remote mounting, and the 20 foot interface cable.

FOAM TANK REFILL SYSTEM

The apparatus shall be equipped with an electronic, automatic, concentrate refill system. System shall operate independently of the foam proportioner allowing simultaneous use. Refill operation shall not require apparatus or fire pump to be running. The system shall be capable of handling Class A or Class B foam concentrates, emulsifiers, gels and decontamination concentrates. The apparatus shall be plumbed from the externally accessed intake/flush ports to the concentrate cell following manufacturer's recommendations. External fill and flush connections to be quick-connect, cam-lock type. Internal piping to incorporate check valves to prevent back flow. Concentrate tank inlet shall be positioned to minimize agitation per manufacturer's recommendations. The refill operation shall be based on direct measurement of concentrate level in tank. System must be capable of automatically stopping when cell is full and include a manual override feature. The system shall be equipped with an electronic control suitable for installation on the pump panel. Incorporated within the control shall be a microprocessor that receives input from the system while controlling foam concentrate pump output. An all bronze three-way valve shall be included to allow the operator to flush system after use. Valve control, intake and flush ports shall be located within corresponding panel plate.

The system shall enable the operator to perform the following control/operation functions and status indicators for the refill operation:

- Provide push-button start/stop control of foam refill
- Solid green light advises operator concentrate cell is full
- Flashing green indicates system is running
- Green light off, system off
- Allow override of "full tank" condition
- Provide a means to flush the pump and intake piping

System shall include a 12 volt electric motor driven, positive displacement concentrate pump. Pump shall deliver minimum flow of 10 gpm (37.8 L/min) @ 20 psi with all concentrates currently utilized in fire apparatus. Pump body to be of all bronze construction and other wetted components and piping to be constructed of non-corrosive materials. The system will draw a maximum of 38 amps @ 12 VDC. A pump/motor solenoid (mounted to the base of the pump) shall receive signals from the computer control display and power the 1/2 hp (0.4 kW) electric motor directly coupled to the concentrate pump. The system shall receive readings when the concentrate tank is full and stop operation to prevent overflow.

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Components of the complete refill system shall include:

- Operator control and display with Weather-Pac connectors
- Refill/flush quick-connect cam-lock fittings and cap
- Check valves
- Pump/motor assembly and solenoid
- Strainer
- Tank level switch
- Three-way fill/flush valve
- Stainless steel pick-up wand and 6' of reinforced suction hose, 1" diameter to allow maximum flow
- Panel placards

An installation and operation manual shall be provided, along with a one-year limited warranty by the manufacturer. The system must be installed and plumbed by a Certified FoamPro Dealer. When two types of concentrates are to be used, a separate refill system must be specified for each.

PLUMBING SPECIFICATIONS

The fire pump plumbing system shall be of rigid or flexible piping with stainless steel fittings. Victaulic couplings shall be installed to permit flexing of the plumbing system and allow for quick removal of piping or valves for service. Flexible hose couplings shall be threaded stainless steel or Victaulic connections.

The fire pump and plumbing shall be hydrostatically tested in compliance to applicable sections of NFPA standards, with test results submit with the delivery documentation.

STAINLESS STEEL INTAKE MANIFOLD

The suction manifold assembly shall be fabricated with Schedule #10 type 304 stainless steel. All threaded fittings shall be a minimum of Schedule 10 stainless steel. The suction manifold assembly shall have radiused sweep elbows to minimize water turbulence into the suction volute.

The suction manifold shall be welded and pressure tested prior to installation. The stainless steel manifold assembly shall be attached to the pump intake volute with a heavy-duty, flexible Victaulic coupling.

The entire intake piping system, valves, bleeder valves, and intake closures, excluding the tank-to-pump line on the tank side of the valve, shall be capable of withstanding a hydrostatic pressure of 250 psi (1700 kPa).

STAINLESS STEEL DISCHARGE MANIFOLD

The discharge manifold assembly shall be fabricated with Schedule #10 type 304 stainless steel. All threaded fittings shall be a minimum of Schedule 10 stainless steel. The discharge manifold assembly shall have radiused sweep elbows to minimize water turbulence into the discharge header.

The manifold shall be welded and pressure tested prior to installation. The stainless steel manifold assembly shall be attached to the pump intake volute with a heavy-duty, flexible Victaulic coupling.

The entire discharge piping system; valves; drain cocks; and outlet closures, excluding the tank fill line on the tank side of the valve and CAF system piping and components that include valves that permit isolation from discharge pressure, shall be capable of withstanding a hydrodynamic discharge pressure of 500 psi (3400 kPa) or 100 psi (700 kPa) over the maximum discharge pressure capability rating of the pump, whichever is greater.

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STAINLESS STEEL PLUMBING WARRANTY

The stainless steel plumbing shall be free of defects in material and 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.

The contractor shall supply details of their warranty information with their bid submission.

STREETSIDE INTAKE - 2-1/2"

There shall be one (1) 2-1/2" (65 mm) gated intake(s) located on pump panel. Each intake shall include:

- One (1) Akron Brass 8900 series Gen II, manual type 2-1/2" (65 mm) valve(s) with Fusion CF composite ball. Each valve shall be equipped with a brass type valve adapter on inlet side, and discharge side with drain port.
 - Valve(s) shall be controlled with a handle for direct valve operation through panel.
- Each intake shall have a 2-1/2" (65 mm) NSTF chrome swivel adapter with strainer provided.
 - The specified adapter shall be provided with a 2-1/2" (65 mm) NSTM chrome plated plug with chain.
- One (1) Class 1, 3/4" brass 90 degree ball type drain valve(s) shall be provided for the above plumbing item. There shall be a 1/4 turn control to manually open the drain valve(s) when the line is under pressure located on pump panel and drain the lowest point in the plumbing.

CURBSIDE INTAKE - 2-1/2"

There shall be one (1) 2-1/2" (65 mm) gated intake(s) located on pump panel. Each intake shall include:

- One (1) Akron Brass 8900 series Gen II, manual type 2-1/2" (65 mm) valve(s) with Fusion CF composite ball. Each valve shall be equipped with a brass type valve adapter on inlet side, and discharge side with drain port.
 - Valve(s) shall be controlled with a handle for direct valve operation through panel.
- Each intake shall have a 2-1/2" (65 mm) NSTF chrome swivel adapter with strainer provided.
 - The specified adapter shall be provided with a 2-1/2" (65 mm) NSTM chrome plated plug with chain.
- One (1) Class 1, 3/4" brass 90 degree ball type drain valve(s) shall be provided for the above plumbing item. There shall be a 1/4 turn control to manually open the drain valve(s) when the line is under pressure located on pump panel and drain the lowest point in the plumbing.

DIRECT TANK FILL

One (1) 2-1/2" (65 mm) direct tank fill(s) shall be located on streetside rear body panel with check valve.

- One (1) Akron Brass 8900 series Gen II, manual type 2-1/2" (65 mm) valve(s) with Fusion CF composite ball. Each valve shall be equipped with a brass type valve adapter on inlet side, and discharge side with drain port.
 - Valve(s) shall be controlled with a handle for direct valve operation through panel.
- Each intake shall have a 2-1/2" (65 mm) NSTF chrome swivel adapter with strainer provided.
 - The specified adapter shall be provided with a 2-1/2" (65 mm) NSTM chrome plated plug with chain.

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TANK TO PUMP CHECK VALVE

There shall be a check valve between the pump suction and the booster tank valve. The check valve shall eliminate back flow into the water tank when the pump is connected to a pressurized source.

TANK TO PUMP VALVE

A 3" (75 mm) full flow ball valve shall be installed between the fire pump and the water tank. The connection between the tank and the pump shall be capable of the flow recommendations as set forth in the latest edition of NFPA 1901. The valve shall be flanged to bolt directly to the pump and shall incorporate a chromium plated bronze ball. The remaining internal moving parts shall be stainless steel for years of dependable service. A non collapsible flexible hose shall be incorporated into the tank to pump plumbing to allow movement in the line as the chassis flexes to avoid damage during normal road operation.

The tank to pump valve shall be controlled from the pump operator's panel.

- Valve(s) shall be controlled with a push/pull type chromed "T" handle with adjustable linkage connected to the valve. The valve handle will be pulled for the closed valve position. The control handle shall be located adjacent to the plumbing connection.

FRONT DISCHARGE

There shall be one (1) 2" (52 mm) gated discharge(s) with control located on valve. Each discharge shall include:

- One (1) of the discharge(s) shall flow water and foam.
- One (1) Akron Brass 8900 series Gen II, manual type 2" (52 mm) valve(s) with Fusion CF composite ball. Each valve shall be equipped with a Class 1 stainless steel weld type valve adapter on inlet side, and discharge side with drain port.
 - Valve(s) shall be controlled with a chrome handle directly connected to valve.
- One (1) Akron Brass 8900 series Gen II, manual type 2" (52 mm) valve(s) shall be provided within pump enclosure to isolate front discharge plumbing if necessary.
- There shall be a 2" (52 mm) VFC x 1-1/2" (38 mm) NSTM brass or chrome plated 90 degree swivel elbow provided for each discharge.
- One (1) Class 1, 3/4" brass 90 degree ball type drain valve(s) shall be provided for the above plumbing item. There shall be a 1/4 turn control to manually open the drain valve(s) when the line is under pressure located on pump panel and drain the lowest point in the plumbing.
- A discharge pressure gauge is not required with the remote valve control.

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STREETSIDE DISCHARGE

There shall be one (1) 2-1/2" (65 mm) gated discharge(s) with control located on pump panel. Each discharge shall include:

- One (1) of the discharge(s) shall flow water only.
- One (1) Akron Brass 8900 series Gen II, manual type 2-1/2" (65 mm) valve(s) with Fusion CF composite ball. Each valve shall be equipped with a Class 1 stainless steel weld type valve adapter on inlet side, and discharge side with drain port.
 - Valve(s) shall be controlled with a handle for direct valve operation through panel.
- Each discharge shall have a 2-1/2" (65 mm) NSTF x 2-1/2" (65 mm) NSTM chrome plated 30 degree downsweep elbow provided.
 - The specified elbow shall be provided with a 2-1/2" (65 mm) NSTF chrome plated cap with chain.
- One (1) Class 1, 3/4" brass 90 degree ball type drain valve(s) shall be provided for the above plumbing item. There shall be a 1/4 turn control to manually open the drain valve(s) when the line is under pressure located on pump panel and drain the lowest point in the plumbing.
- One (1) Class 1, 2-1/2" liquid filled gauge(s)
 - Gauge(s) shall have a white background with black text.
 - Gauge(s) shall have a range from 0 to 400 PSI.
 - The gauge shall have a die cast zinc, chrome plated bezel with color-coded labels insert and a color-coded gauge trim ring. Labels shall be UV and scratch resistant and meet SAE standards where applicable.

REAR STREETSIDE DISCHARGE

There shall be one (1) 2-1/2" (65 mm) gated discharge(s) with control located on valve. Each discharge shall include:

- One (1) of the discharge(s) shall flow water only.
- One (1) Akron Brass 8900 series Gen II, manual type 2-1/2" (65 mm) valve(s) with Fusion CF composite ball. Each valve shall be equipped with a Class 1 stainless steel weld type valve adapter on inlet side, and discharge side with drain port.
 - Valve(s) shall be controlled with a handle for direct valve operation through panel.
- Each discharge shall have a 2-1/2" (65 mm) NSTF x 2-1/2" (65 mm) NSTM chrome plated 30 degree downsweep elbow provided.
 - The specified elbow shall be provided with a 2-1/2" (65 mm) NSTF chrome plated cap with chain.
- One (1) Class 1, 3/4" brass 90 degree ball type drain valve(s) shall be provided for the above plumbing item. There shall be a 1/4 turn control to manually open the drain valve(s) when the line is under pressure located on pump panel and drain the lowest point in the plumbing.
- A discharge pressure gauge is not required with the remote valve control.

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REAR CURBSIDE DISCHARGE

There shall be one (1) 2-1/2" (65 mm) gated discharge(s) with control located on valve. Each discharge shall include:

- One (1) of the discharge(s) shall flow water and foam.
- One (1) Akron Brass 8900 series Gen II, manual type 2-1/2" (65 mm) valve(s) with Fusion CF composite ball. Each valve shall be equipped with a Class 1 stainless steel weld type valve adapter on inlet side, and discharge side with drain port.
 - Valve(s) shall be controlled with a handle for direct valve operation through panel.
- Each discharge shall have a 2-1/2" (65 mm) NSTF x 2-1/2" (65 mm) NSTM chrome plated 30 degree downsweep elbow provided.
 - The specified elbow shall be provided with a 2-1/2" (65 mm) NSTF chrome plated cap with chain.
- One (1) Class 1, 3/4" brass 90 degree ball type drain valve(s) shall be provided for the above plumbing item. There shall be a 1/4 turn control to manually open the drain valve(s) when the line is under pressure located on pump panel and drain the lowest point in the plumbing.
- A discharge pressure gauge is not required with the remote valve control.

BOOSTER REEL DISCHARGE

There shall be one (1) Hannay ESF 16.5-30-31 (18" wide x 36" high x 29" deep) polished aluminum booster hose reel discharge(s) with electric rewind motor located in upper pump module. Reel shall be capable of holding 100' of 1" booster hose.

- Power rewind control(s) shall be in a position where the operator can observe the rewinding operation and not be more than 72 in. (1830 mm) above the operator's standing position, and shall be marked with a label indicating its function.
- Each booster hose reel shall be equipped with hose guide rollers.
- Each booster reel shall be supplied with 100' x 1" of lightweight 100% polyester booster hose with 1" NST Pyrolite couplings. Hose color shall be red.
- No nozzle is required with specified booster hose reel(s).
- One (1) of the discharge(s) shall flow water and foam.
- One (1) Akron Brass 8900 series Gen II, manual type 1-1/2" (38 mm) valve(s) with Fusion CF composite ball. Each valve shall be equipped with a Class 1 stainless steel weld type valve adapter on inlet side, and discharge side with drain port.
 - Valve(s) shall be controlled with a push/pull type chromed "T" handle connected to the valve. The control handle shall be located adjacent to the plumbing connection.
- One (1) Innovative Controls model 3003000, 3/4" brass 90 degree ball type drain valve(s) with lift type handle which can be opened under pressure, with color coded label shall be provided. Valve(s) shall be located on bottom of pump panel and drain the lowest point in the plumbing.

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- One (1) Innovative Controls/NoShok 2-1/2" liquid filled gauge(s) with blue (water) LED backlighting activated with pump engagement.
 - Gauge(s) shall have a white background with black text and blue (water) or red (foam) pie indicator.
 - Gauge(s) shall have a range from 0 to 400 PSI.
 - The gauge shall have a die cast zinc, chrome plated bezel with color-coded labels insert and a color-coded gauge trim ring. Labels shall be UV and scratch resistant and meet SAE standards where applicable.

2" CROSS LAY(S)

There shall be one (1) 2" cross lay(s) located in pump module, or per the itemized compartment list. The crosslay(s) shall be transverse of the pump module or body with access from either side.

Each cross lay shall have a minimum storage capacity of 200' of 1-3/4" double jacket hose and nozzle.

- One (1) of the discharge(s) shall flow water and foam.
- One (1) Akron Brass 8900 series Gen II, manual type 2" (52 mm) valve(s) with Fusion CF composite ball. Each valve shall be equipped with a Class 1 stainless steel weld type valve adapter on inlet side, and discharge side with drain port.
 - 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.
- There shall be a 2" (52 mm) VFC x 1-1/2" (38 mm) NSTM brass or chrome plated 90 degree swivel elbow provided for each discharge.
- One (1) Innovative Controls model 3003000, 3/4" brass 90 degree ball type drain valve(s) with lift type handle which can be opened under pressure, with color coded label shall be provided. Valve(s) shall be located on bottom of pump panel and drain the lowest point in the plumbing.
- One (1) Innovative Controls/NoShok 2-1/2" liquid filled gauge(s) with blue (water) LED backlighting activated with pump engagement.
 - Gauge(s) shall have a white background with black text and blue (water) or red (foam) pie indicator.
 - Gauge(s) shall have a range from 0 to 400 PSI.
 - The gauge shall have a die cast zinc, chrome plated bezel with color-coded labels insert and a color-coded gauge trim ring. Labels shall be UV and scratch resistant and meet SAE standards where applicable.

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BOOSTER REEL

There shall be one (1) Hannay SBEF24-23-24-12 (26" wide x 23.5" high x 20.5" deep) polished aluminum booster hose reel discharge(s) with electric rewind motor located in lower compartment RC1 per itemized compartment layout. Reel shall be capable of holding 100' of 1" booster hose.

- Power rewind control(s) shall be in a position where the operator can observe the rewinding operation and not be more than 72 in. (1830 mm) above the operator's standing position, and shall be marked with a label indicating its function.
- Each booster hose reel shall be equipped with a Hannay FH-3 hose guide rollers.
- Each booster hose reel shall be supplied with 100' x 1" diameter, 800 PSI rubber booster hose with 1" NST hardcoat aluminum couplings. Color of hose shall be red.
- No nozzle is required with specified booster hose reel(s).
- One (1) of the discharge(s) shall flow water and foam.
- One (1) Akron Brass 8900 series Gen II, manual type 1-1/2" (38 mm) valve(s) with Fusion CF composite ball. Each valve shall be equipped with a Class 1 stainless steel weld type valve adapter on inlet side, and discharge side with drain port.
 - 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.
- One (1) Class 1, 3/4" brass 90 degree ball type drain valve(s) shall be provided for the above plumbing item. There shall be a 1/4 turn control to manually open the drain valve(s) when the line is under pressure located on pump panel and drain the lowest point in the plumbing.
- One (1) Class 1, 2-1/2" liquid filled gauge(s)
 - Gauge(s) shall have a white background with black text.
 - Gauge(s) shall have a range from 0 to 400 PSI.
 - The gauge shall have a die cast zinc, chrome plated bezel with color-coded labels insert and a color-coded gauge trim ring. Labels shall be UV and scratch resistant and meet SAE standards where applicable.

TANK FILL VALVE

There shall be one (1) 2" (52 mm) tank fill valve plumbed with 2" plumbing from the pump to the tank. Installation shall be completed with 2" rubber hose and stainless steel hose couplings. The tank fill valve shall be controlled from the operator's control panel.

- One (1) Akron Brass 8900 series Gen II, manual type 2" (52 mm) valve(s) with Fusion CF composite ball. Each valve shall be equipped with a brass type valve adapter on inlet side, and discharge side with drain port.
 - 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.

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PUMP PANEL

The side mount pump control panel shall be hinged, or bolted in place allowing it to be easily removed to gain access to plumbing components.

The pump controls shall be mounted on an aluminum control panel with a black powdercoat painted finish.

PUMP PANEL LOCATION

The pump control panel shall be side mounted.

The pump panel shall include the following items;

PUMP PANEL ACCESS

The pump panel shall be open to the side of the truck. The Pump Operator shall NOT be required to open a compartment door to access the pump control panel.

ENGINE GAUGES

The cab/chassis engine gauges shall be provided with the specified pump pressure governor system.

PRESSURE GOVERNOR and ENGINE MONITORING DISPLAY

A Fire Research PumpBoss series PBA400-A00 pressure governor and monitoring display kit shall be installed. The kit shall include a control module, intake pressure sensor, discharge pressure sensor, and cables. The control module case shall be waterproof and have dimensions not to exceed 6 3/4" high by 4 5/8". The control knob shall be 2" in diameter with no mechanical stops, have a serrated grip, and a red idle push button in the center. It shall not extend more than 1 3/4" from the front of the control module. Inputs for monitored engine information shall be from a J1939 data bus or independent sensors. Outputs for engine control shall be on the J1939 databus or engine specific wiring. Inputs from the pump discharge and intake pressure sensors shall be electrical.

The following continuous displays shall be provided:

- Engine RPM; shown with four daylight bright LED digits more than 1/2" high
- Check engine and stop engine warning LEDs
- Engine oil pressure; shown on a dual color (green/red) LED bar graph display
- Engine coolant temperature; shown on a dual color (green/red) LED bar graph display
- Transmission Temperature: shown on a dual color (green/red) LED bar graph display
- Battery voltage; shown on a dual color (green/red) LED bar graph display
- Pressure and RPM operating mode LEDs
- Pressure / RPM setting; shown on a dot matrix message display
- Throttle ready LED.

A dot-matrix message display shall show diagnostic and warning messages as they occur. It shall show monitored apparatus information, stored data, and program options when selected by the operator. All LED intensity shall be automatically adjusted for day and night time operation.

The program shall store the accumulated operating hours for the pump and engine to be displayed with the push of a button. It shall monitor inputs and support audible and visual warning alarms for the following conditions:

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• High Battery Voltage	• Low Engine Oil Pressure
• Low Battery Voltage (Engine Off)	• High Engine Coolant Temperature
• Low Battery Voltage (Engine Running)	• Out of Water (visual alarm only)
• High Transmission Temperature	• No Engine Response (visual alarm only).

The program features shall be accessed via push buttons located on the front of the control module. There shall be a USB port located at the rear of the control module to upload future firmware enhancements.

The governor shall operate in two control modes, pressure and RPM. No discharge pressure or engine RPM variation shall occur when switching between modes. A throttle ready LED shall light when the interlock signal is recognized. The governor shall start in pressure mode and set the engine RPM to idle. In pressure mode the governor shall automatically regulate the discharge pressure at the level set by the operator. In RPM mode the governor shall maintain the engine RPM at the level set by the operator except in the event of a discharge pressure increase. The governor shall limit a discharge pressure increase in RPM mode to a maximum of 30 psi. Other safety features shall include recognition of no water conditions with an automatic programmed response and a push button to return the engine to idle.

The pressure governor and monitoring pressure display shall be programmed at installation for a specific engine.

PRESSURE GOVERNOR and MONITORING DISPLAY BUZZER

Fire Research PumpBoss –Z1 option for an audible alarm buzzer shall be installed. The buzzer shall sound when a signal from the PumpBoss activates it.

MASTER INTAKE/PRESSURE GAUGES

There shall be one (1) Innovative Controls/NoShok 4" liquid filled gauge to display the Master Intake Pressure, and labeled "PUMP INTAKE".

There shall be one (1) Innovative Controls/NoShok 4" liquid filled gauge to display the Master Discharge Pressure. Gauge shall be labeled "PUMP DISCHARGE".

Both gauges shall have a die cast zinc, chrome plated bezel and color-coded. The left side (Pump Intake) bezel shall be color coded red, and the right side (Pump Discharge) bezel shall be colored black.

A test gauge port manifold shall be integrated into lower center bezel.

- Gauge(s) shall have a white background with black text.
- Gauge(s) shall have a range from -30" to 600 PSI.

PUMP SAFETY AND TEST LABELS

Safety, information, data, and instruction labels for apparatus shall be provided and installed at the operator's instrument panel.

The labels shall include rated capacities, pressure ratings, and engine speeds as determined by the certification tests. The no-load governed speed of the engine, as stated by the engine manufacturer, shall also be included.

The labels shall be provided with all information and be attached to the apparatus prior to delivery.

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PUMP PANEL LIGHTING

All gauges and controls on the pump operator's panel shall be adequately illuminated by a full panel width shielded light assembly with full width OnScene Solutions LED light (each panel, if equipped). The light shall be activated by a weather-proof type switch on the pump operator's panel as well as automatically when pump is engaged. This switch shall also activate any area step lighting.

PUMP PANEL AIR HORN SWITCH

The pump operator's panel shall have an Innovative Controls switch panel to activate the cab/chassis air horn(s). Switch shall be constantly illuminated and labeled.

LOW PRESSURE AIR OUTLET

There shall be one (1) air outlet connection to supply low pressure air for general maintenance. The outlet shall terminate in a 1/4" NPT threaded port. Air outlet shall be located on lower pump operator's panel. The connector shall be supplied by the City of Santa Fe NM, Santa Fe Fire Department.

BACK PACK FILLER VALVE

A Class 1 brass, 3/4", quarter turn ball valve with chrome T-handle shall be supplied and labeled "Back Pack Filler". The valve shall be installed on the streetside lower forward side of the pump panel with the discharge hose terminating at the outside of the apparatus body. The valve plumbing shall be 3/4" I.D. properly routed and clamped from the tank sump to the filler valve.

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POLY WATER TANK

The water tank capacity shall be approximately 500 US gallon or 416 Imperial 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.

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.

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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.

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.

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WATER TANK LEVEL GAUGE

There shall be one (1) Fire Research TankVision Pro model WLA300-A00 tank indicator level gauge provided and installed. The kit shall include an electronic indicator module, a pressure sensor, and a 10' sensor cable. The indicator shall show the volume of water in the tank on nine (9) easy to see super bright RGB LEDs. A wide view lens over the LEDs shall provide for a viewing angle of 180 degrees. The indicator case shall be waterproof, manufactured of Polycarbonate/Nylon material, and have a distinctive blue label.

The program features shall be accessed from the front of the indicator module. The program shall support self-diagnostics capabilities, self-calibration, six (6) programmable colored light patterns to display tank volume, adjustable brightness control levels and a datalink to connect remote indicators. Low water warnings shall include flashing LEDs at 1/4 tank, down chasing LEDs when the tank is almost empty, and an output for an audio alarm.

The indicator shall receive an input signal from an electronic pressure sensor. The sensor shall be mounted from the outside of the water tank near the bottom. No probe shall be placed on the interior of the tank. Wiring shall be weather resistant and have automotive type plug-in connectors.

CAB MOUNTED WATER TANK INDICATOR

There shall be one (1) Class 1 Mini 4-light, remote tank level gauge for indicating water level installed in cab. The tank level gauge shall indicate the liquid level or volume on an easy to read red LED display and show increments of 1/4 of a tank.

The Mini remote gauge will receive data from the same source as the Master Display. No additional transducers shall be required.

TANK LEVEL INDICATOR, REMOTE

Three (3) Fire Research TankVision Maxvision model WLA280-A00 tank large remote indicator shall be installed. The indicator shall show the volume of water in the tank on Ninety six (96) easy to see super bright Tri-color LEDs. The indicator case shall be waterproof, manufactured of Polycarbonate material with an integrated lens.

Remote tank level indicators located one each side adjacent to crosslays and one located body rear street side.

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.

FILL TOWER PROTECTION

The fill tower(s) shall be boxed in with an aluminum panel for protection from damage.

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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. This foam tank capacity shall be deducted from water tank size specified.

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

A minimum 1 in. (25 mm) inside diameter full flow drain valve and piping shall be provided at the lowest point of any foam concentrate tank. The drain shall be piped to drain directly to the surface beneath the apparatus without contacting other body or chassis components.

A label shall be affixed to the foam tank fill indicating: "WARNING" Class A foam tank fill, do not mix brands or types of foam.

FOAM TANK LEVEL GAUGE, CLASS A

There shall be one (1) Fire Research TankVision model WLA260-A00 tank gauge(s) provided. The kit shall include an electronic indicator module, a pressure sensor, a 10' sensor cable and a tank vent. The indicator shall show the volume of Class A foam concentrate in the tank on nine (9) easy to see super bright LEDs. A wide view lens over the LEDs shall provide for a viewing angle of 180 degrees. The indicator case shall be waterproof, manufactured of aluminum, and have a distinctive green label.

The program features shall be accessed from the front of the indicator module. The program shall support self-diagnostics capabilities, self-calibration, and a datalink to connect remote indicators. Low foam warnings shall include flashing LEDs at 1/4 tank, down chasing LEDs when the tank is almost empty, and an output for an audio alarm.

The indicator shall receive an input signal from an electronic pressure sensor. The sensor shall be mounted from the outside of the foam tank near the bottom. No probe shall place on the interior of the tank. The foam tank vent shall be installed on the foam fill tower. Wiring shall be weather resistant and have automotive type plug-in connectors.

HOSE BED STORAGE AREA

Hose bed storage area shall be located over water tank and body, and shall exit at the rear of the apparatus. The interior of storage area shall be free from all projections such as nuts, sharp angles, or brackets that may damage equipment.

ALUMINUM HOSE BED DECKING

The hose bed deck shall be constructed from 3" x 3/4" hollow aluminum extrusions welded into a one-piece grid to allow ventilation and water drainage. The extrusions shall have a radiused ribbed top surface. The deck will be completely removable for easy access to the booster tank. The booster tank fill tower shall be protected as necessary to prevent damage from equipment located in the storage area.

WALKWAY/STEP LIGHTS

There shall be four (4) OnScene Solutions Rough-Service 9" LED lights provided to illuminate the walkway or step area. The lights shall be activated when the parking brake is set.

Each light shall be mounted in an extruded aluminum housing to protect against damage from personnel or equipment.

Lighting shall provide illumination at a minimum level of 2 fc (20 lx) on all work surfaces, steps, and walkways. Lighting shall be switchable from the pump operators panel.

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FILL TOWER PROTECTION

The fill tower(s) shall be boxed in with an aluminum panel for protection from damage.

HOSE BED DIVIDER(S)

Two (2) adjustable aluminum hose bed partition(s) shall be provided in the hose storage area. The partition(s) shall be 3/16" smooth aluminum with split aluminum tubing welded to the top and rear edges.

ALUMINUM HOSE BED COVER

A two-section hose bed cover shall be provided. Each door shall be fabricated from 1/8" NFPA aluminum treadplate with formed hat sections for bracing. Doors shall be hinged along each side of the hose body using stainless steel piano hinge. The top surface of each section shall slant down with the highest point in the center of the hose bed area and shall be supported from underneath by at least one (1) adjustable hose bed divider.

Each section shall be constructed to support the weight of a person (300 lbs).

Each section shall utilize pneumatic cylinders to assist with opening and closing. There shall be one (1) 24" vertical handrail on each door to assist in raising and lowering hose bed door. Handrails shall be NFPA compliant 1-1/4" knurled 304 stainless steel with welded end stanchions.

Each door shall have a horizontally mounted On Scene LED light on the underside of the door that will be automatically activated when the door is opened and wired to the compartment door ajar warning light provided in cab.

A vinyl hose bed flap shall be provided attached to each door and extend downward to bottom of hose bed to protect hose and equipment from weather and dust. The center where both doors come together shall have a Velcro seam to join two-pieces of vinyl together. Bottom of each flap shall be weighted for quick deployment of hose. Vinyl color shall be color coordinated with upper vehicle colors unless specified otherwise.

HOSE BED FULL WIDTH EXTENSION

A full width, bolt-on type hose bed extension step shall be provided. Step shall be fabricated from 3/16" NFPA compliant treadplate aluminum with side gusset supports to body. The specified center rear marker lights shall be located on rear facing edge. The underside of step shall have a 36" OnScene LED light to light the bumper or compartment area below.

HOSEBED TOP LOADING EQUIPMENT COMPARTMENT

In the center of the hosebed area a top loading equipment compartment shall run the length of the hosebed. The compartment shall be constructed of 1/8" smooth aluminum with a total volume of 13.8 cubic feet. Inside dimensions shall be 80" long x 18" deep and 18" wide. The top of the compartment shall be open and covered by the hose bed doors.

A rear access door shall be provided and constructed of aluminum with smooth finished inside panels and painted to match job color on the exterior.

The compartment floor shall be formed with a recess ribbed design for strength and to create a depressed area that will allow any accumulated debris or moisture to collect without the equipment resting in the contaminant. The depressed area is to be covered with open grating material. There shall be large diameter drain holes with removable plugs placed in the depresses area of the compartment floor for cleaning out the compartment.

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The compartment door shall be wired into the door open warning circuit. Inside the compartment there shall be lights activated when the door is open for low ambient light operating conditions. The compartment shall be bolted in place and removable for water tank service.

An OnScene LED light shall be provided that runs from front to back of the compartment.

SHOP NOTES

Clarified to be 80" long x 18" deep and 28" wide.

EQUIPMENT PAYLOAD WEIGHT ALLOWANCE

In compliance with NFPA 1906 standards, the vehicle shall be designed for an equipment loading allowance of 500 lbs. of City of Santa Fe NM, Santa Fe Fire Department provided equipment based on the wildland body having at least 50 cu. ft. of storage space under 26,000 GVWR, and an equipment loading allowance of 750 lbs with 75 cu. ft. of storage space over 26,000 GVWR.

EQUIPMENT

The following equipment shall be furnished with the completed wildland 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.
- There shall be two (2) Worden HW C7Y-WH yellow handled aluminum wheel chocks provided for 44" diameter tires that together will hold the vehicle when loaded to its GVWR or GCWR, on a hard surface with a 20% grade, with the transmission in neutral, and the parking brake released. The wheel chocks shall have a bright yellow powder coat finish for high visibility, safety and corrosion resistance.
 - The wheel chock(s) shall be mounted on the apparatus, location as per the City of Santa Fe NM, Santa Fe Fire Department.
- One (1) Duo-Safety 912 series 20' 3-section extension ladder(s) shall be provided with the completed unit.
 - The ladder(s) shall be located in specified ladder compartment.
- One (1) Duo-Safety 8' fiberglass pike pole(s) shall be provided with the completed unit.
 - The above specified pike pole will not have a D handle attached
 - The pike pole(s) shall be mounted on vehicle, per itemized compartment list.
- One (1) 5 lb. ABC dry chemical aluminum fire extinguisher(s) shall be provided with the completed unit.
 - The above specified fire extinguisher(s) shall be installed on the completed unit, location to be determined by the City of Santa Fe NM, Santa Fe Fire Department.
- One (1) Zico QM-CSM-L chain saw mount(s) shall be provided with the completed apparatus.
- One (1) Kocheck 4.0" x 10' Flexlite PVC flexible suction hose(s) shall be provided with completed unit. The hose shall have light weight Storz, 2-lug couplings provided.
- One (1) 4" barrel strainer(s) with foot valve shall be provided with completed unit. Barrell strainer hard suction end shall match provided hard suction(s).

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- Two (2) Akron 260 gated wye(s), 2 1/2" NH female to 1 1/2" NH male with chrome plated cap(s) shall be provided with completed unit.
- Two (2) wrench holder(s) with two (2) combination spanner wrenches, and one (1) hydrant wrench shall be provided with completed unit.
 - The above specified wrench holder(s) shall be mounted on the completed unit, locations as per the City of Santa Fe NM, Santa Fe Fire Department.

REMAINING NFPA MINOR EQUIPMENT BY PURCHASER

All other minor equipment not specified above, but required by NFPA 1906 for wildland vehicles, section 5.7 shall be supplied and mounted by City of Santa Fe NM, Santa Fe Fire Department before the unit is placed in emergency service.