

**Central Nyack Fire Department**

**Nyack, NY 10960**

**FOR**

**ONE (1) PUMPER**



***"ROCK SOLID QUALITY"***

## Table of Contents

<b>ACCEPTANCE OF VEHICLE</b> .....	7
<b>INTERNET IN-PROCESS SITE</b> .....	8
The fire apparatus shall meet the requirements of this standard in ambient temperature conditions between 32°F (0°C) and 110°F (43°C). ....	8
<b>HIGHWAY PERFORMANCE</b> .....	8
<b>SERVICEABILITY</b> .....	8
<b>FIRE APPARATUS DOCUMENTATION</b> .....	9
<b>OPERATIONS AND SERVICE DOCUMENTATION</b> .....	10
<b>NFPA REQUIRED DOCUMENTATION FORMAT - USB FLASH DRIVE</b> .....	11
<b>STATEMENT OF EXCEPTIONS</b> .....	11
<b>CARRYING CAPACITY</b> .....	11
<b>TESTING</b> .....	12
<b>ROAD TEST</b> .....	12
<b>LOW VOLTAGE - ELECTRICAL SYSTEM PERFORMANCE TEST</b> .....	13
<b>TEST SEQUENCE</b> .....	13
1. <b>RESERVE CAPACITY TEST</b> .....	13
2. <b>ALTERNATOR PERFORMANCE TEST</b> .....	13
<b>TEST AT IDLE</b> .....	13
<b>TEST AT FULL LOAD</b> .....	14
3. <b>LOW VOLTAGE ALARM TEST</b> .....	14
<b>LOW VOLTAGE - ELECTRICAL SYSTEM PERFORMANCE TEST</b> .....	14
<b>DOCUMENTATION</b> .....	14
<b>UL 120/240 VAC CERTIFICATION</b> .....	14
<b>DIELECTRIC VOLTAGE WITHSTAND TEST</b> .....	15
<b>BID BOND AND/OR SECURITY</b> .....	16
<b>PERFORMANCE BOND</b> .....	16
<b>WARRANTY</b> .....	17
<b>GENERAL LIMITED WARRANTY - TWO (2) YEARS</b> .....	17
<b>LOW VOLTAGE ELECTRICAL WARRANTY - FIVE (5) YEARS</b> .....	17
<b>STRUCTURAL WARRANTY - TEN (10) YEARS</b> .....	17
<b>UNDERCOAT WARRANTY</b> .....	17

<b>PAINT LIMITED WARRANTY - TEN (10) YEARS</b> .....	17
<b>GRAPHICS LIMITED WARRANTY</b> .....	17
<b>CONSTRUCTION PERIOD</b> .....	17
<b>OVERALL HEIGHT REQUIREMENT</b> .....	18
<b>OVERALL LENGTH</b> .....	18
<b>OVERALL WIDTH</b> .....	18
<b>INSPECTION TRIPS</b> .....	18
<b>DELIVERY AND DEMONSTRATION</b> .....	18
<b>CHASSIS MODIFICATIONS</b> .....	68
<b>LUBRICATION AND TIRE DATA PLATE</b> .....	68
<b>VEHICLE DATA PLATE</b> .....	69
<b>OVERALL HEIGHT, LENGTH DATA PLATE (US)</b> .....	69
<b>FRONT BUMPER</b> .....	70
<b>BUMPER GRAVELSHIELD</b> .....	70
<b>AIR HORN(S)</b> .....	70
<b>FRONT TOW EYES</b> .....	71
<b>EXHAUST</b> .....	71
<b>CAB CRASH TEST CERTIFICATION</b> .....	71
<b>MUDFLAPS</b> .....	71
<b>AIR BRAKE SYSTEM QUICK BUILD-UP</b> .....	71
<b>ROAD EMERGENCY SAFETY KIT</b> .....	71
<b>FUEL FILL</b> .....	72
<b>BODY DESIGN</b> .....	72
<b>EXTERIOR ALUMINUM BODY</b> .....	72
<b>ROOF CONSTRUCTION</b> .....	73
<b>BODY SUBFRAME</b> .....	73
<b>BODY MOUNTING</b> .....	74
<b>3" REAR BUMPER</b> .....	74
<b>GROUND LIGHTS</b> .....	74
<b>WHEEL WELL EXTERIOR PANEL</b> .....	75
<b>DIEFORMED BEADED EDGE BODY FENDERS</b> .....	75
<b>WHEEL WELL LINERS</b> .....	75
<b>SCBA CYLINDER COMPARTMENTS</b> .....	75

<b>BODY PAINT SPECIFICATIONS</b> .....	75
<b>BODY PAINT PREPARATION</b> .....	75
<b>PAINT PROCESS</b> .....	75
<b>BODY UNDERCOATING</b> .....	77
<b>UNDERCOAT WARRANTY</b> .....	77
<b>PAINT WARRANTY</b> .....	77
<b>COMPARTMENT INTERIOR FINISH</b> .....	77
<b>REFLECTIVE STRIPE REQUIREMENTS</b> .....	77
<b>REFLECTIVE STRIPE - CAB SIDE</b> .....	78
<b>REFLECTIVE STRIPE - CAB FRONT</b> .....	78
<b>REFLECTIVE STRIPE - BODY SIDES</b> .....	78
<b>LETTERING</b> .....	78
<b>SIDE CAB DOOR LETTERING</b> .....	79
<b>UPPER BODY SIDE LETTERING</b> .....	79
<b>REAR BODY LETTERING</b> .....	79
<b>FRONT OF CAB LETTERING</b> .....	79
<b>EXTERIOR COMPARTMENT DOORS</b> .....	79
<b>ROLL-UP DOOR CONSTRUCTION - ROBINSON (ROM)</b> .....	79
<b>BODY WIDTH DIMENSIONS</b> .....	80
<b>STREETSIDE COMPARTMENT - FRONT (S1)</b> .....	80
<b>COMPARTMENT LAYOUT</b> .....	80
<b>STREETSIDE COMPARTMENT - ABOVE REAR WHEELS (S2)</b> .....	81
<b>COMPARTMENT LAYOUT</b> .....	81
<b>STREETSIDE COMPARTMENT - REAR (S3)</b> .....	81
<b>COMPARTMENT LAYOUT</b> .....	82
<b>CURBSIDE COMPARTMENT - FRONT (C1)</b> .....	82
<b>COMPARTMENT LAYOUT</b> .....	83
<b>CURBSIDE COMPARTMENT - ABOVE REAR WHEEL (C2)</b> .....	83
<b>COMPARTMENT LAYOUT</b> .....	83
<b>CURBSIDE COMPARTMENT - REAR (C3)</b> .....	84
<b>COMPARTMENT LAYOUT</b> .....	84
<b>REAR COMPARTMENT - CENTER (RC1)</b> .....	84
<b>COMPARTMENT LAYOUT</b> .....	85

<b>ROPE ANCHOR OR PORTABLE WINCH RECEIVERS</b> .....	85
<b>LADDER LIFT INTERLOCK</b> .....	86
<b>REAR BODY HANDRAILS</b> .....	87
<b>PUMP MODULE HANDRAILS</b> .....	87
<b>FOLDING STEP(S)</b> .....	87
<b>LOW VOLTAGE ELECTRICAL SYSTEM- 12 VDC</b> .....	88
<b>12 VOLT MULTIPLEX CONTROL CENTER</b> .....	90
<b>MULTIPLEX SYSTEM INTERFACE DISPLAY</b> .....	91
<b>OVERHEAD ROCKER SWITCH PANEL</b> .....	91
<b>BATTERY SWITCH</b> .....	92
<b>BATTERY SOLENOID</b> .....	92
<b>BATTERY CONDITIONER</b> .....	92
<b>ENGINE COMPARTMENT LIGHT</b> .....	92
<b>CAB HAZARD WARNING LIGHT</b> .....	93
<b>BACK-UP ALARM</b> .....	93
<b>REAR VIEW CAMERA</b> .....	93
<b>TAIL LIGHTS</b> .....	93
<b>MIDSHIP MARKER/TURN SIGNAL</b> .....	93
<b>MARKER LIGHTS</b> .....	93
<b>LICENSE PLATE LIGHT</b> .....	94
<b>ELECTRONIC SIREN</b> .....	94
<b>SIREN SPEAKER</b> .....	94
<b>WARNING LIGHT PACKAGE</b> .....	95
<b>UPPER LEVEL OPTICAL WARNING DEVICES</b> .....	95
<b>LOWER LEVEL OPTICAL WARNING DEVICES</b> .....	96
<b>HYDRAULIC GENERATOR SYSTEM</b> .....	97
<b>GENERATOR MOUNTING</b> .....	97
<b>WARRANTY PERIOD</b> .....	97
<b>HYDRAULIC COMPONENTS</b> .....	98
<b>GENERATOR MOUNTING</b> .....	98
<b>MANUALS AND SCHEMATICS</b> .....	98
<b>POWER-TAKE-OFF GENERATOR DRIVE</b> .....	98
<b>LOADCENTER</b> .....	98

<b>GENERATOR MONITORING PANEL .....</b>	<b>99</b>
<b>SHORE POWER INLET - BATTERY CHARGER.....</b>	<b>99</b>
<b>LINE VOLTAGE ELECTRICAL SYSTEM .....</b>	<b>99</b>
<b>GENERAL REQUIREMENTS.....</b>	<b>99</b>
<b>120/240 VAC SCENE LIGHTING.....</b>	<b>105</b>
<b>SIDE UPPER RECESSED SCENE LIGHTS.....</b>	<b>105</b>
<b>REAR UPPER RECESSED SCENE LIGHTS.....</b>	<b>105</b>
<b>REAR OF CAB SCENE LIGHTS .....</b>	<b>105</b>
<b>SIDE MOUNT PUMP MODULE .....</b>	<b>106</b>
<b>WATEROUS CU FIRE PUMP.....</b>	<b>107</b>
<b>PUMP TRANSMISSION .....</b>	<b>108</b>
<b>WATEROUS FIVE YEAR PUMP WARRANTY .....</b>	<b>110</b>
<b>MANUFACTURER FIRE PUMP TEST .....</b>	<b>110</b>
<b>FIRE PUMP TEST LABEL.....</b>	<b>110</b>
<b>ALTITUDE REQUIREMENT .....</b>	<b>111</b>
<b>PUMP DRAIN CONTROL .....</b>	<b>111</b>
<b>ELECTRIC PRIMING PUMP CONTROL AT PUMP PANEL .....</b>	<b>111</b>
<b>PRIMER CONTROL.....</b>	<b>111</b>
<b>DISCHARGE RELIEF VALVE.....</b>	<b>111</b>
<b>6" SUCTION INLET - STREETSIDE .....</b>	<b>111</b>
<b>LONG SUCTION TUBE.....</b>	<b>111</b>
<b>6" SUCTION INLET - CURBSIDE .....</b>	<b>112</b>
<b>LONG SUCTION TUBE.....</b>	<b>112</b>
<b>5" SUCTION INLET - FRONT BUMPER.....</b>	<b>112</b>
<b>5" SUCTION INLET - FRONT BUMPER.....</b>	<b>112</b>
<b>HEAT EXCHANGER.....</b>	<b>112</b>
<b>INTAKE RELIEF VALVE.....</b>	<b>112</b>
<b>PLUMBING SPECIFICATIONS.....</b>	<b>112</b>
<b>STAINLESS STEEL INTAKE MANIFOLD.....</b>	<b>113</b>
<b>STAINLESS STEEL DISCHARGE MANIFOLD.....</b>	<b>113</b>
<b>STAINLESS STEEL PLUMBING WARRANTY .....</b>	<b>113</b>
<b>STREETSIDE INTAKE - 2-1/2" .....</b>	<b>114</b>
<b>TANK TO PUMP CHECK VALVE .....</b>	<b>115</b>

<b>TANK TO PUMP VALVE.....</b>	<b>115</b>
<b>DISCHARGES.....</b>	<b>115</b>
<b>FRONT DISCHARGE.....</b>	<b>116</b>
<b>STREETSIDE DISCHARGE .....</b>	<b>117</b>
<b>CURBSIDE DISCHARGE.....</b>	<b>117</b>
<b>REAR STREETSIDE DISCHARGE.....</b>	<b>118</b>
<b>REAR CURBSIDE DISCHARGE.....</b>	<b>119</b>
<b>MISCELLANEOUS DISCHARGE.....</b>	<b>119</b>
<b>2" CROSS LAY(S).....</b>	<b>119</b>
<b>DECK GUN.....</b>	<b>120</b>
<b>PUMP PANEL.....</b>	<b>121</b>
<b>PUMP PANEL LOCATION .....</b>	<b>121</b>
<b>PUMP PANEL ACCESS.....</b>	<b>122</b>
<b>PRESSURE GOVERNOR and ENGINE MONITORING DISPLAY .....</b>	<b>122</b>
<b>MASTER DISCHARGE GAUGE.....</b>	<b>123</b>
<b>PUMP SAFETY AND TEST LABELS.....</b>	<b>123</b>
<b>PUMP PANEL LIGHTING .....</b>	<b>123</b>
<b>PUMP PANEL AIR HORN SWITCH.....</b>	<b>123</b>
<b>WATER TANK LEVEL GAUGE.....</b>	<b>125</b>
<b>UPF POLY WATER TANK WARRANTY .....</b>	<b>126</b>
<b>HOSE BED STORAGE AREA .....</b>	<b>126</b>
<b>ALUMINUM HOSE BED DECKING .....</b>	<b>126</b>
<b>EQUIPMENT PAYLOAD WEIGHT ALLOWANCE.....</b>	<b>127</b>
<b>EQUIPMENT.....</b>	<b>127</b>
<b>REMAINING NFPA MINOR EQUIPMENT BY PURCHASER .....</b>	<b>127</b>

### **ACCEPTANCE OF VEHICLE**

The Central Nyack Fire Department shall notify the contractor in writing within fourteen (14) days after delivery of the vehicle, whether such unit shall not be acceptable. Such notification will clearly itemize specific contract deviations in the event of non-acceptance.

Non-compliance with the terms and specifications of the contract will be the only basis for non-acceptance. The vehicle shall be deemed to have been accepted once Central Nyack Fire Department has put into service. After acceptance, the Central Nyack Fire Department remedy or recourse against the contractor shall be under the warranty.

### **INTERNET IN-PROCESS SITE**

The manufacturer shall post and maintain a website where the Central Nyack 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 6 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).

### **HIGHWAY PERFORMANCE**

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) Accelerating from 0 to 35 mph (55 km/hr) within 25 seconds on a 0 percent grade
- 2) Attaining a speed of 50 mph (80 km/hr) on a 0 percent grade
- 3) Maintaining a speed of at least 20 mph (32 km/hr) on any grade up to and including 6 percent

The maximum top speed of fire apparatus with a GVWR over 26,000 lb (11,800 kg) shall not exceed either 68 mph (109 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 (95 km/hr) or the manufacturer's maximum fire service speed rating for the tires installed on the apparatus, whichever is lower.

### **SERVICEABILITY**

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

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

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



## **FIRE APPARATUS DOCUMENTATION**

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

- 1) The manufacturers record of apparatus construction details, including the following documents:
  - b) Owner's name and address
  - c) Apparatus manufacturer, model, and serial number
  - d) Chassis make, model, and serial number
  - e) GAWR of front and rear axles and GVWR
  - f) Front tire size and total rated capacity in pounds (kilograms)
  - g) Rear tire size and total rated capacity in pounds (kilograms)
  - h) Chassis weight distribution in pounds (kilograms) with water and manufacturer-mounted equipment (front and rear)
  - i) 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
  - j) Type of fuel and fuel tank capacity
  - k) Electrical system voltage and alternator output in amps
  - l) Battery make, model, and capacity in cold cranking amps (CCA)
  - m) Chassis transmission make, model, and serial number; and if so equipped, chassis transmission PTO(s) make, model, and gear ratio
  - n) Ratios of all driving axles
  - o) Maximum governed road speed
  - p) Pump make, model, rated capacity in gallons per minute (liters per minute where applicable), maximum discharge pressure capability rating, and serial number
  - q) Pump transmission make, model, serial number, and gear ratio
  - r) Auxiliary pump make, model, rated capacity in gallons per minute (liters per minute where applicable), and serial number
  - s) Water tank certified capacity in gallons or liters
  - t) Foam tank (if provided) certified capacity in gallons (liters)
  - u) Aerial device type, rated vertical height in feet (meters), rated horizontal reach in feet (meters), and rated capacity in pounds (kilograms)
  - v) Paint manufacturer and paint number(s)
  - w) Company name and signature of responsible company representative
  - x) Weight documents from a certified scale showing actual loading on the front axle, rear axle(s), and overall fire apparatus (with the water tank full but without personnel, equipment, and hose)
- 2) Certification of compliance of the optical warning system (*see 13.8.16*)
- 3) Siren manufacturer's certification of the siren (*see 13.9.1.1*)
- 4) Written load analysis and results of the electrical system performance tests (*see 13.14.1 and Section 13.15*)
- 5) Certification of slip resistance of all stepping, standing, and walking surfaces (*see 15.7.4.5*)
- 6) If the apparatus has a fire pump, the pump manufacturer's certification of suction capability (*see 16.2.4.1*)
- 7) If the apparatus is equipped with a fire pump and special conditions are specified by the purchaser, the pump manufacturer's certification of suction capacity under the special conditions (*see 16.2.4.2*)
- 8) If the apparatus has a fire pump, a copy of the apparatus manufacturer's approval for stationary pumping applications (*see 16.3.1*)
- 9) If the apparatus has a fire pump, the engine manufacturer's certified brake horsepower curve for the engine furnished, showing the maximum governed speed (*see 16.3.2.2*)
- 10) If the apparatus has a fire pump, the pump manufacturer's certification of the hydrostatic test (*see 16.5.2.2*)
- 11) If the apparatus has a fire pump with a maximum discharge pressure capability rating that exceeds the hydrostatic test pressure of 16.5.2.1, the pump manufacturer's certification of the hydrodynamic test

- 12) If the apparatus has a fire pump, the certification of inspection and test for the fire pump (see 16.13.1.1.5 or 16.13.1.2.4 as applicable)
- 13) If the apparatus is equipped with an auxiliary pump, the apparatus manufacturer's certification of the hydrostatic test (see Section 17.13)
- 14) When the apparatus is equipped with a water tank, the certification of water tank capacity (see Section 18.6)
- 15) If the apparatus has an aerial device, the certification of inspection and test for the aerial device (see Section 19.24)
- 16) If the apparatus has an aerial device, all the technical information required for inspections to comply with NFPA 1911
- 17) If the apparatus has a foam proportioning system, the foam proportioning system manufacturer's certification of accuracy (see 20.10.4.2) and the final installer's certification the foam proportioning system meets this standard (see 20.11.2)
- 18) If the system has a CAFS, the documentation of the manufacturer's pre delivery tests (see Section 21.9)
- 19) If the apparatus has a line voltage power source, the certification of the test for the power source (see 22.15.7.2)
- 20) If the apparatus is equipped with an air system, air tank certificates (see 24.5.1.2), the SCBA fill station certification (see 24.9.6), and the results of the testing of the air system installation (see 24.14.5 and 24.15.4)
- 21) 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)
- 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.

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 Body 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:
  - h) The values shown in Table 12.1.2
  - i) A purchaser-provided list of equipment to be carried with weights
  - j) A purchaser-specified 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.

		<b>Equipment Allowance</b>		
<b>Apparatus Type</b>	<b>Storage Areas</b>	<b>Apparatus Size</b>	<b>lb.</b>	<b>kg.</b>
Pumper Fire Apparatus	Equip. minimum of 40 cu ft (1.1 cu mt) of enclosed compartmentation.	Less than 250 cu ft ( 7 cu mt) compartment space	2,000	910
	Hose minimum of 30 cu ft (0.8 cu mt) for 2 1/2" (65 mm) or larger fire hose.	250 cu ft (7 cu mt) or more of compartment space	2,500	1,135
	(2) areas for pre-connects each minimum of 3.5 cu.ft. (0.1 cu.mt.) for 1 1/2" (38 mm) or larger fire hose.			
Compartment space for pumpers is calculated based on the inside dimensions of the enclosed compartment.				

**TESTING**

**ROAD TEST**

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

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

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

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

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

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

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

### **LOW VOLTAGE - ELECTRICAL SYSTEM PERFORMANCE TEST**

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

### **TEST SEQUENCE**

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

#### **1. RESERVE CAPACITY TEST**

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

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

#### **2. ALTERNATOR PERFORMANCE TEST**

##### **TEST AT IDLE**

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

be considered a test failure.

### **TEST AT FULL LOAD**

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

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

### **3. LOW VOLTAGE ALARM TEST**

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

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

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

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

### **LOW VOLTAGE - ELECTRICAL SYSTEM PERFORMANCE TEST**

#### **DOCUMENTATION**

The manufacturer shall deliver the following with the fire apparatus:

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

#### **UL 120/240 VAC CERTIFICATION**

The 120/240 volt electrical system shall be third-party, independent, audit-certified through Underwriters Laboratory (UL) to the current edition of NFPA 1901 to perform as listed below;

The prime mover shall be started from a cold start condition, and the unloaded voltage and frequency shall be recorded.

The line voltage electrical system shall be loaded to at least 100% of the continuous rated wattage stated on the power source specification label. Testing with a resistive load bank shall be permitted.

The power source shall be operated in the manner specified by the apparatus manufacturer as documented on instruction plates or in operation manuals. The power source shall be operated at a minimum of 100% of the continuous rated wattage as stated on the power source specification label for a minimum of two (2) hours.

The load shall be adjusted to maintain the output wattage at or above the continuous rated wattage during the entire 2-hour test.

The following conditions shall be recorded at least every 1/2 hour during the test:

- d) The power source output voltage, frequency and amperes
  - 1) The prime mover's oil pressure, water temperature and transmission temperature, if applicable
  - 2) The power source hydraulic fluid temperature, if applicable
  - 3) The ambient temperature and power source air inlet temperature

The following conditions shall be recorded once during the test for power sources driven by dedicated auxiliary internal combustion engines:

- 4) Altitude
  - 1) Barometric pressure
  - 2) Relative humidity

If the generator is driven by the chassis engine and the generator allows for operation at variable speeds, the chassis engine speed shall be reduced to the lowest rpm allowed for generator operation and the voltage and frequency shall be recorded.

The load shall be removed and the unloaded voltage and frequency shall be recorded.

Voltage shall be maintained within  $\pm 10\%$  of the voltage stated on the power source specification label during the entire test. Frequency shall be maintained within  $\pm 3$  Hz of the frequency stated on the power source specification label during the entire test.

The total continuous electrical loads, excluding those loads associated with the equipment defined in NFPA 22.15.7.3.11.2, shall be applied during the testing unless an auxiliary engine drives the power source.

If the apparatus is equipped with a fire pump, the 2-hour certification test of the power source shall be completed with the fire pump pumping at 100% capacity at 150 psi (1000 kPa) net pump pressure. The test shall be permitted to be run concurrently with the pump certification test.

## **DOCUMENTATION**

The Body Manufacturer shall deliver the following with the fire apparatus:

The results of each test shall be recorded on an appropriate form and provided with the delivery of the fire apparatus.

## **DIELECTRIC VOLTAGE WITHSTAND TEST**

The line voltage wiring and permanently connected devices and equipment shall be subjected to a dielectric voltage withstand test of 900 volts for one (1) minute. The testing shall be performed after all body work has been completed.

The test shall be conducted as follows:

- 3) Isolate the power source from the panel board and disconnect any solid state low voltage components
- 1) Connect one lead of the dielectric tester to all the hot and neutral buses tied together
- 2) Connect the other lead to the fire apparatus frame or body
- 3) Close any switches and circuit breakers in the circuit(s)
- 4) Apply the dielectric voltage for one (1) minute in accordance with the testing equipment manufacturer's instructions

The electrical polarity of all permanently wired equipment, cord reels and receptacles shall be tested to verify that wiring connections have been properly made.

Electrical continuity shall be verified from the chassis or body to all line voltage electrical enclosures, light housings, motor housings, light poles, switch boxes and receptacle ground connections that are accessible to fire fighters in normal operations.

If the apparatus is equipped with a transfer switch, it shall be tested to verify operation and that all non grounded conductors are switched.

Electrical light towers, floodlights, motors, fixed appliances and portable generators shall be operated at their full rating or capacity for 30 minutes to ensure proper operation.

### **BID BOND AND/OR SECURITY**

Each bid must be accompanied by a bid bond in the amount of 10% of the maximum amount of the bid or in lieu thereof, a deposit of cash or, certified check payable to Central Nyack Fire Department in an amount equal to 10% of the maximum amount of the bid, to assure the Central Nyack Fire Department of the adherence of the Bidder to their bid and the execution of the contract, if their bid is accepted.

Within ten (10) days after the opening of bids, the deposits of all but the three (3) lowest responsible Bidders who comply with these specifications will be returned.

Within ten (10) days after the award of the contract, if an award is made, the deposits of the remaining two (2) unsuccessful Bidders will be returned, or if all bids are rejected, the deposits of said three (3) lowest Bidders will be returned.

Within ten (10) days after the execution of the contract and acceptance of the Bidder's bond by the Central Nyack Fire Department, the deposit of the successful Bidder will be returned.

No plea of mistake in such accepted bid shall be available to the Bidder for the recovery of their deposit or as a defense to any action based upon such accepted bid.

### **PERFORMANCE BOND**

The successful Bidder will be required to provide a 100% performance bond in the amount equivalent to the total amount of its bid including any additional options that may have been given. Performance bond shall be provided within two (2) weeks after notice of award.

If the Bidder to whom the contract is awarded, refuses or neglects to execute or fails to furnish the required 100% performance bond within two (2) weeks after notice, the amount of his deposit may be forfeited and retained by the Central Nyack Fire Department as liquidated damages.

The terms of the performance bond shall continue one (1) year after completion and delivery of the apparatus. The balance of any warranty, if greater than 12 months, shall continue to be guaranteed solely by Contractor.



## **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 Central Nyack 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.

### **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 Central Nyack 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 112" (9' - 4") from the ground. This measurement shall be taken on flat ground with the tires properly inflated, in the unloaded condition, at that highest point of the vehicle.

#### **OVERALL LENGTH**

The overall length (OAL) of the vehicle shall be approximately 367" (30' - 7").

#### **OVERALL WIDTH**

The overall width (OAW) of the body at drip rails shall be 102" (8' - 6"), and body shall be 100" (8' - 4").

#### **ANGLE OF APPROACH**

The angle of approach for this vehicle shall not be less than eight (8) degrees when it is loaded to the estimated in-service weight as specified by the current edition of NFPA 1901.

#### **ANGLE OF DEPARTURE**

The angle of departure for this vehicle shall not be less than eight (8) degrees when it is loaded to the estimated in-service weight as specified by the current edition of NFPA 1901.

#### **INSPECTION TRIPS**

All required inspection trips shall be the financial responsibility of the Central Nyack 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 Central Nyack 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 Central Nyack Fire Department regarding the operation, care and maintenance of the apparatus and equipment supplied at Central Nyack Fire Department location.

The Delivery Engineer shall set delivery and instruction schedule with the person appointed by Central Nyack Fire Department.

After delivery of the apparatus, the Central Nyack 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.

#### **TOOL MOUNTING ALLOWANCE**

Each bidder shall include in the bid price for the rescue pumper, an allowance of \$6,000.00 for the mounting of fire department supplied tools. The required tool mounting shall be done either at the factory, or at the dealership before delivery to the fire department.

## **CHASSIS SPECIFICATION**

### **MODEL**

The chassis shall be a Metro Star model. The cab and chassis shall include design considerations for multiple emergency vehicle applications, rapid transit and maneuverability. The chassis shall be manufactured for heavy duty service with the strength and capacity to support a fully laden apparatus, one hundred (100) percent of the time.

### **MODEL YEAR**

The chassis shall have a vehicle identification number that reflects a 2018 model year.

### **COUNTRY OF SERVICE**

The chassis shall be put in service in the country of United States of America (USA).

The chassis will meet applicable U.S.A. federal motor vehicle safety standards per CFR Title 49 Chapter V Part 571 as clarified in the incomplete vehicle book per CFR Title 49 Chapter V Part 568 Section 4 which accompanies each chassis. Spartan Chassis is not responsible for compliance to state, regional, or local regulations. Dealers should identify those regulations and order any necessary optional equipment from Spartan Chassis or their OEM needed to be in compliance with those regulations.

### **CAB AND CHASSIS LABELING LANGUAGE**

The cab and chassis shall include the applicable caution, warning, and safety notice labels with text to be written in English.

### **APPARATUS TYPE**

The apparatus shall be a pumper vehicle designed for emergency service use which shall be equipped with a permanently mounted fire pump which has a minimum rated capacity of 750 gallons per minute (3000 L/min). The apparatus shall include a water tank and hose body whose primary purpose is to combat structural and associated fires.

### **VEHICLE TYPE**

The chassis shall be manufactured for use as a straight truck type vehicle and designed for the installation of a permanently mounted apparatus behind the cab. The apparatus of the vehicle shall be supplied and installed by the apparatus manufacturer.

### **AXLE CONFIGURATION**

The chassis shall feature a 4 x 2 axle configuration consisting of a single rear drive axle with a single front steer axle.

### **GROSS AXLE WEIGHT RATINGS FRONT**

The front gross axle weight rating (GAWR) of the chassis shall be 21,500 pounds.

This front gross axle weight rating shall be adequate to carry the weight of the completed apparatus including all equipment and personnel.

### **GROSS AXLE WEIGHT RATINGS REAR**

The rear gross axle weight rating (GAWR) of the chassis shall be 27,000 pounds.

This rear gross axle weight rating shall be adequate to carry the weight of the completed apparatus including all equipment and personnel.

### **PUMP PROVISION**

The chassis shall include provisions to mount a drive line pump in the middle of the chassis, behind the cab, more commonly known as the midship location.

### **WATER & FOAM TANK CAPACITY**

The chassis shall include a carrying capacity of up to 750 gallons (2839 liters). The water and/or foam tank(s) shall be supplied and installed by the apparatus manufacturer.

### **CAB STYLE**

The cab shall be a custom, fully enclosed, MFD model with a flat roof over the driver, officer, and crew area, designed and built specifically for use as an emergency response vehicle by a company specializing in cab and chassis design for all emergency response applications. The cab shall be designed for heavy-duty service utilizing superior strength and capacity for the application of protecting the occupants of the vehicle. This style of cab shall offer up to eight (8) seating positions.

The cab shall incorporate a fully enclosed design with side wall roof supports, allowing for a spacious cab area with no partition between the front and rear sections of the cab. To provide a superior finish by reducing welds that fatigue cab metal; the roof, the rear wall and side wall panels shall be assembled using a combination of welds and proven industrial adhesives designed specifically for aluminum fabrication for construction.

The cab shall be constructed using multiple aluminum extrusions in conjunction with aluminum plate, which shall provide proven strength and the truest, flattest body surfaces ensuring less expensive paint repairs if needed. All aluminum welding shall be completed to the American Welding Society and ANSI D1.2-96 requirements for structural welding of aluminum.

All interior and exterior seams shall be sealed for optimum noise reduction and to provide the most favorable efficiency for heating and cooling retention.

The cab shall be constructed of 5052-H32 corrosion resistant aluminum plate. The cab shall incorporate tongue and groove fitted 6061-T6 0.13 & 0.19 inch thick aluminum extrusions for extreme duty situations. A single formed, one (1) piece extrusion shall be used for the "A" pillar, adding strength and rigidity to the cab as well as additional roll-over protection. The cab side walls and lower roof skin shall be 0.13 inch thick; the rear wall and raised roof skins shall be 0.09 inch thick; the front cab structure shall be 0.19 inch thick.

The exterior width of the cab shall be 94.00 inches wide with a minimum interior width of 88.00 inches. The overall cab length shall be 131.10 inches with 54.00 inches from the centerline of the front of the axle to the back of the cab.

The cab interior shall be designed to afford the maximum usable interior space and attention to ergonomics with hip and legroom while seated which exceeds industry standards. The crew cab floor shall be flat across the entire walking area for ease of movement inside the cab.

The cab shall offer an interior height of 57.50 inches from the front floor to the headliner and a rear floor to headliner height of 55.00 inches at a minimum. The cab shall offer an interior measurement at the floor level from the rear of the engine tunnel to the rear wall of the cab of 51.88 inches. All interior measurements shall include the area within the interior trimmed surfaces and not to any unfinished surface.

The cab shall include a driver and officer area with two (2) cab doors large enough for personnel in full firefighting gear. The front doors shall offer a clear opening of 40.25 inches wide X 53.50 inches high, from the cab floor to the top of the door opening. The cab shall also include a crew area with up to two (2) cab doors, also large enough for personnel in full firefighting gear. The rear doors shall offer a clear opening of 32.25 inches wide X 51.00 inches high, from the cab floor to the top of the door opening.

The cab shall incorporate a progressive two (2) step configuration from the ground to the cab floor at each door opening. The progressive steps are vertically staggered and extend the full width of each step well allowing personnel in full firefighting gear to enter and exit the cab easily and safely.

The first step for the driver and officer area shall measure approximately 11.50 inches deep X 31.13 inches wide. The intermediate step shall measure approximately 8.50 inches deep X 32.50 inches wide. The height from the first step to the intermediate step and the intermediate step to the cab floor shall not exceed 11.00 inches.

The first step for the crew area shall measure approximately 11.50 inches deep X 20.44 inches wide. The intermediate step shall measure approximately 10.25 inches deep X 22.75 inches wide. The height from the first step to the intermediate step and the intermediate step to the cab floor shall not exceed 12.80 inches.

### **OCCUPANT PROTECTION**

The vehicle shall include the Advanced Protection System™ (APS) which shall secure belted occupants and increase the survivable space within the cab. The APS shall selectively deploy integrated systems to protect against injuries in qualifying frontal impact, side impact, and rollover events. The increase in survivable space and security of the APS shall also provide ejection mitigation protection.

The system components shall include:

- 5) Driver steering wheel airbag
  - Driver dual knee air bags (patent pending) with energy management mounting (patent pending) and officer knee airbag.
  - Large driver, officer, and crew area side curtain airbags
  - APS advanced seat belt system - retractor pre-tensioners tighten the seat belts around the occupants, securing the occupants in seats and load limiters play out some of the seat belt webbing to reduce seat belt to chest and torso force upon impact as well as mitigate head and neck injuries
  - Heavy truck Restraints Control Module (RCM) - receives inputs from the outboard sensors, selectively deploys APS systems, and records sensory inputs immediately before and during a detected qualifying event
  - Integrated outboard crash sensors mounted at the perimeter of the vehicle - detects a qualifying front or side impact event and monitors and communicates vehicle status and real time diagnostics of all critical subsystems to the RCM
  - Fault-indicating Supplemental Restraint System (SRS) light on the driver's instrument panel

Frontal impact protection shall be provided by the outboard sensors and the RCM. In a qualifying front impact event the outboard sensors provide inputs to the RCM. The RCM activates the steering wheel airbag, driver side dual knee airbags (patent pending), officer side knee airbag, and advanced seat belts for each occupant in the cab.

The APS frontal impact system shall be independently tested to ensure occupant injury criteria does not exceed injury criteria defined in Federal Motor Vehicle Safety Standard (FMVSS) 208. Frontal impact into a rigid barrier at 25 mph shall be conducted by an independent third party test facility using belted 95<sup>th</sup> percentile Hybrid II test dummies.

Rollover, side impact, and ejection mitigation shall be provided by the outboard sensors and the RCM. In qualifying rollover or side impact events the outboard sensors provide inputs to the RCM. The RCM activates the side curtain airbags and advanced seat belts for each occupant in the cab. The RCM measures roll angle, lateral acceleration, and roll rate to determine if a rollover event or side impact event is imminent or occurring.

In the event of a qualifying offset or other non-frontal impact, the RCM shall determine and intelligently deploy the front impact protection system, the side impact protection system, or both front and side impact protection systems based on the inputs received from the outboard crash sensors.

The APS side impact system shall be independently tested to ensure occupant injury criteria does not exceed injury criteria defined in Federal Motor Vehicle Safety Standard (FMVSS) 214. Side impact from a moving barrier at 17 mph shall be conducted by an independent third party test facility using belted 50<sup>th</sup> percentile ES-2re test dummies.

### **CAB FRONT FASCIA**

The front cab fascia shall be constructed of 5052-H32 Marine Grade, 0.13 of an inch thick aluminum plate which shall be an integral part of the cab.

The cab fascia will encompass the entire front of the aluminum cab structure from the bottom of the windshield to the bottom of the cab and shall be the "Classic" design.

The front cab fascia shall include two (2) molded plastic modules on each side accommodating a total of up to four (4) Hi/Low beam headlights and two (2) turn signal lights or up to four (4) warning lights. A chrome plated molded plastic bezel shall be provided on each side around each set of four lamps.

### **FRONT GRILLE**

The front fascia shall include a box style, 304 stainless steel front grille 44.45 inches wide X 33.50 inches high X 1.50 inches deep. The grille shall include a minimum free air intake of 732.00 square inches. The upper portion of the grille shall be hinged to provide service access behind the grille.

### **CAB UNDERCOAT**

There shall be a rubberized undercoating applied to the underside of the cab that provides abrasion protection, sound deadening and corrosion protection.

### **CAB SIDE DRIP RAIL**

There shall be a drip rail along the top radius of each cab side. The drip rails shall help prevent water from the cab roof running down the cab side.

### **CAB PAINT EXTERIOR**

The cab shall be painted prior to the installation of glass accessories and all other cab trim to ensure complete paint coverage and the maximum in corrosion protection of all metal surfaces.

All metal surfaces on the entire cab shall be ground by disc to remove any surface oxidation or surface debris which may hinder the paint adhesion. Once the surface is machine ground a high quality acid etching of base primer shall be applied. Upon the application of body fillers and their preparation, the cab shall be primed with a coating designed for corrosion resistance and surface paint adhesion. The maximum thickness of the primer coat shall be 2.00 mils.

The entire cab shall then be coated with an intermediate solid or epoxy surfacing agent that is designed to fill any minor surface defects, provide an adhesive bond between the primer and the paint and improve the color and gloss retention of the color. The finish to this procedure shall be a sanding of the cab with 360 grit paper followed by sealing the seams with SEM brand seam sealer.

The cab shall then be painted the specific color designated by the customer with an acrylic urethane type system designed to retain color and resist acid rain and most atmospheric chemicals found on the fire ground or emergency scene. The paint shall have a minimum thickness of 2.00 mils, followed by a clear top coat not to exceed 2.00 mils. The entire cab shall then be baked at 180 degrees for one (1) hour to speed the curing process of the coatings.

#### **CAB PAINT MANUFACTURER**

The cab shall be painted with PPG Industries paint.

#### **CAB PAINT PRIMARY/LOWER COLOR**

The lower paint color shall be PPG FBCH 71663 Red.

#### **CAB PAINT SECONDARY/UPPER COLOR**

The secondary/upper paint color shall be PPG FBCH 2185 white.

#### **CAB PAINT EXTERIOR BREAKLINE**

The upper and lower paint shall meet at a breakline on the cab which shall be located approximately 1.00 inch below the door windows on each side of the cab. The breakline shall curve down at the front cab corners to approximately 5.00 inches below the windshields on the front of the cab.

#### **CAB PAINT PINSTRIPE**

Where the upper and lower paint colors meet a temporary 0.50 inch wide black pinstripe shall be applied over this break line to offer a more finished look prior to the final pinstripe being installed by the OEM.

#### **CAB PAINT WARRANTY**

The cab and chassis shall be covered by a limited manufacturer paint warranty which shall be in effect for ten (10) years from the first owner's date of purchase or in service or the first 100,000 actual miles, whichever occurs first.

#### **CAB PAINT INTERIOR**

The visible interior cab structure surfaces shall be painted with a multi-tone silver gray texture finish.

#### **CAB ENTRY DOORS**

The cab shall include four (4) entry doors, two (2) front doors and two (2) crew doors designed for ease of entering and egress when outfitted with an SCBA. The doors shall be constructed of extruded aluminum with a nominal thickness of 0.13 inch. The exterior skins shall be constructed of 0.13 inch aluminum plate.

The doors shall include a double rolled style automotive rubber seal around the perimeter of each door frame and door edge which ensures a weather tight fit.

All door hinges shall be hidden within flush mounted cab doors for a pleasing smooth appearance and perfect fit along each side of the cab. Each door hinge shall be piano style with a 0.38 inch pin and shall be constructed of stainless steel.

### **CAB ENTRY DOOR TYPE**

All cab entry doors shall be barrier clear design resulting in exposed lower cab steps. The doors shall provide approximately 32.00 inches of clearance from the ground to the bottom of the door so cab doors may be opened un-hindered by most obstacles encountered, such as guard rails along interstate highways.

Entry doors shall include Pollak mechanical plunger style switches for electrical component activation.

### **CAB INSULATION**

The cab ceiling and walls shall include 1.00 inch thick foam insulation. The insulation shall act as a barrier absorbing noise as well as assisting in sustaining the desired climate within the cab interior.

### **CAB STRUCTURAL WARRANTY**

Summary of Warranty Terms:

THE FOLLOWING IS SUMMARY OF WARRANTY TERMS FOR INFORMATION ONLY. THE ACTUAL LIMITED WARRANTY DOCUMENT, WHICH IS ATTACHED TO THIS OPTION, CONTAINS THE COMPLETE STATEMENT OF THE SPARTAN MOTORS USA LIMITED WARRANTY. SPARTAN'S RESPONSIBILITY IS TO BE ACCORDING TO THE TERMS OF THE COMPLETE LIMITED WARRANTY DOCUMENT.

The cab structure shall be warranted for a period of ten (10) years or one hundred thousand (100,000) miles which ever may occur first. The warranty period shall commence on the date the vehicle is delivered to the first end user.

### **CAB TEST INFORMATION**

The cab shall have successfully completed the preload side impact, static roof load application and frontal impact without encroachment to the occupant survival space when tested in accordance with Section 4 of SAE J2420 COE Frontal Strength Evaluation Dynamic Loading Heavy Trucks, Section 5 of SAE J2422 Cab Roof Strength Evaluation Quasi -Static Loading Heavy Trucks and ECE R29 Uniform Provisions Concerning the Approval of Vehicles with regard to the Protection of the Occupants of the Cab of a Commercial Vehicles Annex 3 Paragraph 5.

The above tests have been witnessed by and attested to by an independent third party. The test results were recorded using cameras, high speed imagers, accelerometers and strain gauges. Documentation of the testing shall be provided upon request.

### **ELECTRICAL SYSTEM**

The chassis shall include a single starting electrical system which shall include a 12 volt direct current Weldon brand of multiplexing system, suppressed per SAE J551. The wiring shall be appropriate gauge cross link with 311 degree Fahrenheit insulation. All SAE wires in the chassis shall be color coded and



shall include the circuit number and function where possible. The wiring shall be protected by 275 degree Fahrenheit minimum high temperature flame retardant loom. All nodes and sealed Deutsch connectors shall be waterproof.

### **APPARATUS WIRING PROVISION**

An apparatus wiring panel shall be installed in the center dash area behind the rocker switch panel which shall include eight (8) open circuits consisting of three (3) 20 amp, one (1) 30 amp, three (3) 10 amp, and one (1) 15 amp circuit, with relays and breakers with trigger wires which shall be routed to the rocker switch panel.

### **MULTIPLEX DISPLAY**

The multiplex electrical system shall include a Weldon Vista IV display with interactive touchscreen. The display shall be located on the left side of the dash in the switch panel. The Vista IV shall feature a full color LCD display screen which includes a message bar displaying the time of day and important messages requiring acknowledgement by the user which shall all be displayed on the top of the screen in the order they are received. There shall be eight (8) push button virtual controls, four (4) on each side of the display for the on-board diagnostics. The display screen shall be video ready for back-up cameras, thermal cameras, and DVD.

The Vista IV display shall offer varying fonts and background colors. The display shall be fully programmable to the needs of the customer and shall offer virtually infinite flexibility for screen configuration options.

### **LOAD MANAGEMENT SYSTEM**

The apparatus load management shall be performed by the included multiplex system. The multiplex system shall also feature the priority of sequences and shall shed electrical loads based on the priority list specifically programmed.

### **DATA RECORDING SYSTEM**

The chassis shall have a Weldon Vehicle Data Recorder (VDR) system installed. The system shall be designed to meet NFPA 1901 and shall be integrated with the Weldon Multiplex electrical system. The following information shall be recorded:

- Vehicle Speed
- Acceleration
- Deceleration
- Engine Speed
- Engine Throttle Position
- ABS Event
- Seat Occupied Status
- Seat Belt Status
- Master Optical Warning Device Switch Position
- Time
- Date

Each portion of the data shall be recorded at the specified intervals and stored for the specified length of time to meet NFPA 1901 guidelines and shall be retrievable by connecting a laptop computer to the VDR system.

### **ACCESSORY POWER**

The electrical distribution panel shall include two (2) power studs. The studs shall be size #10 and each of the power studs shall be circuit protected with a fuse of the specified amperage. One (1) power stud shall be capable of carrying up to a 40 amp battery direct load. One (1) power stud shall be capable of carrying up to a 15 amp ignition switched load. The two (2) power studs shall share one (1) #10 ground stud. A 225 amp battery direct power and ground stud shall be provided and installed on the chassis near the left hand battery box for OEM body connections.

### **AUXILIARY ACCESSORY POWER**

An auxiliary set of power and ground studs shall be provided and installed in the officer side under seat storage compartment. The power and ground studs shall be circuit protected with a 40 amp breaker. The studs shall be 0.38 inch diameter and be capable of carrying up to a 40 amp battery direct load.

### **EXTERIOR ELECTRICAL TERMINAL COATING**

All terminals exposed to the elements will be sprayed with a high visibility protective rubberized coating to prevent corrosion.

### **ENGINE**

The chassis engine shall be a Cummins L9 engine. The L9 engine shall be an in-line six (6) cylinder, four cycle diesel powered engine. The engine shall offer a rating of 450 horse power at 2100 RPM and shall be governed at 2200 RPM. The torque rating shall feature 1250 foot pounds of torque at 1400 RPM with 543 cubic inches (8.9 liters) of displacement.

The L9 engine shall feature a VGT™ Turbocharger, a high pressure common rail fuel system, fully integrated electronic controls with an electronic governor, and shall be EPA certified to meet the 2017 emissions standards using cooled exhaust gas recirculation and selective catalytic reduction technology.

The engine shall include an engine mounted combination full flow/by-pass oil filter with replaceable spin on cartridge for use with the engine lubrication system. The engine shall include Citgo brand Citgard 500, or equivalent SAE 15W40 CJ4 low ash engine oil which shall be utilized for proper engine lubrication.

A wiring harness shall be supplied ending at the back of the cab. The harness shall include a connector which shall allow an optional harness for the pump panel. The included circuits shall be provided for a tachometer, oil pressure, engine temperature, hand throttle, high idle and a PSG system. A circuit for J1939 data link shall also be provided at the back of the cab.

### **CAB ENGINE TUNNEL**

The cab interior shall include an integrated engine tunnel constructed of 5052-H32 Marine Grade, 0.19 of an inch thick aluminum. The tunnel shall be a maximum of 41.50 inches wide X 25.50 inches high.

### **DIESEL PARTICULATE FILTER CONTROLS**

There shall be two (2) controls for the diesel particulate filter. One (1) control shall be for regeneration and one (1) control shall be for regeneration inhibit.

### **ENGINE PROGRAMMING HIGH IDLE SPEED**

The engine high idle control shall maintain the engine idle at approximately 1250 RPM when engaged.

### **ENGINE HIGH IDLE CONTROL**

The vehicle shall be equipped with an automatic high-idle speed control. It shall be pre-set so when activated, it will operate the engine at the appropriate RPM to increase alternator output. This device shall operate only when the master switch is activated and the transmission is in neutral with the parking brake set. The device shall disengage when the operator depresses the brake pedal, or the transmission is placed in gear, and shall be available to manually or automatically re-engage when the brake is released, or when the transmission is placed in neutral. There shall be an indicator on the Vista display and control screen for the high idle speed control.

### **ENGINE PROGRAMMING ROAD SPEED GOVERNOR**

The engine shall include programming which will govern the top speed of the vehicle.

### **AUXILIARY ENGINE BRAKE**

A compression brake, for the six (6) cylinder engine shall be provided. A cutout relay shall be installed to disable the compression brake when in pump mode or when an ABS event occurs. The engine compression brake shall activate upon 0% accelerator when in operation mode and actuate the vehicle's brake lights.

The engine shall utilize a variable geometry turbo (VGT) as an integrated auxiliary engine brake to offer a variable rate of exhaust flow, which when activated in conjunction with the compression brake shall enhance the engine's compression braking capabilities.

### **AUXILIARY ENGINE BRAKE CONTROL**

An engine compression brake control device shall be included. The electronic control device shall monitor various conditions and shall activate the engine brake only if all of the following conditions are simultaneously detected:

- A valid gear ratio is detected.
- The driver has requested or enabled engine compression brake operation.
- The throttle is at a minimum engine speed position.
- The electronic controller is not presently attempting to execute an electronically controlled final drive gear shift.

The compression brake shall be controlled via an off/low/medium/high virtual button on the Vista display and control screen. The multiplex system shall remember and default to the last engine brake control setting when the vehicle is shut off and re-started.

### **ELECTRONIC ENGINE OIL LEVEL INDICATOR**

The engine oil shall be monitored electronically and shall send a signal to activate a warning in the instrument panel when levels fall below normal. The warning shall activate in a low oil situation upon turning on the master battery and ignition switches without the engine running.

### **FLUID FILLS**

The front of the chassis shall accommodate fluid fill for the engine oil through the grille. This area shall also accommodate a check for the engine oil. The transmission, power steering, and coolant fluid fills and checks shall be under the cab. The windshield washer fill shall be accessible through the front left side mid step.

### **ENGINE DRAIN PLUG**

The engine shall include an original equipment manufacturer installed oil drain plug.

### **ENGINE WARRANTY**

The Cummins engine shall be warranted for a period of five (5) years or 100,000 miles, whichever occurs first.

### **REMOTE THROTTLE HARNESS**

An apparatus interface wiring harness for the engine shall be supplied with the chassis. The harness shall include a connector for connection to the chassis harness and shall terminate in the left frame rail behind the cab for connection by the body builder. The harness shall contain connectors for a hand throttle and a multiplexed gauge. Separate circuits shall also be included for pump controls, "Pump Engaged" and "OK to Pump" indicator lights, open compartment ground, start signal, park brake ground, ignition signal, master power, customer ignition, air horn solenoid switch, high idle switch and high idle indicator light. The harness shall contain interlocks that will prevent shifting to road or pump mode unless the transmission output speed translates to less than 1 mph and the transmission is in neutral. The shift to pump mode shall also require the park brake be set. The harness shall be designed for a side mount pump panel.

An apparatus interface wiring harness shall be included for the cab and shall be wired into the cab harness interface connectors which shall incorporate circuits with relays to control pump functions. This harness shall control the inputs for the transmission lock up circuits, governor/hand throttle controls and dash display which shall incorporate the "Pump Engaged" and "OK to Pump" indicator lamps. The harness shall contain circuits for the body builder to wire a pump switch.

### **ENGINE PROGRAMMING REMOTE THROTTLE**

The engine ECM discreet wire remote throttle circuit will be turned on for use with a discreet wire based pump controller.

### **ENGINE PROGRAMMING IDLE SPEED**

The engine low idle speed will be programmed at 700 rpm.

### **ENGINE FAN DRIVE**

The engine cooling system fan shall incorporate a thermostatically controlled, Horton clutched type fan drive.

When the clutched fan is disengaged it shall facilitate improved vehicle performance, cab heating in cold climates, and fuel economy. The fan clutch design shall be fail safe so that if the clutch drive fails the fan shall engage to prevent engine overheating due to the fan clutch failure.

### **ENGINE COOLING SYSTEM**

There shall be a heavy-duty aluminum cooling system designed to meet the demands of the emergency response industry. The cooling system shall have the capacity to keep the engine properly cooled under all conditions of road and pumping operations. The cooling system shall be designed and tested to meet or exceed the requirements specified by the engine and transmission manufacturer and all EPA requirements. The complete cooling system shall be mounted to isolate the entire system from vibration or stress. The individual cores of the cooling system shall be mounted in a manner to allow expansion and contraction at various rates without inducing stress into the adjoining cores.

The cooling system shall utilize a charge air cooler to radiator serial flow package that provides the maximum cooling capacity for the specified engine as well as serviceability. The main components shall include a surge tank, an air to air charge air cooler bolted to the front of the radiator, recirculation shields, a shroud, a fan, and required tubing.

The radiator shall be a down-flow design constructed with aluminum cores, plastic end tanks, and a steel frame. The radiator shall be equipped with a drain cock to drain the coolant for serviceability.

The cooling system shall include a one piece injection molded polymer eleven (11) blade fan with a fiberglass fan shroud.

The cooling system shall be equipped with a surge tank that is capable of removing entrained air from the system. The surge tank shall be equipped with a low coolant probe and rearward oriented sight glass to monitor the level of the coolant. The surge tank shall have a dual seal cap that meets the engine manufacturer's pressure requirements, and allows for expansion and recovery of coolant into a separate integral expansion chamber.

All radiator tubes shall be formed from aluminized steel tubing. Recirculation shields shall be installed where required to prevent heated air from reentering the cooling package and affecting performance.

The charge air cooler shall be a cross-flow design constructed completely of aluminum with cast tanks. All charge air cooler tubes shall be formed from aluminized steel tubing and installed with silicone hump hoses and stainless steel "constant torque" style clamps meeting the engine manufacturer's requirements.

The radiator and charge air cooler shall be removable through the bottom of the chassis.

#### **ENGINE COOLING SYSTEM PROTECTION**

The engine cooling system shall include a recirculation shield designed to act as a light duty skid plate below the radiator to provide additional protection for the engine cooling system from light impacts, stones, and road debris. The skid plate shall be painted to match the frame color.

#### **ENGINE COOLANT**

The cooling package shall include Extended Life Coolant (ELC). The use of ELC provides longer intervals between coolant changes over standard coolants providing improved performance. The coolant shall contain a 50/50 mix of ethylene glycol and de-ionized water to keep the coolant from freezing to a temperature of -34 degrees Fahrenheit.

Proposals offering supplemental coolant additives (SCA) shall not be considered, as this is part of the extended life coolant makeup.

#### **ENGINE COOLANT FILTER**

An engine coolant filter with a shut-off valve for the inlet and outlet shall be installed on the chassis. The location of the filter shall allow for easy maintenance.

Proposals offering engines equipped with coolant filters shall be supplied with standard non-chemical type particulate filters.

#### **ELECTRONIC COOLANT LEVEL INDICATOR**

The instrument panel shall feature a low engine coolant indicator light which shall be located in the center of the instrument panel. An audible tone alarm shall also be provided to warn of a low coolant incident.

### **ENGINE PUMP HEAT EXCHANGER**

A single bundle type coolant to water heat exchanger shall be installed between the engine and the radiator. The heat exchanger shall be designed to prohibit water from the pump from coming in contact with the engine coolant. This shall allow the use of water from the discharge side of the pump to assist in cooling the engine.

### **COOLANT HOSES**

The cooling system hoses shall be silicone heater hose with rubber hoses in the cab interior. The radiator hoses shall be formed silicone coolant hoses with formed aluminized steel tubing. All heater hose, silicone coolant hose, and tubing shall be secured with stainless steel constant torque band clamps.

### **ENGINE AIR INTAKE**

The engine air intake system shall include an ember separator air intake filter which shall be located behind the right hand side headlamp. This filter ember separator shall be designed to protect the downstream air filter from embers, using a combination of unique flat and crimped metal screens packaged in a corrosion resistant heavy duty galvanized steel frame. This multilayered screen shall be design traps embers and allows them to burn out before passing through the pack.

The engine air intake system shall also include a stainless steel air cleaner mounted to the frame and located beneath the cab on the right side of the vehicle. The air cleaner shall utilize a replaceable filter element designed to prevent dust and debris from being ingested into the engine. The air cleaner housing and connections in the air intake system shall be designed to mitigate water intrusion into the system during severe weather conditions.

The air intake system shall also include a restriction indicator light in the warning light cluster on the instrument panel, which shall activate when the air cleaner element requires replacement.

### **AIR INTAKE PROTECTION**

A light duty skid plate shall be supplied for the engine air intake system below the right front side of the cab. The skid plate shall provide protection for the air intake system from light impacts, stones, and road debris. The skid plate shall be painted to match the frame color.

### **ENGINE EXHAUST SYSTEM**

The exhaust system shall include an end-in end-out horizontally mounted single module after treatment device, downpipe from the charge air cooled turbo. The single module shall include four temperature sensors, diesel particulate filter (DPF), urea dosing module (UL2), and a selective catalytic reduction (SCR) catalyst to meet current EPA standards. The selective catalytic reduction catalyst utilizes a diesel exhaust fluid solution consisting of urea and purified water to convert NOx into nitrogen, water, and trace amounts of carbon dioxide. The solution shall be mixed and injected into the system through the between the DPF and SCR.

The system shall utilize 0.07 inch thick stainless steel exhaust tubing between the engine turbo and the DPF. Zero leak clamps seal all system joints between the turbo and DPF.

The single module after treatment through the end of the tailpipe shall be connected with zero leak clamps. The discharge shall terminate horizontally on the right side of the vehicle ahead of the rear tires.

The exhaust system after treatment module shall be mounted below the frame in the outboard position.

### **DIESEL EXHAUST FLUID TANK**

The exhaust system shall include a molded cross linked polyethylene tank for Diesel Exhaust Fluid (DEF). The tank shall have a capacity of six (6) usable gallons and shall be mounted on the left hand side of the chassis frame behind the batteries below the frame.

The DEF tank shall be designed with capacity for expansion in case of fluid freezing. Engine coolant, which shall be thermostatically controlled, shall be run through lines in the tank to help prevent the DEF from freezing and to provide a means of thawing the fluid if it should become frozen.

The tank fill tube shall be routed under the rear of the cab with the fill neck and splash guard accessible in the top rear step.

### **ENGINE EXHAUST ACCESSORIES**

An exhaust temperature mitigation device shall be shipped loose for installation by the body manufacturer on the vehicle. The temperature mitigation device shall lower the temperature of the exhaust by combining ambient air with the exhaust gasses at the exhaust outlet.

### **ENGINE EXHAUST WRAP**

The exhaust tubing between the engine turbo and the diesel particulate filter (DPF) shall be wrapped with a thermal cover in order to retain the necessary heat for DPF regeneration. The exhaust wrap shall also help protect surrounding components from radiant heat which can be transferred from the exhaust.

### **TRANSMISSION**

The drive train shall include an Allison model EVS 3000 torque converting, automatic transmission which shall include electronic controls. The transmission shall feature two (2) 10-bolt PTO pads located on the converter housing.

The transmission shall include two (2) internal oil filters and Castrol TranSynd™ synthetic TES 295 transmission fluid which shall be utilized in the lubrication of the EVS transmission. An electronic oil level sensor shall be included with the readout located in the shift selector.

The transmission gear ratios shall be:

1st	3.49:1
2nd	1.86:1
3rd	1.41:1
4th	1.00:1
5th	0.75:1
6th	0.65:1 (if applicable)
Rev	5.03:1

### **TRANSMISSION MODE PROGRAMMING**

The transmission, upon start-up, will automatically select a four (4) speed operation. The fifth speed over drive shall be available with the activation of the mode button on the shifting pad.

### **TRANSMISSION FEATURE PROGRAMMING**

The Allison Gen V-E transmission EVS group package number 127 shall contain the 198 vocational package in consideration of the duty of this apparatus as a pumper. This package shall incorporate an automatic neutral with selector override. This feature commands the transmission to neutral when the park brake is applied, regardless of drive range requested on the shift selector. This requires re-selecting drive range to shift out of neutral for the override.

This package shall be coupled with the use of a split shaft PTO and incorporate pumping circuits. These circuits shall be used allowing the vehicle to operate in the fourth range lockup while operating the pump mode due to the 1 to 1 ratio through the transmission, therefore the output speed of the engine is the input speed to the pump. The pump output can be easily calculated by using this input speed and the drive ratio of the pump itself to rate the gallons of water the pump can provide.

A transmission interface connector shall be provided in the cab. This package shall contain the following input/output circuits to the transmission control module. The Gen V-E transmission shall include prognostic diagnostic capabilities. These capabilities shall include the monitoring of the fluid life, filter change indication, and transmission clutch maintenance.

<u>Function ID</u>	<u>Description</u>	<u>Wire assignment</u>
Inputs		
C	PTO Request	142
J	Fire Truck Pump Mode (4th Lockup)	122 / 123
Outputs		
C	Range Indicator	145 (4th)
G	PTO Enable Output	130
	Signal Return	103

### **ELECTRONIC TRANSMISSION OIL LEVEL INDICATOR**

The transmission fluid shall be monitored electronically and shall send a signal to activate a warning in the instrument panel when levels fall below normal.

### **TRANSMISSION SHIFT SELECTOR**

An Allison pressure sensitive range selector touch pad shall be provided and located to the right of the driver within clear view and easy reach. The shift selector shall have a graphical Vacuum Florescent Display (VFD) capable of displaying two lines of text. The shift selector shall provide mode indication and a prognostic indicator (wrench symbol) on the digital display. The prognostics monitor various operating parameters and shall alert you when a specific maintenance function is required.

### **TRANSMISSION PRE-SELECT WITH AUXILIARY BRAKE**

When the auxiliary brake is engaged, the transmission shall automatically shift to second gear to decrease the rate of speed assisting the secondary braking system and slowing the vehicle.

### **TRANSMISSION COOLING SYSTEM**

The transmission shall include a water to oil cooler system located in the cooling loop between the radiator and the engine. The transmission cooling system shall meet all transmission manufacturer requirements. The transmission cooling system shall feature continuous flow of engine bypass water to maintain uninterrupted transmission cooling.

### **TRANSMISSION DRAIN PLUG**

The transmission shall include an original equipment manufacturer installed magnetic transmission fluid drain plug.

### **TRANSMISSION WARRANTY**

The Allison EVS series transmission shall be warranted for a period of five (5) years with unlimited mileage. Parts and labor shall be included in the warranty.

### **PTO LOCATION**



The transmission shall have two (2) power take off (PTO) mounting locations, one (1) in the 8:00 o'clock position and one (1) in the 4:00 o'clock position.

### **DRIVELINE**

All drivelines shall be heavy duty metal tube and equipped with Spicer 1710 series universal joints. The shafts shall be dynamically balanced prior to installation to alleviate future vibration. In areas of the driveline where a slip shaft is required, the splined slip joint shall be coated with Glide Coat®.

### **DRIVELINE GUARDS**

Two (2) driveline guard loops shall be provided and installed to support the driveline shafts for routine maintenance and in the event of a driveline component failure.

### **MIDSHIP PUMP / GEARBOX**

A temporary jackshaft driveline shall be installed by the chassis manufacturer to accommodate the midship split shaft pump as specified by the apparatus manufacturer.

### **MIDSHIP PUMP / GEARBOX MODEL**

The midship pump/gearbox provisions shall be for a Waterous CMC20 pump.

### **MIDSHIP PUMP GEARBOX DROP**

The Waterous pump gearbox shall have a "C" (medium length) drop length.

### **MIDSHIP PUMP RATIO**

The ratio for the midship pump shall be 2.27:1.

### **MIDSHIP PUMP LOCATION C/L SUCTION TO C/L REAR AXLE**

The midship pump shall be located so the dimension from the centerline of the suction to the centerline of the rear axle is 80.00 inches.

### **FUEL FILTER/WATER SEPARATOR**

The fuel system shall have a Fleetguard FS1098 fuel filter/water separator with a thermostatically controlled integral heater as a primary filter. The fuel filter shall have a drain valve.

An instrument panel lamp and audible alarm which indicates when water is present in the fuel-water separator shall also be included.

A secondary fuel filter shall be included as approved by the engine manufacturer.

### **FUEL LINES**

The fuel system supply and return lines installed from the fuel tank to the engine shall be reinforced nylon tubing rated for diesel fuel. The fuel lines shall be brown in color and connected with brass fittings.

### **FUEL SHUTOFF VALVE**

A fuel shutoff valve shall be installed in the fuel draw line at the primary fuel filter to allow the fuel filter to be changed without loss of fuel to the fuel pump.

A second fuel shutoff valve shall be installed in the fuel draw line, near the fuel tank to allow maintenance to be performed with minimal loss of fuel.

### **ELECTRIC FUEL PRIMER**

Integral to the engine assembly is an electric lift pump that serves the purpose of pre-filter fuel priming.

### **FUEL TANK**

The fuel tank shall have a capacity of sixty-eight (68) gallons and shall measure 35.00 inches in width X 17.00 inches in height X 29.00 inches in length.

The baffled tank shall have a vent port to facilitate venting to the top of the fill neck for rapid filling without "blow-back" and a roll over ball check vent for temperature related fuel expansion and draw.

The tank is designed with dual draw tubes and sender flanges. The tank shall have 2.00 inch NPT fill ports for right or left hand fill. A 0.50 inch NPT drain plug shall be centered in the bottom of the tank.

The fuel tank shall be mounted below the frame, behind the rear axle. Two (2) three-piece strap hanger assemblies with "U" straps bolted midway on the fuel tank front and rear shall be utilized to allow the tank to be easily lowered and removed for service purposes. Rubber isolating pads shall be provided between the tank and the upper tank mounting brackets. Strap mounting studs through the rail, hidden behind the body shall not be acceptable.

### **FUEL TANK MATERIAL AND FINISH**

The fuel tank shall be constructed of 12 gauge stainless steel. The exterior of the tank shall be powder coated black and then painted to match the frame color.

All powder coatings, primers and paint shall be compatible with all metals, pretreatments and primers used. The cross hatch adhesion test per ASTM D3359 Method B, results to be 5B minimum. The pencil hardness test per ASTM D3363 shall have a final post-cured pencil hardness of H-2H. The direct impact resistance test per ASTM D2794, results to be 5B minimum.

Any proposals offering painted fuel tanks with variations from the above process shall not be accepted. The film thickness of vendor supplied parts shall also be sufficient to meet the performance standards as stated above.

### **FUEL TANK STRAP MATERIAL**

The fuel tank straps shall be constructed of #304 stainless steel. The fuel tank straps shall be powder coated black and then painted to match the frame color if applicable.

### **FUEL TANK FILL PORT**

The fuel tank fill ports shall be provided with two (2) left fill ports located one (1) in the forward position and one (1) in the middle position and the right fill port located in the middle position of the fuel tank.

### **FUEL TANK DRAIN PLUG**

A 0.5 inch NPT drain plug shall be centered in the bottom of the fuel tank.

### **FRONT AXLE**

The front axle shall be a Meritor Easy Steer Non drive front axle, model number MFS-20. The axle shall include a 3.74 inch drop and a 71.00 inch king pin intersection (KPI). The axle shall include a conventional style hub with a standard knuckle. The weight capacity for the axle shall be rated to 21,500 pounds FAWR.

### **FRONT AXLE WARRANTY**

The front axle shall be warranted by Meritor for two (2) years with unlimited miles under the general service application. Details of the Meritor warranty are provided on the PDF document attached to this option.

### **FRONT WHEEL BEARING LUBRICATION**

The front axle wheel bearings shall be lubricated with oil. The oil level can be visually checked via clear inspection windows in the front axle hubs.

### **FRONT SHOCK ABSORBERS**

Two (2) Bilstein inert, nitrogen gas filled shock absorbers shall be provided and installed as part of the front suspension system. The shocks shall be a monotubular design and fabricated using a special extrusion method, utilizing a single blank of steel without a welded seam, achieving an extremely tight peak-to-valley tolerance and maintains consistent wall thickness. The monotubular design shall provide superior strength while maximizing heat dissipation and shock life.

The ride afforded through the use of a gas shock is more consistent and shall not deteriorate with heat, the same way a conventional oil filled hydraulic shock would.

The Bilstein front shocks shall include a digressive working piston assembly allowing independent tuning of the compression and rebound damping forces to provide optimum ride and comfort without compromise. The working piston design shall feature fewer parts than most conventional twin tube and "road sensing" shock designs and shall contribute to the durability and long life of the Bilstein shock absorbers.

Proposals offering the use of conventional twin tube or "road sensing" designed shocks shall not be considered.

### **FRONT SUSPENSION**

The front suspension shall include a nine (9) leaf spring pack in which the longest leaf measures 54.00 inch long and 4.00 inches wide and shall include a military double wrapped front eye. Both spring eyes shall have a case hardened threaded bushing installed with lubrication counter bore and lubrication land off cross bore with grease fitting. The spring capacity shall be rated at 21,500 pounds.

### **STEERING COLUMN/ WHEEL**

The cab shall include a Douglas Autotech steering column which shall include a seven (7) position tilt, a 2.25 inch telescopic adjustment, and an 18.00 inch, four (4) spoke steering wheel located at the driver's position. The steering wheel shall be covered with black polyurethane foam padding.

The steering column shall contain a horn button, self-canceling turn signal switch, four-way hazard switch and headlamp dimmer switch.

### **ELECTRONIC POWER STEERING FLUID LEVEL INDICATOR**

The power steering fluid shall be monitored electronically and shall send a signal to activate an audible alarm and visual warning in the instrument panel when fluid level falls below normal.

**POWER STEERING PUMP**

The hydraulic power steering pump shall be a TRW PS and shall be gear driven from the engine. The pump shall be a balanced, positive displacement, sliding vane type. The power steering system shall include an oil to air passive cooler.

**FRONT AXLE CRAMP ANGLE**

The chassis shall have a front axle cramp angle of 48-degrees to the left and 44-degrees to the right.

**POWER STEERING GEAR**

The power steering gear shall be a TRW model TAS 65 with an assist cylinder.

**CHASSIS ALIGNMENT**

The chassis frame rails shall be measured to insure the length is correct and cross checked to make sure they run parallel and are square to each other. The front and rear axles shall be laser aligned. The front tires and wheels shall be aligned and toe-in set on the front tires by the chassis manufacturer.

**REAR AXLE**

The rear axle shall be a Meritor model RS-25-160 single drive axle. The axle shall include precision forged, single reduction differential gearing, and shall have a fire service rated capacity of 27,000 pounds.

The axle shall be built of superior construction and quality components to provide the rugged dependability needed to stand up to the fire industry's demands. The axle shall include rectangular shaped, hot-formed housing with a standard wall thickness of 0.63 of an inch for extra strength and rigidity and a rigid differential case for high axle strength and reduced maintenance.

The axle shall have heavy-duty Hypoid gearing for longer life, greater strength and quieter operation. Industry-standard wheel ends for compatibility with both disc and drum brakes, and unitized oil seal technology to keep lubricant in and help prevent contaminant damage will be used.

**REAR AXLE DIFFERENTIAL LUBRICATION**

The rear axle differential shall be lubricated with oil.

**REAR AXLE WARRANTY**

The rear axle shall be warranted by Meritor for two (2) years with unlimited miles under the general service application. Details of the Meritor warranty are provided on the PDF document attached to this option.

**REAR WHEEL BEARING LUBRICATION**

The rear axle wheel bearings shall be lubricated with oil.

**REAR AXLE DIFFERENTIAL CONTROL**

A driver controlled differential lock shall be installed on the rear axle. This feature shall allow the main differential to be locked and unlocked when encountering poor road or highway conditions, where maximum traction is needed, for use at speeds no greater than 25 MPH. The differential lock shall be

controlled by a virtual button on the Vista display and control screen. The Vista display shall also indicate when positive engagement of the differential control has occurred.

### **VEHICLE TOP SPEED**

The top speed of the vehicle shall be approximately 68 MPH +/-2 MPH at governed engine RPM.

### **REAR SUSPENSION**

The single rear axle shall feature a Reyco 79KB vari-rate, self-leveling captive slipper type conventional multi-leaf spring suspension, with 57.50 inch X 3.00 inch springs. One (1) adjustable and one (1) fixed torque rod shall be provided.

The rear suspension capacity shall be rated from 21,000 to 31,500 pounds.

### **REAR SHOCK ABSORBERS**

Two (2) Bilstein inert, nitrogen gas filled shock absorbers shall be provided and installed as part of the rear suspension system. The shocks shall be a monotubular design and fabricated using a special extrusion method, utilizing a single blank of steel without a welded seam, achieving an extremely tight peak-to-valley tolerance and maintains consistent wall thickness. The monotubular design shall provide superior strength while maximizing heat dissipation and shock life.

The ride afforded through the use of a gas shock is more consistent and shall not deteriorate with heat, the same way a conventional oil filled hydraulic shock would.

The Bilstein front shocks shall include a digressive working piston assembly allowing independent tuning of the compression and rebound damping forces to provide optimum ride and comfort without compromise. The working piston design shall feature fewer parts than most conventional twin tube and "road sensing" shock designs and shall contribute to the durability and long life of the Bilstein shock absorbers.

Proposals offering the use of conventional twin tube or "road sensing" designed shocks shall not be considered.

### **FRONT TIRE**

The front tires shall be Michelin 425/65R-22.5 20PR "L" tubeless radial XZY3 mixed service tread.

The front tire stamped load capacity shall be 22,800 pounds per axle with a nominal speed rating of 65 miles per hour when properly inflated to 120 pounds per square inch.

The Michelin Intermittent Service Rating maximum load capacity shall be 24,396 pounds per axle with a maximum speed of 65 miles per hour when properly inflated to 120 pounds per square inch.

The Michelin Intermittent Service Rating maximum speed capacity shall be 22,800 pounds per axle with a speed rating of 75 miles per hour when properly inflated to 120 pounds per square inch.

The Michelin Intermittent Service Rating limits the operation of the emergency vehicle to no more than fifty (50) miles of continuous operation under maximum recommended payload, or without stopping for at least twenty (20) minutes. The emergency vehicle must reduce its speed to no more than 50 MPH after the first fifty (50) miles of travel.

### **REAR TIRE**

The rear tires shall be Michelin 12R-22.5 16PR "H" tubeless radial XDN2 all-weather tread.

The rear tire stamped load capacity shall be 27,120 pounds per axle with a nominal speed rating of 75 miles per hour when properly inflated to 120 pounds per square inch.

The Michelin Intermittent Service Rating maximum load capacity shall be 29,020 pounds per axle with a maximum speed of 75 miles per hour when properly inflated to 120 pounds per square inch.

The Michelin Intermittent Service Rating maximum speed capacity shall match the nominal speed rating.

The Michelin Intermittent Service Rating limits the operation of the emergency vehicle to no more than fifty (50) miles of continuous operation under maximum recommended payload, or without stopping for at least twenty (20) minutes. The emergency vehicle must reduce its speed to no more than 50 MPH after the first fifty (50) miles of travel.

### **REAR AXLE RATIO**

The rear axle ratio shall be 5.13:1.

### **TIRE PRESSURE INDICATOR**

There shall be a voucher provided with the chassis for a pop up style tire pressure indicator at each tire valve stem. The indicator shall provide visual indication of pressure in the specific tire.

The tire pressure indicators shall be redeemed upon the vehicle manufacturer's receipt of the voucher for installation by the customer.

### **FRONT WHEEL**

The front wheels shall be Alcoa hub piloted, 22.50 inch X 12.25 inch LvL One™ polished aluminum wheels. The hub piloted mounting system shall provide easy installation and shall include two-piece flange nuts. The wheels shall feature one-piece forged strength and shall include Alcoa's Dura-Bright® finish with XBR technology as an integral part of the wheel surface. Alcoa Dura-Bright® wheels keep their shine without polishing. Brake dust, grime and road debris are easily removed by simply cleaning the wheels with soap and water.

### **REAR WHEEL**

The rear wheels shall be Alcoa hub piloted, 22.50 inch X 8.25 inch LvL One™ aluminum wheels with a polished outer surface and Alcoa Dura-Bright® wheel treatment with XBR® technology as an integral part of the wheel. The hub piloted mounting system shall provide easy installation and shall include two-piece flange nuts.

### **WHEEL TRIM**

The front wheels shall include stainless steel lug nut covers and stainless steel baby moons shipped loose with the chassis for installation by the apparatus builder. The baby moons shall have cutouts for oil seal viewing when applicable.

The rear wheels shall include stainless steel lug nut covers and band mounted spring clip stainless steel high hats shipped loose with the chassis for installation by the apparatus builder.

The lug nut covers, baby moons, and high hats shall be RealWheels® brand constructed of 304L grade, non-corrosive stainless steel with a mirror finish. Each wheel trim component shall meet D.O.T. certification.

## **TIRE CHAINS**

Onspot brand six (6) strand automatic ice chains shall be installed on the rear axle of the chassis to provide instant traction while traveling on ice and snow at speeds below 35 MPH.

## **TIRE CHAINS ACTIVATION**

The tire chain system shall be activated by a locking switch on the dash to deter accidental activation. The light on the switch shall illuminate when the tire chains are engaged. The tire chains shall be interlocked with the transmission and shall engage only if the vehicle is traveling 30 MPH or less. After traveling over 30 MPH, the vehicle must be reduced to a speed below 5 MPH for the tire chains to be engaged or re-engaged.

## **BRAKE SYSTEM**

A rapid build-up air brake system shall be provided. The air brakes shall include a two (2) air tank, three (3) reservoir system with a total of 4152 cubic inch of air capacity. A floor mounted treadle valve shall be mounted inside the cab for graduated control of applying and releasing the brakes. An inversion valve shall be installed to provide a service brake application in the unlikely event of primary air supply loss. All air reservoirs provided on the chassis shall be labeled for identification.

The rear axle spring brakes shall automatically apply in any situation when the air pressure falls below 25 PSI and shall include a mechanical means for releasing the spring brakes when necessary. An audible alarm shall designate when the system air pressure is below 60 PSI.

A four (4) sensor, four (4) modulator Anti-lock Braking System (ABS) shall be installed on the front and rear axles in order to prevent the brakes from locking or skidding while braking during hard stops or on icy or wet surfaces. This in turn shall allow the driver to maintain steering control under heavy braking and in most instances, shorten the braking distance. The electronic monitoring system shall incorporate diagonal circuitry which shall monitor wheel speed during braking through a sensor and tone ring on each wheel. A dash mounted ABS lamp shall be provided to notify the driver of a system malfunction. The ABS system shall automatically disengage the auxiliary braking system device when required. The speedometer screen shall be capable of reporting all active defaults using PID/SID and FMI standards.

Additional safety shall be accommodated through Automatic Traction Control (ATC) which shall be installed on the single rear axle. The ATC system shall apply the ABS when the drive wheels loose traction. The system shall scale the electronic engine throttle back to prevent wheel spin while accelerating on ice or wet surfaces.

A virtual style switch shall be provided and properly labeled "mud/snow". When the switch is pressed once, the system shall allow a momentary wheel slip to obtain traction under extreme mud and snow conditions. During this condition the ATC light shall blink continuously notifying the driver of activation. Pressing the switch again shall deactivate the mud/snow feature.

The Electronic Stability Control (ESC) unit is a functional extension of the electronic braking system. It is able to detect any skidding of the vehicle about its vertical axis as well as any rollover tendency. The control unit comprises an angular-speed sensor that measures the vehicle's motion about the vertical axis, caused, for instance, by cornering or by skidding on a slippery road surface. An acceleration sensor measures the vehicle's lateral acceleration. The Controller Area Network (CAN) bus provides information on the steering angle. On the basis of lateral acceleration and steering angle, an integrated microcontroller calculates a theoretical angular speed for the stable vehicle condition.

## **FRONT BRAKES**

The front brakes shall be Meritor EX225 Disc Plus disc brakes with 17.00 inch vented rotors.

### **REAR BRAKES**

The rear brakes shall be Meritor 16.50 inch X 7.00 inch S-cam drum type. The brakes shall feature a cast iron shoe.

### **PARK BRAKE**

Upon application of the push-pull valve in the cab, the rear brakes will engage via mechanical spring force. This is accomplished by dual chamber rear brakes, satisfying the FMVSS parking brake requirements.

### **PARK BRAKE CONTROL**

A Meritor-Wabco manual hand control push-pull style valve shall operate the parking brake system. The control shall be yellow in color.

The parking brake actuation valve shall be mounted on the center of the tunnel within easy access of both the driver and officer positions.

### **REAR BRAKE SLACK ADJUSTERS**

The rear brakes shall include Meritor automatic slack adjusters installed on the axle which features a simple, durable design offering reduced weight. The automatic slack adjusters shall feature a manual adjusting nut which cannot inadvertently be backed off and threaded grease fittings for easy serviceability.

### **AIR DRYER**

The brake system shall include a Wabco System Saver 1200 air dryer with an integral heater with a Metri-Pack sealed connector. The air dryer incorporates an internal turbo cutoff valve that closes the path between the air compressor and air dryer purge valve during the compressor "unload" cycle. The turbo cutoff valve allows purging of moisture and contaminants without the loss of turbo boost pressure. The air dryer shall be mounted behind the battery box on the left hand side.

### **FRONT BRAKE CHAMBERS**

The front brakes shall be provided with MGM type 24 long stroke brake chambers.

### **REAR BRAKE CHAMBERS**

The rear axle shall include TSE 30/36 brake chambers which shall convert the energy of compressed air into mechanical force and motion. This shall actuate the brake camshaft, which in turn shall operate the foundational brake mechanism forcing the brake shoes against the brake drum. The TSE Type 36 brake chamber has a 36.00 square inch effective area.

### **AIR COMPRESSOR**

The air compressor provided for the engine shall be a Wabco<sup>®</sup> SS318 single cylinder pass-through drive type compressor which shall be capable of producing 18.7 CFM at 1200 engine RPMs. The air compressor shall feature a higher delivery efficiency translating to more air delivery per horsepower absorbed. The compressor shall include an aluminum cylinder head which shall improve cooling, reduce weight and decrease carbon formation. Superior piston and bore finishing technology shall reduce oil consumption and significantly increasing the system component life.



**AIR GOVERNOR**

An air governor shall be provided to control the cut-in and cut-out pressures of the engine mounted air compressor. The governor shall be calibrated to meet FMVSS requirements. The air governor shall be located on the air dryer bracket on the left frame rail behind the battery box.

**AUXILIARY AIR RESERVOIR**

One (1) auxiliary air reservoir with a 2084 cubic inch capacity shall be installed on the chassis to act as an additional reserve supply to the air system for air horn, air tool, or other non-service brake use. The reservoir shall be isolated with a 90 PSI pressure protection valve on the reservoir supply side to prevent depletion of the air to the air brake system.

**MOISTURE EJECTORS**

A heated, automatic moisture ejector with a manual drain provision shall be installed on the wet tank of the air supply system. Manual pet-cock type drain valves shall be installed on all remaining reservoirs of the air supply system.

**AIR SUPPLY LINES**

The air system on the chassis shall be plumbed with color coded reinforced nylon tubing air lines. The primary (rear) brake line shall be green, the secondary (front) brake line red, the parking brake line orange and the auxiliary (outlet) will be blue.

Brass compression type fittings shall be used on the nylon tubing. All drop hoses shall include fiber reinforced neoprene covered hoses.

**WHEELBASE**

The chassis wheelbase shall be 188.00 inches.

**REAR OVERHANG**

The chassis rear overhang shall be 50.00 inches.

**FRAME**

The frame shall consist of single rails running parallel to each other with cross members forming a ladder style frame. The frame rails shall be formed in the shape of a "C" channel, 10.25 inch web X 3.50 inches deep upper and lower flanges X 0.38 inches thick. Each rail shall be constructed of 110,000 psi minimum yield high strength low alloy steel. Each single rail shall be rated by a Resistance Bending Moment (RBM) minimum of 1,830,400 inch pounds and have a minimum section modulus of 16.64 cubic inches calculated by the radius method. The outside dimension frame shall measure 34.25 inches in width.

Proposals calculating the frame strength using the "box method" shall not be considered.

Proposals including heat treated rails shall not be considered. Heat treating frame rails produces rails that are not uniform in their mechanical properties throughout the length of the rail. Rails made of high strength, low alloy steel are already at the required yield strength prior to forming the rail.

A minimum of seven (7) fully gusseted 0.25 inch thick cross members shall be installed. The inclusion of the body mounting, or bumper mounting shall not be considered as a cross member. The cross members shall be attached using zinc coated grade 8 fasteners. The bolt heads shall be flanged type, held in place by distorted thread flanged lock nuts. Each cross member shall be mounted to the frame rails utilizing a

minimum of 0.25 inch thick gusset reinforcement plates at all corners balancing the area of force throughout the entire frame.

Any proposals not including additional reinforcement for each cross member shall not be considered.

All relief areas shall be cut in with a minimum 2.00 inch radius at intersection points with the edges ground to a smooth finish to prevent a stress concentration point.

The frame and cross members shall carry a lifetime warranty to the original purchaser. A copy of the frame warranty shall be made available upon request.

Proposals offering warranties for frames not including cross members shall not be considered.

### **FRAME WARRANTY**

Summary of Warranty Terms:

THE FOLLOWING IS SUMMARY OF WARRANTY TERMS FOR INFORMATION ONLY. THE ACTUAL LIMITED WARRANTY DOCUMENT, WHICH IS ATTACHED TO THIS OPTION, CONTAINS THE COMPLETE STATEMENT OF THE SPARTAN MOTORS USA LIMITED WARRANTY. SPARTAN'S RESPONSIBILITY IS TO BE ACCORDING TO THE TERMS OF THE COMPLETE LIMITED WARRANTY DOCUMENT.

The frame and cross members shall carry a limited lifetime warranty to the original purchaser. The warranty period shall commence on the date the vehicle is delivered to the first end user.

### **REAR TOW DEVICE**

Two (2) heavy duty painted tow eyes shall be installed extending rearward from the frame at the rear of the chassis. The tow eyes shall be fabricated from 0.75 inch thick #1020 ASTM-36 hot rolled steel. The inside diameter of the tow eye shall be 2.00 inches and shall have a chamfered edge. The tow eyes shall be bolted one (1) on each side to the outside of the chassis frame with grade 8 bolts. The tow eyes shall be painted to match the chassis frame.

### **FRAME CLEAR AREA**

The chassis frame shall be left clear of chassis mounted components inside the frame rails within the first 30.00 inches behind the cab to allow space for OEM installed components. Cross members may be installed in the clear area if required for proper frame or driveline configuration.

### **FRAME PAINT**

The frame shall be hot dip galvanized prior to assembly and attachment of any components. The components that shall be galvanized shall include:

- Main frame "C" channel or channels
- Front splayed rails and fish plates
- Cross members (excluding suspension cross members)
- Cross member gussets
- Fuel tank mounting brackets
- Air tank mounting brackets
- Exhaust mounting brackets

- Air cleaner skid plate
- Radiator skid plate
- Battery supports, battery trays and battery covers

The frame parts which are not galvanized shall be powder coated prior to any attachment of components. Parts which shall be powder coated shall include but are not limited to:

- Spring hangers
- Suspension components
- Steering gear bracket
- Front and rear axles

All powder coatings, primers and paint used on the non-galvanized components shall be compatible with all metals, pretreatments and primers used. The cross hatch adhesion test per ASTM D3359 shall not have a fail of more than ten (10) squares. The pencil hardness test per ASTM D3363 shall have a final post-cured pencil hardness of H-2H. The direct impact resistance test per ASTM D2794 shall have an impact resistance of 120.00 inches per pound at 2 mils.

### **FRONT BUMPER**

A one piece, two (2) rib wrap-around style, polished stainless steel front bumper with polished welded bumper tail end caps shall be provided. The material shall be 10 gauge 304 stainless steel, 12.00 inches high and 99.00 inches wide.

### **FRONT BUMPER EXTENSION LENGTH**

The front bumper shall be extended approximately 21.00 inches ahead of the cab.

### **FRONT BUMPER SUCTION PROVISION**

The bumper apron shall include a 5.00 inch stainless steel pipe intended for use as a suction intake for the pump. The suction pipe shall be routed from the right hand front bumper area to the area rear of the front axle near the back of the cab.

The front of the suction pipe shall be designed to extend vertically 1.50 inches above the top surface of the bumper in the right hand outboard position.

The forward end of the suction pipe shall be finished with a 5.00 inch National Pipe Thread (NPT). The rear of the suction shall include a Victaulic groove for connecting to the pump plumbing. The suction pipe shall also include a 0.50 inch NPT port intended as a primer assist connection.

The apparatus manufacturer shall plumb the suction pipe to the pump and shall provide all valves as required.

### **FRONT BUMPER APRON**

The 21.00 inch extended front bumper shall include an apron constructed of 0.19 inch thick embossed aluminum tread plate.

The apron shall be installed between the bumper and the front face of the cab affixed using stainless steel bolts attaching the apron to the top bumper flange.

**FRONT BUMPER COMPARTMENT CENTER**

The front bumper shall include a compartment in the bumper apron located in the center between the frame rails which may be used as a hose well. The compartment shall be constructed of 0.13 inch 5052-H32 grade aluminum and shall include drain holes in the bottom corners to allow excess moisture to escape.

**FRONT BUMPER COMPARTMENT LH**

The bumper shall include a compartment in the front bumper located on the left hand side of the bumper outboard of the frame rail which may be used as a hose well. The compartment shall be constructed of 0.13 inch 5052-H32 grade aluminum.

**MECHANICAL SIREN**

The front bumper shall include an electro mechanical Federal Q2B™ siren, which shall be streamlined, chrome-plated and shall produce 123 decibels of sound at 10.00 feet. The Q2B™ siren produces a distinctive warning sound that is recognizable at long distances. A unique clutch design provides a longer coast down sound while reducing the amp draw to 100 amps. The siren shall measure 10.50 inches wide X 10.00 inches high X 14.00 inches deep. The siren shall include a pedestal mount to surface mount on a horizontal surface.

**MECHANICAL SIREN LOCATION**

The siren shall be pedestal mounted on the bumper apron on the inboard section of the bumper on the driver side.

**AIR HORN**

The front bumper shall include two (2) Hadley brand E-Tone air horns which shall measure 21.00 inches long with a 6.00 inch round flare. The air horns shall be trumpet style with a chrome finish on the exterior and a painted finish deep inside the trumpet.

**AIR HORN LOCATION**

The air horns shall be recess mounted in the front bumper fascia between the frame rails in the right and left outboard positions.

**AIR HORN RESERVOIR**

One (1) air reservoir, with a 1200 cubic inch capacity, shall be installed on the chassis to act as a supply tank for operating air horns. The reservoir shall be isolated with a 90 PSI pressure protection valve on the reservoir supply side to prevent depletion of the air to the air brake system.

**ELECTRONIC SIREN SPEAKER**

There shall be two (2) Whelen Engineering Inc. model SP123BMC, 100 watt cast aluminum speakers provided. Each speaker shall measure 7.25 inches tall X 9.25 inches wide X 5.25 inches deep. Each speaker shall include a chrome grille.

**ELECTRONIC SIREN SPEAKER LOCATION**

The two (2) electronic siren speakers shall be located on the front bumper face outboard of the frame rails with one (1) on the right side and one (1) on the left side in the inboard positions.

### **CAB TILT SYSTEM**

The entire cab shall be capable of tilting approximately 45-degrees to allow for easy maintenance of the engine and transmission. The cab tilt pump assembly shall be located on the right side of the chassis above the battery box.

The electric-over-hydraulic lift system shall include an ignition interlock and red cab lock down indicator lamp on the tilt control which shall illuminate when holding the "Down" button to indicate safe road operation.

It shall be necessary to activate the master battery switch and set the parking brake in order to tilt the cab. As a third precaution the ignition switch must be turned off to complete the cab tilt interlock safety circuit.

Two (2) spring-loaded hydraulic hold down hooks located outboard of the frame shall be installed to hold the cab securely to the frame. Once the hold-down hooks are set in place, it shall take the application of pressure from the hydraulic cab tilt lift pump to release the hooks.

Two (2) cab tilt cylinders shall be provided with velocity fuses in each cylinder port. The cab tilt pivots shall be 1.90 inch ball and be anchored to frame brackets with 1.25 inch diameter studs.

A steel safety channel assembly, painted safety yellow shall be installed on the right side cab lift cylinder to prevent accidental cab lowering. The safety channel assembly shall fall over the lift cylinder when the cab is in the fully tilted position. A cable release system shall also be provided to retract the safety channel assembly from the lift cylinder to allow the lowering of the cab.

### **CAB TILT LIMIT SWITCH**

A cab tilt limit switch shall be installed. The switch will effectively limit the travel of the cab when being tilted. The limit adjustment of the switch shall be preset by the chassis manufacturer to prevent damage to the cab or any bumper mounted option mounted in the cab tilt arc. Further adjustment to the limit by the apparatus manufacturer shall be available to accommodate additional equipment.

### **CAB TILT CONTROL RECEPTACLE**

The cab tilt control cable shall include a receptacle which shall be temporarily located on the right hand chassis rail rear of the cab to provide a place to plug in the cab tilt remote control pendant. The tilt pump shall include 8.00 feet of cable with a six (6) pin Deutsch receptacle with a cap.

The remote control pendant shall include 20.00 feet of cable with a mating Deutsch connector. The remote control pendant shall be shipped loose with the chassis.

### **CAB WINDSHIELD**

The cab windshield shall have a surface area of 2825.00 square inches and be of a two (2) piece wraparound design for maximum visibility.

The glass utilized for the windshield shall include standard automotive tint. The left and right windshield shall be fully interchangeable thereby minimizing stocking and replacement costs.

Each windshield shall be installed using black self locking window rubber.

### **GLASS FRONT DOOR**

The front cab doors shall include a window which is 27.00 inches in width X 26.00 inches in height. These windows shall have the capability to roll down completely into the door housing. This shall be accomplished

using electric actuation. The left and right front door windows shall be controlled using a switch on each respective side inner door panel. The driver's door shall include a switch for each powered door window in the cab.

There shall be an irregular shaped fixed window which shall measure 2.50 inches wide at the top, 8.00 inches wide at the bottom X 26.00 inches in height, more commonly known as "cozy glass" ahead of the front door roll down windows.

The windows shall be mounted within the frame of the front doors trimmed with a black anodized ring on the exterior.

#### **GLASS TINT FRONT DOOR**

The windows located in the left and right front doors shall have a standard green automotive tint which shall allow seventy-five percent (75%) light transmittance.

#### **GLASS REAR DOOR RH**

The rear right hand side crew door shall include a window which is 27.00 inches in width X 26.00 inches in height. The window shall be a powered type and shall be controlled by a switch on the inner door panel and on the driver's control panel.

#### **GLASS TINT REAR DOOR RIGHT HAND**

The window located in the right hand side rear window shall include a dark gray automotive tint which shall allow forty-five percent (45%) light transmittance. The dark tint shall aid in cab cooling and help protect passengers from radiant solar energy.

#### **GLASS REAR DOOR LH**

The rear left hand side crew door shall include a window which is 27.00 inches in width X 26.00 inches in height. The window shall be a powered type and shall be controlled by a switch on the inner door panel and on the driver's control panel.

#### **GLASS TINT REAR DOOR LEFT HAND**

The window located in the left hand side rear door shall include a dark gray automotive tint which shall allow forty-five percent (45%) light transmittance. The dark tint shall aid in cab cooling and help protect passengers from radiant solar energy.

#### **GLASS SIDE MID RH**

The cab shall include a window on the right side behind the front and ahead of the crew door which shall measure 16.00 inches wide X 26.00 inches high. This window shall be fixed within this space and shall be rectangular in shape. The window shall be mounted using self locking window rubber. The glass utilized for this window shall include a green automotive tint unless otherwise noted.

#### **GLASS TINT SIDE MID RIGHT HAND**

The window located on the right hand side of the cab between the front and rear doors shall include a dark gray automotive tint which shall allow forty-five percent (45%) light transmittance. The dark tint shall aid in cab cooling and help protect passengers from radiant solar energy.

#### **GLASS SIDE MID LH**

The cab shall include a window on the left side behind the front door and ahead of the crew door and above the wheel well which shall measure 16.00 inches wide X 26.00 inches high. This window shall be fixed within this space and shall be rectangular in shape. The window shall be mounted using self locking window rubber. The glass utilized for this window shall include a green automotive tint unless otherwise noted.

#### **GLASS TINT SIDE MID LEFT HAND**

The window located on the left hand side of the cab between the front and rear doors shall include a dark gray automotive tint which shall allow forty-five percent (45%) light transmittance. The dark tint shall aid in cab cooling and help protect passengers from radiant solar energy.

#### **CLIMATE CONTROL**

The cab shall include a 57,500 BTU @ 425 CFM front overhead heater/defroster which shall be provided and installed above the windshield between the sun visors.

The cab shall also include a combination heater air-conditioning unit mounted on the engine tunnel. This unit shall offer eight (8) adjustable louvers, four (4) forward facing and four (4) rearward facing, a temperature control valve and two (2) blowers offering three (3) speeds which shall be capable of circulating 550 cubic feet of air per minute. The unit shall be rated for 42,500 BTU/Hr of cooling and 36,000 BTU/Hr of heating. The temperature and blower controls shall be located on the heater/air conditioning unit.

All defrost/heating systems shall be plumbed with one (1) seasonal shut-off valve at the front corner on the right side of the cab.

The air conditioner lines shall be a mixture of custom bend zinc coated steel fittings and Aero-quip GH 134 flexible hose with Aero-quip EZ clip fittings.

#### **CLIMATE CONTROL DRAIN**

The climate control system shall include a gravity drain for water management. The gravity drain shall remove condensation from the air conditioning system without additional mechanical assistance.

#### **CLIMATE CONTROL ACTIVATION**

The heating and defrosting controls shall be located on the front overhead climate control unit. There shall be additional heating and air conditioning controls located on the engine tunnel mounted climate control unit.

#### **A/C CONDENSER LOCATION**

A frame mounted A/C condenser shall be installed below the left side chassis rail.

#### **A/C COMPRESSOR**

The air-conditioning compressor shall be a belt driven, engine mounted, open type compressor that shall be capable of producing a minimum of 32,000 BTU at 1500 engine RPMs. The compressor shall utilize R-134A refrigerant and PAG oil.

#### **UNDER CAB INSULATION**

The underside of the cab tunnel surrounding the engine shall be lined with multi-layer insulation, engineered for application inside diesel engine compartments.

The insulation shall act as a noise barrier, absorbing noise thus keeping the decibel level in the cab well within NFPA recommendations. As an additional benefit, the insulation shall assist in sustaining the desired temperature within the cab interior.

The engine tunnel insulation shall measure approximately 0.75 inch thick including a vertically lapped polyester fiber layer, a 1.0 lb/ft<sup>2</sup> PVC barrier layer, an open cell foam layer, and a moisture and heat reflective foil facing reinforced with a woven fiberglass layer. The foil surface acts as protection against moisture and other contaminants. The insulation shall meet or exceed FMVSS 302 flammability test.

The insulation shall be cut precisely to fit each section and sealed for additional heat and sound deflection. The insulation shall be held in place by 3 mils of acrylic pressure sensitive adhesive and aluminum pins with hard hat, hold in place fastening heads.

### **INTERIOR TRIM FLOOR**

The floor of the cab shall be covered with a multi-layer mat consisting of 0.25 inch thick sound absorbing closed cell foam with a 0.06 inch thick non-slip vinyl surface with a pebble grain finish. The covering shall be held in place by a pressure sensitive adhesive and aluminum trim molding. All exposed seams shall be sealed with silicone caulk matching the color of the floor mat to reduce the chance of moisture and debris retention.

### **INTERIOR TRIM**

The cab interior shall include trim on the front ceiling, rear crew ceiling, and the cab walls. It shall be easily removable to assist in maintenance. The trim shall be constructed of insulated vinyl over a hard board backing.

### **REAR WALL INTERIOR TRIM**

The rear wall of the cab shall be trimmed with vinyl.

### **HEADER TRIM**

The cab interior shall feature header trim over the driver and officer dash constructed of 5052-H32 Marine Grade, 0.13 inch thick aluminum.

### **TRIM CENTER DASH**

The main center dash area shall be constructed of durable vacuum formed ABS composite.

### **TRIM LH DASH**

The left hand dash shall be a one (1) piece durable vacuum formed ABS composite housing which shall be custom molded for a perfect fit around the instrument panel. The left hand dash shall offer lower vertical surface area to the left and right of the steering column to accommodate control panels.

### **TRIM RH DASH**

The right hand dash trim shall consist of a vacuum formed ABS composite module, which contains a glove compartment with a hinged locking door and a Mobile Data Terminal (MDT) provision. The glove compartment size shall be 13.50 inches wide X 6.25 inches high X 5.50 inches deep. The MDT provision shall be provided above the glove compartment.

### **ENGINE TUNNEL TRIM**



The cab engine tunnel shall be covered with a multi-layer mat consisting of 0.25 inch closed cell foam with a 0.06 inch thick non-slip vinyl surface with a pebble grain finish. The mat shall be held in place by pressure sensitive adhesive. The engine tunnel mat shall be trimmed with anodized aluminum stair nosing trim for an aesthetically pleasing appearance.

### **STEP TRIM**

Each cab entry door shall include a three step entry. The first step closest to the ground shall be constructed of polished 5032 H32 aluminum Grip Strut® grating with angled outer corners. The step shall feature a splash guard to reduce water and debris from splashing in to the step. The splash guard shall have an opening on the outer edge to allow debris and water to flow through rather than becoming trapped within the stepping surface. The lower step shall be mounted to a frame which is integral with the construction of the cab for rigidity and strength. The middle step shall be integral with the cab construction and shall be trimmed with a Flex-Tred® adhesive grit surface material.

### **UNDER CAB ACCESS DOOR**

The cab shall include an aluminum access door in the left crew step riser painted to match the cab interior paint with a push and turn latch. The under cab access door shall provide access to the diesel exhaust fluid fill.

### **INTERIOR DOOR TRIM**

The interior trim on the doors of the cab shall consist of an aluminum panel constructed of Marine Grade 5052-H32 0.13 of an inch thick aluminum plate. The door panels shall include a painted finish.

### **DOOR TRIM CUSTOMER NAMEPLATE**

The interior door trim on the front doors shall include a customer nameplate which states the vehicle was custom built for their Department.

### **CAB DOOR TRIM REFLECTIVE**

The interior of each door shall include high visibility reflective tape. A white reflective tape shall be provided vertically along the outer rear edge of the door. The lowest portion of each door skin shall include a reflective tape chevron with red and white stripes. The chevron tape shall measure 6.00 inches in height.

### **INTERIOR GRAB HANDLE "A" PILLAR**

There shall be two (2) rubber covered 11.00 inch grab handles installed inside the cab, one on each "A" post at the left and right door openings. The left handle shall be located 7.88 inches above the bottom of the door window opening and the right handle shall be located 2.88 inches above the bottom of the door window opening. The handles shall assist personnel in entering and exiting the cab.

### **INTERIOR GRAB HANDLE FRONT DOOR**

Each front door shall include one (1) ergonomically contoured 9.00 inch cast aluminum handle mounted horizontally on the interior door panels. The handles shall feature a textured black powder coat finish to assist personnel entering and exiting the cab.

### **INTERIOR GRAB HANDLE REAR DOOR**

A black powder coated cast aluminum assist handle shall be provided on the inside of each rear crew door. A 30.00 inch long handle shall extend horizontally the width of the window just above the window sill. The handle shall assist personnel in exiting and entering the cab.

#### **INTERIOR SOFT TRIM COLOR**

The cab interior soft trim surfaces shall be gray in color.

#### **INTERIOR TRIM SUNVISOR**

The header shall include two (2) sun visors, one each side forward of the driver and officer seating positions above the windshield. Each sun visor shall be constructed of Masonite and covered with padded vinyl trim.

#### **INTERIOR ABS TRIM COLOR**

The cab interior vacuum formed ABS composite trim surfaces shall be gray in color.

#### **INTERIOR FLOOR MAT COLOR**

The cab interior floor mat shall be gray in color.

#### **CAB PAINT INTERIOR DOOR TRIM**

The inner door panel surfaces shall be painted with multi-tone silver gray texture finish.

#### **HEADER TRIM INTERIOR PAINT**

The metal surfaces in the header area shall be coated with multi-tone silver gray texture finish.

#### **DASH PANEL GROUP**

The main center dash area shall include three (3) removable panels located one (1) to the right of the driver position, one (1) in the center of the dash and one (1) to the left of the officer position. The center panel shall be within comfortable reach of both the driver and officer.

#### **SWITCHES CENTER PANEL**

The center dash panel shall include no rocker switches or legends.

#### **SWITCHES LEFT PANEL**

The left dash panel shall include five (5) switches in a three (3) over two (2) staggered switch configuration. Two (2) rocker switches, one (1) headlight switch, one (1) windshield wiper/washer control switch and one (1) instrument lamp dimmer switch shall be provided.

A rocker switch with a blank legend installed directly above shall be provided for any position not designated by a specific option. The non-designated switches shall be two-position, black switches with a green indicator light. Each blank switch legend can be custom engraved by the body manufacturer. All switch legends shall have backlighting provided.

#### **SWITCHES RIGHT PANEL**

The right dash panel shall include no rocker switches or legends.

#### **SEAT BELT WARNING**

A Weldon seat belt warning system, integrated with the Vehicle Data Recorder system, shall be installed for each seat within the cab. The system shall provide a visual warning indicator in the Vista display and control screen(s), an indicator light in the instrument panel, and an audible alarm.

The warning system shall activate when any seat is occupied with a minimum of 60 pounds, the corresponding seat belt remains unfastened, and the park brake is released. The warning system shall also activate when any seat is occupied, the corresponding seat belt was fastened in an incorrect sequence, and the park brake is released. Once activated, the visual indicators and audible alarm shall remain active until all occupied seats have the seat belts fastened.

### **SEAT MATERIAL**

The seats shall include a covering of high strength, wear resistant fabric made of durable ballistic polyester. A PVC coating shall be bonded to the back side of the material to help protect the seats from UV rays and from being saturated or contaminated by fluids. Common trade names for this material are Imperial 1200 and Durawear.

### **SEAT COLOR**

All seats supplied with the chassis shall be gray in color. All seats shall include red seat belts.

### **SEAT BACK LOGO**

The seat backs shall include the logo for the OEM body manufacturer. The logo shall be centered on the standard headrest of the seat back and on the left side of a split headrest.

### **SEAT DRIVER**

The driver's seat shall be an H.O. Bostrom 400 Series Sierra model seat with air suspension. The four-way seat shall feature 3.00 inch vertical travel air suspension and manual fore and aft adjustment with 5.00 inches of travel. The suspension control shall be located on the seat below the left front corner of the bottom cushion. The seat shall also feature integral springs to isolate shock.

The seat position shall include a three-point shoulder harness with lap belt and an automatic retractor attached to the cab. The buckle portion of the seat belt shall be mounted on a semi-rigid stalk extending from the seat base within easy reach of the occupant.

The minimum vertical dimension from the seat H-point to the ceiling for this belted seating position shall be 37.00 inches measured with the seat suspension height adjusted to the upper limit of its travel.

This model of seat shall have successfully completed the static load tests set forth by FMVSS 207, 209, and 210 in effect at the time of manufacture. This testing shall include a simultaneous forward load of 3000 pounds each on the lap and shoulder belts and twenty (20) times the weight through the center of gravity.

The materials used in construction of the seat shall also have successfully completed testing with regard to the flammability of materials used in the occupant compartments of motor vehicles as outlined in FMVSS 302, of which dictates the allowable burning rate of materials in the occupant compartments of motor vehicles.

### **SEAT BACK DRIVER**

The driver's seat shall feature a two (2) way adjustable lumbar support and offer an infinite fully reclining adjustable tilting seat back. The seat back shall also feature a contoured head rest.

### **SEAT MOUNTING DRIVER**

The driver's seat shall be installed in an ergonomic position in relation to the cab dash.

### **OCCUPANT PROTECTION DRIVER**

The driver's position shall be equipped with the Advanced Protection System™ (APS). The APS shall selectively deploy integrated systems to protect against injuries in qualifying frontal impact, side impact, and rollover events. The increase in survivable space and security of the APS shall also provide ejection mitigation protection.

The driver's seating area APS shall include:

- Advanced seat belt system - retractor pre-tensioner tightens the seat belt around the driver, securing the occupant in the seat and the load limiter plays out some of the seat belt webbing to reduce seat belt to chest and torso force upon impact as well as mitigate head and neck injuries.
- Large side curtain airbag - protects the driver's head, neck, and upper body from dangerous cab side surfaces and contact points with intrusive surfaces as a result of a collision as well as provides ejection mitigation protection to the driver in a qualifying event by covering the window and the upper portion of the door.
- Dual knee airbags (patent pending) with energy management mounting (patent pending) - protects the driver's lower body from dangerous surface contact injuries, acceleration injuries, and from intrusion as well as locks the lower body in place so the upper body shall be slowed by the load limiting seat belt.

Steering wheel airbag - protects the driver's head, neck, and upper torso from contact injuries, acceleration injuries, and contact points with intrusive surfaces as a result of a collision.

### **SEAT OFFICER**

The officer's seat shall be a H.O. Bostrom 400 Series Firefighter series. The seat shall feature a tapered and padded seat, and cushion. The seat shall be a non-adjustable type seat.

The seat shall feature an all belts to seat (ABTS) style of safety restraint. The ABTS feature shall include a three-point shoulder harness with the lap belt and automatic retractor as an integral part of the seat assembly. The buckle portion of the seat belt shall extend from the seat base towards the driver position within easy reach of the occupant.

The minimum vertical dimension from the seat H-point to the ceiling for this belted seating position shall be 35.00 inches.

This model of seat shall have successfully completed the static load tests by FMVSS 207/210. This testing shall include a simultaneous forward load of 3000 pounds each on the lap and shoulder belts and twenty (20) times the weight through the center of gravity. This model of seat installed in the cab model, as specified, shall have successfully completed the dynamic sled testing using FMVSS 208 as a guide with the following accommodations. In order to reflect the larger size outfitted firefighters, the test dummy used shall be a 95th percentile hybrid III male weighing 225 pounds rather than the 50th percentile male dummy weighing 165 pounds as referenced in FMVSS 208. The model of seats shall also have successfully completed the flammability of materials used in the occupant compartments of motor vehicles as outlined in FMVSS 302, of which decides the burning rate of materials in the occupant compartments of motor vehicles.

### **SEAT BACK OFFICER**

The officer's seat back shall include an IMMI brand SmartDock® Gen 2 hands-free self contained breathing apparatus (SCBA) holder. The hands-free holder shall meet NFPA 1901-03 9G dynamic requirements for cylinder restraint systems for use in crew compartments of emergency response vehicles. The bracket shall accommodate and secure most types of self-contained breathing apparatus cylinders.

The hands-free holder shall consist of a back plate, bottom cradle, non-marring top claws, and claw height adjustment knob. The height adjustment knob shall allow for easy adjustment of the claws to the SCBA. The hands-free holder's claws shall lock from inertial forces to prevent the SCBA from becoming a projectile in the event of a crash to meet the NFPA 1901-03 standard for SCBA retention. The SCBA holder shall offer single-motion insertion into the claws and hands-free release when the SCBA fitted seat occupant rises.

The seat back shall include a removable padded cover which shall be provided over the SCBA cavity.

### **SEAT MOUNTING OFFICER**

The officer's seat shall be installed in an ergonomic position in relation to the cab dash.

### **OCCUPANT PROTECTION OFFICER**

The officer's position shall be equipped with the Advanced Protection System™ (APS). The APS shall selectively deploy integrated systems to protect against injuries in qualifying frontal impact, side impact, and rollover events. The increase in survivable space and security of the APS shall also provide ejection mitigation protection.

The officer's seating area APS shall include:

- Advanced seat belt system - retractor pre-tensioner tightens the seat belt around the officer, securing the occupant in the seat and the load limiter plays out some of the seat belt webbing to reduce seat belt to chest and torso force upon impact as well as mitigate head and neck injuries.
- Large side curtain airbag - protects the officer's head, neck, and upper body from dangerous cab side surfaces and contact points with intrusive surfaces as a result of a collision as well as provides ejection mitigation protection to the officer in a qualifying event by covering the window and the upper portion of the door.

Knee airbags - protects the officer's lower body from dangerous surface contact injuries, acceleration injuries, and from contact points with intrusive surfaces as a result of a collision as well as locks the lower body in place so the upper body shall be slowed by the load limiting seat belt.

### **SCBA MASK POUCH OFFICER**

The officer's seat shall feature a pouch designed specifically to contain the mask attached to self contained breathing apparatus. This pouch shall keep the mask safe from scratches and abrasions while the breathing apparatus is contained within the seat back.

### **SEAT BELT ORIENTATION CREW**

The crew position seat belts shall follow the standard orientation which extends from the outboard shoulder extending to the inboard hip.

### **SEAT REAR FACING OUTER LOCATION**

The crew area shall include two (2) rear facing crew seats, which include one (1) located directly behind the left side front seat and one (1) located directly behind the right side front seat.

### **SEAT CREW REAR FACING OUTER**

The crew area shall include a seat in the rear facing outboard position which shall be a H.O. Bostrom 400 Series Firefighter model seat. The seat shall feature a tapered and padded seat, and cushion.

The seat shall feature an all belts to seat (ABTS) style of safety restraint. The ABTS feature shall include a three-point shoulder harness with the lap belt and automatic retractor as an integral part of the seat assembly. The buckle portion of the seat belt shall extend from the seat base towards the driver position within easy reach of the occupant.

The minimum vertical dimension from the seat H-point to the ceiling for each belted seating position shall be 35.00 inches.

This model of seat shall have successfully completed the static load tests by FMVSS 207/210. This testing shall include a simultaneous forward load of 3000 pounds each on the lap and shoulder belts and twenty (20) times the weight through the center of gravity. This model of seat installed in the cab model, as specified, shall have successfully completed the dynamic sled testing using FMVSS 208 as a guide with the following accommodations. In order to reflect the larger size outfitted firefighters, the test dummy used shall be a 95th percentile hybrid III male weighing 225 pounds rather than the 50th percentile male dummy weighing 165 pounds as referenced in FMVSS 208. The model of seats shall also have successfully completed the flammability of materials used in the occupant compartments of motor vehicles as outlined in FMVSS 302, of which decides the burning rate of materials in the occupant compartments of motor vehicles.

### **SEAT BACK REAR FACING OUTER**

The crew area seat backs shall include an IMMI brand SmartDock® Gen 2 hands-free self contained breathing apparatus (SCBA) holder. The hands-free holder shall meet NFPA 1901-03 9G dynamic requirements for cylinder restraint systems for use in crew compartments of emergency response vehicles. The bracket shall accommodate and secure most types of self-contained breathing apparatus cylinders.

The hands-free holder shall consist of a back plate, bottom cradle, non-marring top claws, and claw height adjustment knob. The height adjustment knob shall allow for easy adjustment of the claws to the SCBA. The hands-free holder's claws shall lock from inertial forces to prevent the SCBA from becoming a projectile in the event of a crash to meet the NFPA 1901-03 standard for SCBA retention. The SCBA holder shall offer single-motion insertion into the claws and hands-free release when the SCBA fitted seat occupant rises.

The seat back shall include a removable padded cover which shall be provided over the SCBA cavity.

### **SEAT MOUNTING REAR FACING OUTER**

The rear facing outer seats shall offer special mounting positions which shall be 2.00 inches towards the rear wall offering additional space between the front seats and the outer rear facing seats.

### **OCCUPANT PROTECTION RFO**

The rear facing outer seat position(s) shall be equipped with the Advanced Protection System™ (APS). The APS shall selectively deploy integrated systems to protect against injuries in qualifying frontal impact, side impact, and rollover events. The increase in survivable space and security of the APS shall also provide ejection mitigation protection.

Each rear facing outer seating position APS shall include:

- APS advanced seat belt system - retractor pre-tensioners tighten the seat belts around each occupant, securing the occupants in seats and load limiters play out some of the seat belt webbing to reduce seat belt to chest and torso force upon impact as well as mitigate head and neck injuries.

Side curtain airbag - protects each occupant's head, neck, and upper body from dangerous cab side surfaces and contact points with intrusive surfaces as a result of a collision as well as provides ejection mitigation protection to each occupant in a qualifying event by covering the windows and walls adjacent to each seating position with an airbag custom designed for each cab configuration.

### **SEAT FORWARD FACING CENTER LOCATION**

The crew area shall include two (2) forward facing center crew seats with both located at the center of the rear wall.

### **SEAT CREW FORWARD FACING CENTER**

The crew area shall include a seat in the forward facing center position which shall be a theatre style series. The seat shall feature a padded seat cushion which shall be hinged and attached to the wall providing optimum space savings. The padded rear wall trim shall act as the backrest for the seat position. The seat shall remain in the stored position until occupied.

The minimum vertical dimension from the seat H-point to the ceiling for each belted seating position shall be 35.00 inches.

This model of seat shall have successfully completed the static load tests by FMVSS 207/210. This testing shall include a simultaneous forward load of 3000 pounds each on the lap and shoulder belts and twenty (20) times the weight through the center of gravity. This model of seat installed in the cab model, as specified, shall have successfully completed the dynamic sled testing using FMVSS 208 as a guide with the following accommodations. In order to reflect the larger size outfitted firefighters, the test dummy used shall be a 95th percentile hybrid III male weighing 225 pounds rather than the 50th percentile male dummy weighing 165 pounds as referenced in FMVSS 208. The model of seats shall also have successfully completed the flammability of materials used in the occupant compartments of motor vehicles as outlined in FMVSS 302, of which decides the burning rate of materials in the occupant compartments of motor vehicles.

### **SEAT BACK FORWARD FACING CENTER**

The crew area shall include a seat in the forward facing center position which shall be a theatre style seat. The rear wall padded trim shall act as the backrest for each seat.

There shall be a red, three-point shoulder harness with lap belt and an automatic retractor attached to the cab and available to the seat. 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. The seat belt assembly anchorages shall conform to the Federal Safety Standard (FMVSS) No. 210, "Seat belt assembly anchorages".

### **OCCUPANT PROTECTION FFC**

The forward facing center seat position(s) shall be equipped with the Advanced Protection System™ (APS). The APS shall selectively deploy integrated systems to protect against injuries in qualifying frontal impact, side impact, and rollover events. The increase in survivable space and security of the APS shall also provide ejection mitigation protection.

Each forward facing center seating position APS shall include:

- APS advanced seatbelt system - retractor pre-tensioners tighten the seat belts around each occupant, securing the occupants in seats and load limiters play out some of the seat belt webbing to reduce seat belt to chest and torso force upon impact as well as mitigate head and neck injuries.

Side curtain airbag - provides ejection mitigation protection to each occupant in a qualifying event by covering the windows and walls adjacent to crew seating with an airbag custom designed for each cab configuration.

### **SEAT MOUNTING FORWARD FACING CENTER**

The forward facing center seats shall be installed facing the front of the cab.

### **CAB FRONT UNDERSEAT STORAGE ACCESS**

The left and right under seat storage areas shall have a solid aluminum hinged door with non-locking latch.

### **SEAT COMPARTMENT DOOR FINISH**

All underseat storage compartment access doors shall have a multi-tone silver gray texture finish.

### **WINDSHIELD WIPER SYSTEM**

The cab shall include a dual arm wiper system which shall clear the windshield of water, ice and debris. There shall be two (2) windshield wipers which shall be affixed to a radial wet arm. The system shall include a single motor which shall initiate the arm in which both the left hand and right hand windshield wipers are attached, initiating a back and forth motion for each wiper. The wiper motor shall be activated by an intermittent wiper control located within easy reach of the driver's position.

### **ELECTRONIC WINDSHIELD FLUID LEVEL INDICATOR**

The windshield washer fluid level shall be monitored electronically. When the washer fluid level becomes low the yellow "Check Message Center" indicator light on the instrument panel shall illuminate and the message center in the dual air pressure gauge shall display a "Check Washer Fluid Level" message.

### **CAB DOOR HARDWARE**

The cab entry doors shall be equipped with exterior pull handles, suitable for use while wearing firefighter gloves. The handles shall be made of aluminum with a chrome plated finish.

The interior exit door handles shall be flush paddle type with a black finish, which are incorporated into the upper door panel.

All cab entry doors shall include locks which are keyed alike. The door locks shall be designed to prevent accidental lockout.

### **DOOR LOCKS**

Each cab entry door shall include a manually operated door lock. Each door lock may be actuated from the inside of the cab by means of a red knob located on the paddle handle of the respective door or by using a TriMark key from the exterior. The door locks are designed to prevent accidental lock out.

### **GRAB HANDLES**

The cab shall include one (1) 18.00 inch knurled, anti-slip, one-piece exterior assist handle behind each cab door. The assist handle shall be made of SAE 304 stainless steel and be 1.25 inch diameter to



enable easy grabbing with the gloved hand. Each assist handle shall include a stainless steel plate which saves the cab from scuffs through continued use of the handle.

### **REARVIEW MIRRORS**

Ramco model CRM-310-1750-CHCHR bus style mirrors shall be provided. The mirror heads shall be injection molded chrome plated ABS plastic and shall measure 9.50 inches wide X 17.50 inches high. The mirrors shall be mounted one (1) on each the driver and officer doors of the cab with polished die-cast aluminum arms.

The mirrors shall feature an upper heated remote controlled flat glass and a lower heated manually adjustable convex glass. The mirror control switches shall be located within easy reach of the driver. The mirrors shall be manufactured using the finest quality non-glare glass and shall feature a rigid mounting thereby reducing vibration. The mirrors shall be corrosion free under all weather conditions.

### **REARVIEW MIRROR HEAT SWITCH**

The heat for the rearview mirrors shall be controlled through a virtual button on the Vista display and control screen.

### **CAB FENDER**

Full width wheel well liners shall be installed on the extruded cab to limit road splash and enable easier cleaning. Each two-piece liner shall consist of an inner liner 16.00 inches wide made of vacuum formed ABS composite and an outer fenderette 5.00 inches wide made of polished aluminum.

### **MUD FLAPS FRONT**

The front wheel wells shall have mud flaps installed on them.

### **CAB EXTERIOR FRONT & SIDE EMBLEMS**

The cab shall include three (3) Spartan emblems and two (2) Advanced Protection System shield emblems. The emblems shall be included in the cab shipped loose components for installation by the body builder.

### **IGNITION**

A master battery system with a keyless start ignition system shall be provided. Each system shall be controlled by a one-quarter turn Cole Hersee switch, both of which shall be mounted to the left of the steering wheel on the dash. A chrome push type starter button shall be provided adjacent to the master battery and ignition switches.

Each switch shall illuminate a green LED indicator light on the dash when the respective switch is placed in the "ON" position.

The starter button shall only operate when both the master battery and ignition switches are in the "ON" position.

### **BATTERY**

The single start electrical system shall include six (6) Harris BCI 31 925 CCA batteries with a 210 minute reserve capacity and 4/0 welding type dual path starter cables per SAE J541.

### **BATTERY TRAY**

The batteries shall be installed within two (2) steel battery trays located on the left side and right side of the chassis, securely bolted to the frame rails. The battery trays shall be coated with the same material as the frame.

The battery trays shall include drain holes in the bottom for sufficient drainage of water. A durable, non-conducting, interlocking mat made by Dri-Dek shall be installed in the bottom of the trays to allow for air flow and help prevent moisture build up. The batteries shall be held in place by non-conducting phenolic resin hold down boards.

### **BATTERY BOX COVER**

Each battery box shall include a steel cover which protects the top of the batteries. Each cover shall include flush latches which shall keep the cover secure as well as a black powder coated handle for convenience when opening.

### **BATTERY CABLE**

The starting system shall include cables which shall be protected by 275 degree F. minimum high temperature flame retardant loom, sealed at the ends with heat shrink and sealant.

### **BATTERY JUMPER STUD**

The starting system shall include battery jumper studs. These studs shall be located in the forward most portion of the driver's side lower step. The studs shall allow the vehicle to be jump started, charged, or the cab to be raised in an emergency in the event of battery failure.

### **ALTERNATOR**

The charging system shall include a 320 amp Leece-Neville 12 volt alternator. The alternator shall include a self-exciting integral regulator.

### **BATTERY CONDITIONER**

A Kussmaul 1200 Pump Plus battery conditioner shall be supplied. The battery conditioner shall be mounted in the cab in the area between the driver seat and the LH rear facing outer seat position.

### **BATTERY CONDITIONER DISPLAY**

A Kussmaul battery conditioner display shall be supplied. The battery conditioner display shall be mounted in the cab, viewable through the cab mid side window behind the left front door.

### **AUXILIARY AIR COMPRESSOR**

A Kussmaul Pump 12V air compressor shall be supplied. The air compressor shall be installed behind the driver's seat. The air compressor shall be plumbed to the air brake system to maintain air pressure.

### **ELECTRICAL INLET**

A Kussmaul 20 amp super auto-eject electrical receptacle shall be supplied. It shall automatically eject the plug when the starter button is depressed.

A single item or an addition of multiple items must not exceed the rating of the electric inlet that it's connected to.

### **Amp Draw Reference List:**

*Kussmaul 1000 Charger - 3.5 Amps*  
*Kussmaul 1200 Charger - 10 Amps*  
*Kussmaul 35/10 Charger - 10 Amps*  
*1000W Engine Heater - 8.33 Amps*  
*1500W Engine Heater - 12.5 Amps*  
*120V Air Compressor - 4.2 Amps*

### **ELECTRICAL INLET LOCATION**

An electrical inlet shall be installed on the left hand side of the cab ahead of the front door.

### **ELECTRICAL INLET CONNECTION**

The electrical inlet shall be connected to the battery conditioner.

### **ELECTRICAL INLET COLOR**

The electrical inlet connection shall include a yellow cover.

### **HEADLIGHTS**

The cab front shall include four (4) rectangular LED headlamps with separate high and low beams mounted in bright chrome bezels.

### **FRONT TURN SIGNALS**

The front fascia shall include two (2) Whelen model 600 4.00 inch X 6.00 inch programmable LED amber turn signals which shall be installed in a chrome bezel outboard of the front warning and above the headlamps.

### **HEADLIGHT LOCATION**

The headlights shall be located on the front fascia of the cab directly below the front warning lights.

### **SIDE TURN/MARKER LIGHTS**

The sides of the cab shall include two (2) LED round side marker lights which shall be provided just behind the front cab radius corners.

### **MARKER AND ICC LIGHTS**

In accordance with FMVSS, there shall be five (5) LED cab marker lamps designating identification, center and clearance provided. These lights shall be installed on the face of the cab within full view of other vehicles from ground level.

### **HEADLIGHT AND MARKER LIGHT ACTIVATION**

The headlights and marker lights shall be controlled through a rocker switch within easy reach of the driver. There shall be a dimmer switch within easy reach of the driver to adjust the brightness of the dash lights. The headlamps shall be equipped with the "Daytime Running" light feature, which shall illuminate the headlights to 80% brilliance when the battery master switch is in the "On" position and the parking brake is released.

### **GROUND LIGHTS**

Each door shall include an NFPA compliant LED ground light mounted to the underside of the cab step below each door. The lights shall include a polycarbonate lens, a housing which is vibration welded and LEDs which shall be shock mounted for extended life. The ground lighting shall be activated by the opening of the door on the respective cab side as well as through a virtual button on the Vista display and control screen.

### **LOWER CAB STEP LIGHTS**

The middle step located at each door shall include a recess mounted 4.00 inch round LED light which shall activate with the ground lights.

### **INTERMEDIATE STEP LIGHTS**

The intermediate step well area at each door shall include an LED light within a chrome housing. The Egress step lights shall provide visibility to the step well area for the first step exiting the vehicle. The Egress step lights shall activate with Entry step lighting.

### **UNDER BUMPER LIGHTS**

There shall be two (2) 4.00 inch round LED ground lights mounted under the bumper. The lights shall include a polycarbonate lens, a housing which is vibration welded, and LEDs which shall be shock mounted for extended life. The under bumper ground lighting shall be interlocked with the park brake.

### **ENGINE COMPARTMENT LIGHT**

There shall be an LED NFPA compliant light mounted under the engine tunnel for area work lighting on the engine. The light shall include a polycarbonate lens, a housing which is vibration welded and a bulb which shall be shock mounted for extended life. The light shall activate automatically when the cab is tilted.

### **LIGHTBAR PROVISION**

There shall be three (3) light bars installed on the cab roof. The light bars shall be provided and installed by Spartan Chassis. The light bar installation shall include a lowered mounting that shall place the light bar just above the junction box and wiring to a control switch on the cab dash.

### **CAB FRONT LIGHTBAR**

The lightbar provisions shall be for one (1) Whelen Mini Edge Ultra Freedom IV series forward facing lightbar mounted centered on the front of the cab roof. The lightbar shall be 21.50 inches in length. The lightbar shall feature two (2) red LED light modules and two (2) clear LED light modules. The clear lights shall be disabled with park brake engaged. The cable shall exit the light bar on the right side of the cab.

There shall also be lightbar provisions for two (2) Whelen Mini Edge Ultra Freedom IV series forward facing lightbars mounted on the left and right side of the front cab roof, each at a 30 degree angle. Each lightbar shall be 21.50 inches in length. Each lightbar shall feature five (5) red LED light modules per lightbar. The cables shall exit the lightbars near the center of each lightbar.

### **LIGHTBAR SWITCH**

The light bar shall be controlled by a virtual button on the Vista display and control screen. This button shall be clearly labeled for identification.

### **FRONT SCENE LIGHTS**

The front of the cab shall include two (2) Fire Research Spectra model, universal mount scene lights installed on the brow of the cab.

Each lamp head shall have eighty-four (84) ultra-bright white LEDs, seventy-two (72) for flood lighting and twelve (12) to provide a spot light beam pattern. Each lamp head shall draw 18 amps and generate 20,000 lumens. Each lamp head shall have a unique lens that directs flood lighting onto the work area and focuses the spot light beam into the distance. The angle of elevation of the lamp head shall be adjustable at a pivot in the mounting arm and the position locked with a round knurled locking knob. Each lamp head shall incorporate heat-dissipating fins and be no more than 6.00 inches high by 14.00 inches wide. Each lamp head shall be powder coated white.

### **FRONT SCENE LIGHTS ACTIVATION**

The front scene lighting shall be activated by a virtual button on the Vista display and control screen.

### **FRONT SCENE LIGHT LOCATION**

There shall be two (2) scene lights mounted to the front brow of the cab inboard of the outer front marker lights.

### **INTERIOR OVERHEAD LIGHTS**

The cab shall include a two-section, red and clear Weldon LED dome lamp located over each door. The dome lamps shall be rectangular in shape and shall measure approximately 7.00 inches in length X 3.00 inches in width with a black colored bezel. The clear portion of each lamp shall be activated by opening the respective door and both the red and clear portion can be activated by individual push lenses on each lamp.

An additional incandescent three (3) light module with dual map lights shall be located over the engine tunnel which can be activated by individual switches on the lamp.

### **DO NOT MOVE APPARATUS LIGHT**

The front headliner of the cab shall include a flashing red Whelen Ion LED light clearly labeled "Do Not Move Apparatus". In addition to the flashing red light, an audible alarm shall be included which shall sound while the light is activated.

The flashing red light shall be located centered left to right for greatest visibility.

The light and alarm shall be interlocked for activation when either a cab door is not firmly closed or an apparatus compartment door is not closed, and the parking brake is released.

### **MASTER WARNING SWITCH**

A master switch shall be included, as a virtual button on the Vista display and control screen which shall be labeled "E Master" for identification. The button shall feature control over all devices wired through it. Any warning device switches left in the "ON" position when the master switch is activated shall automatically power up.

### **HEADLIGHT FLASHER**

An alternating high beam headlight flashing system shall be installed into the high beam headlight circuit which shall allow the high beams to flash alternately from left to right.

Deliberate operator selection of high beams will override the flashing function until low beams are again selected. Per NFPA, these clear flashing lights will also be disabled "On Scene" when the park brake is applied.

#### **HEADLIGHT FLASHER SWITCH**

The flashing headlights shall be activated through a virtual button on the Vista display and control screen.

#### **INBOARD FRONT WARNING LIGHTS**

The cab front fascia shall include two (2) Whelen M6 Super LED front warning lights in the left and right inboard positions. The lights shall feature multiple flash patterns including steady burn for solid colors and multiple flash patterns for split colors. The lights shall be mounted to the front fascia of the cab within a chrome bezel

#### **INBOARD FRONT WARNING LIGHTS COLOR**

The warning lights mounted on the cab front fascia in the inboard positions shall be red.

#### **FRONT WARNING SWITCH**

The front warning lights shall be controlled through a virtual control on the Vista display and control screen. This switch shall be clearly labeled for identification.

#### **INTERSECTION WARNING LIGHTS**

The chassis shall include two (2) Whelen M6 series Super LED intersection warning lights, one (1) each side. The lights shall feature multiple flash patterns including steady burn.

#### **INTERSECTION WARNING LIGHTS COLOR**

The intersection lights shall be red.

#### **INTERSECTION WARNING LIGHTS LOCATION**

The intersection lights shall be mounted in the forward position on the side of the bumper.

#### **SIDE WARNING LIGHTS**

The cab sides shall include two (2) Whelen M6 Super LED warning lights, one (1) on each side. The lights shall feature multiple flash patterns including steady burn for solid colors and multiple flash patterns for split colors. The lights shall be mounted to the sides of the cab within a chrome bezel.

#### **SIDE WARNING LIGHTS COLOR**

The warning lights located on the side of the cab shall be red.

#### **SIDE WARNING LIGHTS LOCATION**

The warning lights on the side of the cab shall be mounted over the front wheel well directly over the center of the front axle.

#### **SIDE AND INTERSECTION WARNING SWITCH**

The side warning lights shall be controlled through a virtual button on the Vista display and control screen. This button shall be clearly labeled for identification.

### **TANK LEVEL LIGHTS**

There shall be two (2) Whelen PSTANK water level light strips surface mounted vertically, one (1) on each side of the cab behind the rear cab doors.

The light strips shall feature four (4) colors of LED lights to indicate the fluid level of a tank. The colors from top to bottom shall be green, blue, amber, and red.

### **SIREN CONTROL HEAD**

A Whelen 295HFSA7 electronic siren control head with remote dual amplifier shall be provided and flush mounted in the switch panel with a location specific to the customer's needs. The siren shall feature 200-watt output, radio broadcast, public address, wail, yelp, or piercer tones and hands free operation which shall allow the operator to turn the siren on and off from the horn ring if a horn/siren selector switch option is also selected.

### **AIR HORN ACTIVATION**

The air horn activation shall be accomplished by two (2) lanyard cables, one (1) on the left hand side accessible to the driver and one (1) on the right hand side accessible to the officer. An air horn activation circuit shall be provided to the chassis harness pump panel harness connector.

### **MECHANICAL SIREN ACTIVATION**

The mechanical siren shall be actuated by a Linemaster model SP491-S81 foot switch mounted in the front section of the cab for use by the driver and a virtual button on the Vista display. A virtual button for the siren brake shall be provided on the Vista display.

The siren shall only be active when master warning switch is on to prevent accidental engagement.

### **BACK-UP ALARM**

An ECCO model 575 backup alarm shall be installed at the rear of the chassis with an output level of 107 dB. The alarm shall automatically activate when the transmission is placed in reverse.

### **INSTRUMENTATION**

An ergonomically designed instrument panel shall be provided. Each gauge shall be backlit with LED lamps. Stepper motor movements shall drive all gauges. The instrumentation system shall be multiplexed and shall receive ABS, engine, and transmission information over the J1939 data bus to reduce redundant sensors and wiring.

A twenty eight (28) icon lightbar message center with integral LCD odometer/trip odometer shall be included. The odometer shall display up to 999,999.9 miles. The trip odometer shall display 9,999.9 miles. The LCD message center screen shall be capable of custom configuration by the users for displaying certain vehicle status and diagnostic functions.

The instrument panel shall contain the following gauges:

One (1) three-movement gauge displaying vehicle speed, fuel level, and Diesel Exhaust Fluid (DEF) level. The primary scale on the speedometer shall read from 0 to 100 MPH, and the secondary scale on the speedometer shall read from 0 to 160 KM/H. The scale on the fuel and DEF level gauges shall read from

empty to full as a fraction of full tank capacity. Red indicator lights in the gauge and an audible alarm shall indicate low fuel or low DEF at 1/8<sup>th</sup> tank level.

One (1) three-movement gauge displaying engine RPM, and primary and secondary air system pressures shall be included. The scale on the tachometer shall read from 0 to 3000 RPM. The scale on the air pressure gauges shall read from 0 to 150 pounds per square inch (PSI) with a red line zone indicating critical levels of air pressure. Red indicator lights in the gauge and an audible alarm shall indicate low air pressure.

One (1) four-movement gauge displaying engine oil pressure, coolant temperature, voltmeter, and transmission temperature shall be included. The scale on the engine oil pressure gauge shall read from 0 to 100 pounds PSI with a red line zone indicating critical levels of oil pressure. A red indicator light in the gauge and audible alarm shall indicate low engine oil pressure. The scale on the coolant temperature gauge shall read from 100 to 250 degrees Fahrenheit (°F) with a red line zone indicating critical coolant temperatures. A red indicator light in the gauge and audible alarm shall indicate high coolant temperature. The scale on the voltmeter shall read from 9 to 18 volts with a red line zone indicating critical levels of battery voltage. A red indicator light in the gauge and an audible alarm shall indicate high or low system voltage. The low voltage alarm shall indicate when the system voltage has dropped below 11.8 volts for more than 120 seconds in accordance with the requirements of NFPA 1901. The scale on the transmission temperature gauge shall read from 100 to 300 degrees °F with a red line zone indicating critical temperatures. A red indicator light in the gauge and an audible alarm shall indicate a high transmission temperature.

The light bar portion of the message center shall include twenty-eight (28) LED backlit indicators. The lightbar shall be split with fourteen (14) indicators on each side of the LCD message screen. The lightbar shall contain the following indicators and produce the following audible alarms when supplied in conjunction with applicable configurations:

### **RED INDICATORS**

Stop Engine - indicates critical engine fault  
 Air Filter Restricted - indicates excessive engine air intake restriction  
 Park Brake - indicates parking brake is set  
 Seat Belt - indicates a seat is occupied and corresponding seat belt remains unfastened  
 Low Coolant - indicates critically low engine coolant  
 Cab Tilt Lock - indicates the cab tilt system locks are not engaged.

### **AMBER INDICATORS**

Malfunction Indicator Lamp (MIL) - indicates an engine emission control system fault  
 Check Engine - indicates engine fault  
 Check Transmission - indicates transmission fault  
 Anti-Lock Brake System (ABS) - indicates anti-lock brake system fault  
 High exhaust system temperature – indicates elevated exhaust temperatures  
 Water in Fuel - indicates presence of water in fuel filter  
 Wait to Start - indicates active engine air preheat cycle  
 Windshield Washer Fluid – indicates washer fluid is low  
 DPF restriction - indicates a restriction of the diesel particulate filter  
 Regen Inhibit-indicates regeneration of the DPF has been inhibited by the operator  
 Range Inhibit - indicates a transmission operation is prevented and requested shift request may not occur.  
 SRS - indicates a problem in the supplemental restraint system  
 Check Message - indicates a vehicle status or diagnostic message on the LCD display requiring attention.

### **GREEN INDICATORS**

Left and Right turn signal indicators



ATC - indicates low wheel traction for automatic traction control equipped vehicles, also indicates mud/snow mode is active for ATC system  
 High Idle - indicates engine high idle is active.  
 Cruise Control - indicates cruise control is enabled  
 OK to Pump - indicates the pump is engaged and conditions have been met for pump operations  
 Pump Engaged - indicates the pump transmission is currently in pump gear  
 Auxiliary Brake - indicates secondary braking device is active

### **BLUE INDICATORS**

High Beam indicator

### **AUDIBLE ALARMS**

Air Filter Restriction  
 Cab Tilt Lock  
 Check Engine  
 Check Transmission  
 Open Door/Compartment  
 High Coolant Temperature  
 High or Low System Voltage  
 High Transmission Temperature  
 Low Air Pressure  
 Low Coolant Level  
 Low DEF Level  
 Low Engine Oil Pressure  
 Low Fuel  
 Seatbelt Indicator  
 Stop Engine  
 Water in Fuel  
 Extended Left/Right Turn Signal On  
 ABS System Fault

### **BACKLIGHTING COLOR**

The instrumentation gauges and the switch panel legends shall be backlit using red LED backlighting.

### **RADIO**

A Jensen radio with weather band, AM/FM stereo receiver, compact disc (CD) player, and four (4) speakers shall be installed in the cab. The radio shall include rear RCA input pigtail connector, satellite radio capability, and a covered front auxiliary mini stereo input with iPod ready USB jack. The CD player shall be compatible with CD-R, CD-RW and MP3 format discs. The radio shall be installed in the right hand overhead position. The speakers shall be installed inside the cab with two (2) speakers recessed within the headliner of the front of the cab just behind the windshield and two (2) speakers on the upper rear wall of the cab.

### **AM/FM ANTENNA**

A small antenna shall be located on the right hand side of the cab roof for AM/FM and weather band reception.

### **SPARTAN MOBILE GATEWAY**

A vehicle mobile gateway router shall be provided. The device, once supplied with a customer provided USB aircard(s) and data plan SIM card(s), shall produce a mobile Wi-Fi hotspot in and around the vehicle using a cellular data connection. The vehicle router also enhances the vehicle's effective cellular data coverage and range. This option comes with free access to remote configuration software for a year. The

mobile data hotspot shall be mounted in the cab, in the overhead above the driver's seating position within a removable bracket for ease of access.

### **MOBILE GATEWAY ANTENNA**

A mobile gateway Wi-Fi hotspot antenna shall be provided. The antenna shall be mounted on the right hand mid area of the cab roof above the "B" pillar so not to interfere with light bars or other roof mounted equipment installed by Spartan Chassis.

### **CAMERA**

An Audiovox Voyager heavy duty rearview camera system shall be supplied. One (1) box shaped camera shall be shipped loose for OEM installation in the body to afford the driver a clear view to the rear of the vehicle and one (1) camera with a teardrop shaped chrome plated housing shall be mounted on the officer side of the cab below windshield ahead of the front door at approximately the same level as the cab door handle.

The cameras shall be wired to a single Weldon Vista display located on the driver's side dash. The rear camera shall activate when the transmission is placed in reverse and the right camera shall activate with the right side turn signal. Each camera shall also be activated by a button on the Vista display.

### **COMMUNICATION ANTENNA**

An antenna base, for use with an NMO type antenna, shall be mounted on the right hand front corner of the cab roof so not to interfere with light bars or other roof mounted equipment installed by Spartan Chassis. The antenna base shall be an Antenex model MABVT8 made for either a 0.38 inch or 0.75 inch receiving hole in the antenna and shall include 17.00 foot of RG58 A/U cable with no connector at the radio end of the cable. The antenna base design provides the most corrosion resistance and best power transfer available from a high temper all brass construction and gold plated contact design. The antenna base shall be provided by Spartan.

### **COMMUNICATION ANTENNA CABLE ROUTING**

The antenna cable shall be routed from the antenna base mounted on the roof to the area behind and underneath the right hand front seat.

### **AUXILIARY COMMUNICATION ANTENNA**

An auxiliary antenna base, for use with an NMO type antenna, shall be installed on the cab. The antenna base shall be an Antenex model MABVT8 and shall include 17.00 foot of RG58 A/U cable with no connector at the radio end of the cable. The antenna shall be mounted on the left hand front corner of the cab roof so not to interfere with light bars or other roof mounted equipment installed by Spartan Chassis. The antenna base shall be provided by Spartan.

### **AUXILIARY COMMUNICATION ANTENNA CABLE ROUTING**

The auxiliary antenna cable shall be routed from the antenna base mounted on the roof to the area behind and underneath the right hand front seat.

### **ADDITIONAL COMMUNICATION ANTENNA**

An additional antenna base, for use with and NMO type antenna, shall be installed on the cab. The antenna base shall be an Antenex model MABVT8 and shall include 17.00 foot of RG58 A/U cable with no connector at the radio end of the cable. The antenna base shall be mounted in the inboard position on the left hand front corner of the cab roof so not to interfere with light bars or other roof mounted equipment installed by Spartan Chassis. The antenna base shall be provided by Spartan.

**ADDITIONAL COMMUNICATION ANTENNA CABLE ROUTING**

The additional antenna cable shall be routed from the antenna base mounted on the roof to the area inside the center rocker switch console.

**CAB EXTERIOR PROTECTION**

The cab face shall have a removable plastic film installed over the painted surfaces to protect the paint finish during transport to the body manufacturer.

**FIRE EXTINGUISHER**

A 2.50 pound D.O.T approved fire extinguisher with BC rating shall be shipped loose with the cab.

**DOOR KEYS**

The cab and chassis shall include a total of four (4) door keys for the manual door locks.

**DIAGNOSTIC SOFTWARE OCCUPANT PROTECTION**

Diagnostic software for the Spartan Advanced Protection System shall be available for free download from the Spartan Chassis website to Spartan authorized OEMs, dealers and service centers, as well as the vehicle owner.

The software has been validated to be compatible with the following RP1210 interface adapters:

- Dearborn Group DPA4 Plus
- Noregon Systems JPRO<sup>®</sup> DLA+
- Cummins INLINE5
- Cummins INLINE6
- NexIQ<sup>™</sup> USB-Link<sup>™</sup>

The software and adapter utilize the SAE J1939-13 heavy duty nine (9) pin connector which is located below the driver's side dash to the left of the steering column.

**WARRANTY**

Summary of Warranty Terms:

THE FOLLOWING IS SUMMARY OF WARRANTY TERMS FOR INFORMATION ONLY. THE ACTUAL LIMITED WARRANTY DOCUMENT, WHICH IS ATTACHED TO THIS OPTION, CONTAINS THE COMPLETE STATEMENT OF THE SPARTAN MOTORS USA LIMITED WARRANTY. SPARTAN'S RESPONSIBILITY IS TO BE ACCORDING TO THE TERMS OF THE COMPLETE LIMITED WARRANTY DOCUMENT.

The chassis manufacturer shall provide a limited parts and labor warranty to the original purchaser of the custom built cab and chassis for a period of twenty-four (24) months, or the first 36,000 miles, whichever occurs first. The warranty period shall commence on the date the vehicle is delivered to the first end user.

**CHASSIS OPERATION MANUAL**

There shall be two (2) digital copies of the chassis operation manual provided with the chassis. The digital data shall include a parts list specific to the chassis model.

### **ENGINE AND TRANSMISSION OPERATION MANUALS**

The following manuals specific to the engine and transmission models ordered will be included with the chassis in the ship loose items:

- (1) Hard copy of the Engine Operation and Maintenance manual with CD
- (1) Digital copy of the Transmission Operator's manual
- (1) Digital copy of the Engine Owner's manual

### **CAB/CHASSIS AS BUILT WIRING DIAGRAMS**

The cab and chassis shall include two (2) digital copies of wiring schematics and option wiring diagrams.

### **PAINT CONFIRMATION**

There shall be a paint confirmation letter sent to the body manufacturer with paint spray outs to confirm the cab primary paint color or primary and secondary paint color as specified by the paint options.

### **DRIVELINE LAYOUT CONFIRMATION**

During the design phase of the chassis the Spartan Chassis driveline engineer shall submit the driveline layout to an OEM engineer to review the chassis design for any potential problems integrating the OEM body to the chassis. The OEM engineer shall provide approval to the driveline engineer prior to driveline bills of materials being released.

### **CAB TO AXLE DIMESION**

Cab to axle will be 134".

### **CHASSIS MODIFICATIONS**

### **LUBRICATION AND TIRE DATA PLATE**

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

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

- Rear tire cold pressure
- Maximum tire speed ratings

### **VEHICLE DATA PLATE**

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

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

### **OVERALL HEIGHT, LENGTH DATA PLATE (US)**

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

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

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

**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.

**FRONT BUMPER**

The front bumper shall be as provided by the cab/chassis manufacturer. No other alteration or modifications are required to extension length.

**BUMPER GRAVELSHIELD**

The bumper extension gravel shield shall be provided by the cab/chassis manufacturer.

**AIR HORN(S)**

The air horn(s) shall be supplied and installed by the cab/chassis manufacturer.

**FRONT TOW EYES**

There shall be two (2) heavy duty cast tow eyes securely mounted to the chassis frame below the front bumper.

**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.

**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:

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

**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.

**AIR BRAKE SYSTEM QUICK BUILD-UP**

The air brake quick build-up system shall be supplied from the cab/chassis manufacturer.

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.

**ROAD EMERGENCY SAFETY KIT**

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

One (1) 2.5 lb. ABC type vehicle fire extinguisher with bracket per DOT requirements shall be provided and mounted inside cab area.

**CAB MISCELLANEOUS EQUIPMENT**

The following items shall be provided by the customer and installed in cab as follows: Two (2) portable radio charger bases and a Thermal Imaging Camera charger base. These items shall be wired to the battery direct.

Location of items shall be determined at the pre-construction conference.

### **FUEL FILL**

There shall be one (1) fuel fill door located in the streetside exterior wheel well panel, behind the rear axle. The fill door shall be fabricated from brushed stainless steel. There shall be a permanent label with the text "DIESEL FUEL ONLY" located adjacent to the fuel fill access.

### **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 Central Nyack 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 Central Nyack 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.

### **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 3/16" (.187) 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 formed into the upper body panels providing a ridged lower panel and a flat upper body panel surface. The use of mechanically fastened, taped or glued on drip rails will not be acceptable, No Exceptions.

### **ROOF CONSTRUCTION**

The roof structure shall be integral with the body sheet metal construction and shall be an all welded assembly. The body roof structure shall be overlaid with not less than 3/16" aluminum 3003H-14 alloy tread plate and welded to roof structure and body sheet metal. All seams in roof material shall be fully and continuously welded to prevent entry of moisture.

There shall be a total of four (4) 2" x 2" x 1/4" 6061-T6 alloy aluminum "C" channels running the length of body, two (2) on each outboard side. These "C" channels shall be used for roof support and in addition shall be used for mounting of any specified reels. This open "C" channel design along with special reel mounting clips allows for a universal location of any specified reels within each compartment.

In between the two (2) center "C" channels running the length of body shall be 2" x 2" x 1/4" 6061-T6 alloy aluminum tubing running in between and welded in place on approximate 16" centers to support roof and/or walkway structure if specified.

A 2" formed radius shall be provided along the body sides and utilized as a wiring trough. The use of aluminum extrusions in this area shall not be acceptable, .

### **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 1/4" aluminum tubes minimum, the same width as the chassis frame rails. Welded to this tubing shall be cross members of 2" x 4" x 1/4" 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 six (6) 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.

### **RECESSED CENTER STEP**

Center rear body shall have recessed step at front of hosebed. This step's surface shall have Grip Strut inserted to cover a minimum of 60% of the step's surface.

### **3" REAR BUMPER**

The full width rear bumper shall be constructed from minimum 2" x 2" x 1/4" aluminum tubing and covered with mirror finish stainless steel. The bumper shall extend from the rear vertical body panel 3" with a minimum of 1/2" space between the body and bumper 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 9" Night Axe 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.

### **WHEEL WELL EXTERIOR PANEL**

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

### **DIEFORMED BEADED EDGE BODY FENDERS**

A die formed beaded edge shall be provided along the radius of the wheel well opening for a finished appearance.

### **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 three (3) SCBA cylinder storage compartments, two (2) on the curbside and one (1) on the streetside of the body in the rear wheel well area. Each compartment shall have a brushed SST door assembly with a positive catch latch. Each compartment shall have a 8" diameter tube behind the wheel well panel attached to the door assembly. Each compartment shall allow the storage of an SCBA cylinder or a fire extinguisher up to 7-3/4" in diameter and 22" deep. The door shall activate the "Hazard Warning Light" in the cab when not in the closed position.

### **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.
- 1) Re-clean bare metal using a wax and grease remover and low lint rags.

- 2) 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.
- 3) Inspect, putty fill, and dry guild coat entire body surface and DA sand using 180-400 grit dry paper.
- 4) Re-clean bare metal using a wax and grease remover using low lint rags.
- 5) 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.
- 6) 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.
- 7) 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.).
- 8) 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.
- 9) Polish as needed using 3M Perfect-It-Polish and a black foam pad, repeat as necessary and inspect until all sand scratches are removed.

### **PAINT - ENVIRONMENTAL IMPACT**

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

### **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.

### **PAINT FINISH - SINGLE COLOR**

The body shall be painted with a single color of PPG Delfleet® Evolution per Central Nyack Fire Department approved paint spray out provided.

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

- 10) 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.

## **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 compartment interior paintable surfaces shall be prepared and DA sanded using 80-120 grit dry paper and cleaned with a wax and grease remover. A PPG Delfleet® primer topcoat of either a solids epoxy primer or an etch primer shall be applied.

A PPG Delfleet® color primer with proper hardener and thinner mix shall then be sprayed using a pressure pot spray gun and applying 2 wet coats achieving full hiding on entire compartment surface and allow to air dry for 30 minutes @ 70°F before applying texture coat.

A PPG Delfleet® F3985 White/F3986 Gray top coat/texture coat with proper hardener and dry additive shall then be sprayed using a pressure pot and reducing the atomizing air pressure and turn fan pattern all the way in on the gun. Apply the first color texture coat as needed and allow to air dry @ 70°F overnight before assembly and 7 days before putting into full service.

## **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 Central Nyack Fire Department prior to installation. The graphics proof shall be submitted to Central Nyack 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.

### **REFLECTIVE STRIPE - CAB SIDE**

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

11) 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.

### **REFLECTIVE STRIPE - CAB FRONT**

The reflective stripe material shall be 4" 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.

### **REFLECTIVE STRIPE - BODY SIDES**

The reflective stripe material shall be 4" 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 remain in a straight line from the front of the front of cab to the rear body.

### **REAR CHEVRON**

No rear body chevron shall be provided from manufacturer.

### **LETTERING**

### **GRAPHICS PROOF**

A color graphics proof of the lettering layout shall be provided for approval by Central Nyack Fire Department prior to installation. The graphics proof shall be submitted to Central Nyack 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**

### **UPPER BODY SIDE LETTERING**

### **REAR BODY LETTERING**

### **FRONT OF CAB LETTERING**

### **LETTERING AND STRIPING ALLOWANCE**

Each bidder shall include an allowance of \$5,000.00 in the bid price for lettering and striping. Lettering and striping of apparatus shall be done at the manufacturers facility. Pictures shall be provided at the pre-construction conference to match existing apparatus.

### **EXTERIOR COMPARTMENT DOORS**

#### **ROLL-UP DOOR CONSTRUCTION - ROBINSON (ROM)**

The vehicle shall be equipped with R•O•M Series IV roll-up exterior compartment doors. The R•O•M roll-up doors shall be complete with the following features;

Each shutter slat, track, bottom rail, and drip rail shall be constructed from anodized 6063 T6 aluminum. Shutter slats shall feature a double wall extrusion 0.315" thick with a concave interior surface to minimize loose equipment jamming the shutter door closed. Shutter slats shall feature an interlocking end shoe to prevent side to side binding of the shutter door during operation. Slat must have interlocking joints with an inverted locking flange. Slat inner seal shall be a one piece PVC extrusion; seal design will be such to prevent metal to metal contact while minimizing dirt and water from entering the compartment.

Shutter door track shall be one piece design with integral overlapping flange to provide a clean finished look without the need of caulk. Door track shall feature an extruded Santoprene rubber double lip low profile side seal with a silicone co-extruded back to reduce friction during shutter operation.

Shutter bottom rail shall be a one piece double wall extrusion with integrated finger pull. Finger pull shall be curved upward with a linear striated surface to improve operator grip while operating the shutter door. Bottom rail shall have a smooth contoured interior surface to prevent loose equipment from jamming the shutter door. Bottom rail seal shall be made from Santoprene; it will be a double "V" seal to prevent water and debris from entering compartment. Bottom rail lift bar shall be a one piece "D" shaped aluminum extrusion with linear striations to improve operator grip during operation. Lift bar shall have a wall thickness of 0.125". Lift bar shall be supported by no less than two pivot blocks; pivot blocks shall be constructed from Type 66 Glass filled reinforced nylon for superior strength. Bottom rail end blocks shall have incorporated drain holes which will allow any moisture that collects inside the extrusion to drain out.

Shutter door shall have an enclosed counter balance system. Counter balance system shall be 4" in diameter and held in place by two (2) heavy duty 18 gauge zinc plated plates. Counter balance system shall have two (2) over-molded rubber guide wheels to provide a smooth transition from vertical track to counter balance system; no foam material of any kind shall be permitted or used in this area.

#### **ROM DOOR TALL BOTTOM RAIL**

All exterior compartment doors shall have 4.5" tall bottom rail profile adding 1.5" of additional hand clearance between the lift bar and the threshold. The "Tall Bottom Rail" reduces the compartment clear opening height at the top by 1.5".

The specified retroreflective stripe material shall be applied on the roll-up compartment doors. The stripe shall be precision machine cut for each door slat of the roll-up doors. Under no circumstance will the stripe material be cut on roll-up door surface.

### **BODY WIDTH DIMENSIONS**

The pumper body shall be 100.0" wide, not including drip rail or non-permanent fixtures. Interior compartment depth dimensions shall be approximately:

<u>Area Description</u>	<u>Dimension</u>
Transverse Area above Subframe (If specified)	95.0"
Compartment Depth above Subframe	13.0" or 24.5" (depending on water tank and/or ladder configuration)
Compartment Depth below Subframe	24.5"

### **STREETSIDE COMPARTMENT - FRONT (S1)**

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

The compartment door opening shall be approximately 42.0" wide.

This compartment shall have a R•O•M series IV roll-up door.

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- There shall be NO keyed lock on this roll-up compartment door.
- One (1) nylon strap shall be provided to assist in closing the door.
- One (1) aluminum drip pan/door finish guard shall be provided with the roll-up 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 24" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edge.
- Two (2) OnScene 54" Access LED compartment lights, vertically mounted.
- One (1) 120/240 VAC load center.
- There shall be one (1) 120 VAC outlet(s) located in compartment on the forward wall.
  - The outlet receptacle(s) shall be 20 amp, twist-lock (NEMA L5-20R).
  - Outlet(s) shall be powered through the on-board generator system.
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.
- The 12 volt electrical distribution panel shall be located in the front lower compartment.

### **STREETSIDE COMPARTMENT - ABOVE REAR WHEELS (S2)**

The interior useable compartment width shall be approximately 59.0" wide.

The compartment door opening shall be approximately 52.0" wide.

This compartment shall have a R•O•M series IV roll-up door.

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- There shall be NO keyed lock on this roll-up compartment door.
- One (1) nylon strap shall be provided to assist in closing the door.
- One (1) aluminum drip pan/door finish guard shall be provided with the roll-up 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 24" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edge.
- Two (2) OnScene 28" Access LED compartment lights, vertically mounted.

### **STREETSIDE COMPARTMENT - REAR (S3)**

The interior useable compartment width shall be approximately 45.0" wide.

The compartment door opening shall be approximately 38.0" wide.

This compartment shall have a R•O•M series IV roll-up door.

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- There shall be NO keyed lock on this roll-up compartment door.
- One (1) aluminum drip pan/door finish guard shall be provided with the roll-up 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 24" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edge.
- There shall be one (1) 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 tray assembly shall utilize a pneumatic cylinder mounted on underside to hold the tray in both the extended and closed positions.
- Two (2) OnScene 54" Access LED compartment lights, vertically mounted.
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

### **CURBSIDE COMPARTMENT - FRONT (C1)**

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

The compartment door opening shall be approximately 42.0" wide.

This compartment shall have a R•O•M series IV roll-up door.

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.

- There shall be NO keyed lock on this roll-up compartment door.
- One (1) aluminum drip pan/door finish guard shall be provided with the roll-up 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 24" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edge.
- Two (2) OnScene 31" Access LED compartment lights, vertically mounted.
- There shall be one (1) 120 VAC outlet(s) located in compartment on the forward wall.
  - The outlet receptacle(s) shall be 20 amp, twist-lock (NEMA L5-20R).
  - Outlet(s) shall be powered through the on-board generator system.
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

### **CURBSIDE COMPARTMENT - ABOVE REAR WHEEL (C2)**

The interior useable compartment width shall be approximately 59.0" wide.

The compartment door opening shall be approximately 52.0" wide.

- 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.
- The hinged door(s) shall have a pair of tailgate style mechanisms to stop the door at 90 degrees. Each door shall be capable of being closed without unlatching.

### **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.
- One (1) OnScene 48" Access LED compartment light, horizontally mounted at the top of the compartment toward the door opening.

### **CURBSIDE COMPARTMENT - REAR (C3)**

The interior useable compartment width shall be approximately 45.0" wide.

The compartment door opening shall be approximately 38.0" wide.

This compartment shall have a R•O•M series IV roll-up door.

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- There shall be NO keyed lock on this roll-up compartment door.
- One (1) aluminum drip pan/door finish guard shall be provided with the roll-up 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) 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 tray assembly shall utilize a pneumatic cylinder mounted on underside to hold the tray in both the extended and closed positions.
- Two (2) OnScene 36" Access LED compartment lights, vertically mounted.
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

### **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. There shall also be a compartment below the frame, as wide as the chassis frame rails permit.

Compartment Depth 8-10".

The interior useable compartment width shall be approximately 45.0" wide.

The compartment door opening shall be approximately 42.0" wide.

This compartment shall have a R•O•M series IV roll-up door.

- The roll-up door shall have an unpainted satin aluminum finish on the door slats and the door trim components.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- There shall be NO keyed lock on this roll-up compartment 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.
- Two (2) OnScene 18" Access LED compartment lights, vertically mounted.

### **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:

STRAIGHT PULL

SAFETY FACTOR

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;

- Two (2) removable rope anchor(s) shall be provided with completed vehicle. Each rope anchor shall be fabricated from 3/4" steel, 2" high x 11.5" long with a 3" OD/2" ID eyelet. Eyelet end shall have radiused edge to prevent damage to rope or carabineer. Each rope anchor shall have a powder coat paint finish and a steel 5/8" hitch pin to lock it in place. An aluminum mounting bracket shall be provided to store rope anchor(s) inside a body compartment as close to receiver location as possible.
- There shall be one (1) 2" x 2" x 1/4" wall steel receiver tube(s) with powder coat paint finish located on the streetside of the body in the forward wheel well panel area for use with removable rope anchor and/or a portable electric winch (when specified).
  - There shall be one (1) 12 VDC plug(s) with quick connect provided to power a Ramsey portable winch. All 12 VDC cables to be sized according to Ramsey and installation for intended use.
  - The receiver(s) shall have one (1) rubber cover(s) provided.
- There shall be one (1) 2" x 2" x 1/4" wall steel receiver tube(s) with powder coat paint finish located on the curbside of the body in the forward wheel well panel area for use with removable rope anchor and/or a portable electric winch (when specified).
  - There shall be one (1) 12 VDC plug(s) with quick connect provided to power a Ramsey portable winch. All 12 VDC cables to be sized according to Ramsey and installation for intended use.
  - The receiver(s) shall have one (1) rubber cover(s) provided.

### **LADDER LIFT SYSTEM, CURBSIDE**

A Ziamatic 12 VDC, 60 amp, LAS (Horizontal Ladder Access System), model LAS-975 shall be provided above the exterior side body compartments, on the curbside.

The lift system shall be electro-hydraulic with built-in electric safety latches and warning alarm when in operation. Access shall still be provided to compartments with system in lowered position. Flashing lights on ends shall produce a visual signal when the system is out of the stored position. A flashing warning light signal shall be provided indicating when a ladder rack is not in a stowed position as required by NFPA 1901.

The ladder control panel shall be located on curbside pump panel. The ladder lift system shall be designed to store the specified ladders and equipment. The side of ladder storage area shall be enclosed with an aluminum panel and painted the same color as body.

### **LADDER LIFT INTERLOCK**

An interlock circuit shall be included on the ladder lift system to prevent the lift from raising if a specified hose bed or compartment doors are in the open position.

Storage shall be provided for the following;

- One (1) 24' 2-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 Central Nyack Fire Department.
- One (1) 14' roof ladder(s). Manufacturer, model number of the ladder shall be provided in equipment section of specification, or at pre-construction meeting when provided by Central Nyack Fire Department.
- One (1) 10' folding ladder(s). Manufacturer, model number of the ladder shall be provided in equipment section of specification, or at pre-construction meeting when provided by Central Nyack 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 Central Nyack Fire Department.

#### **LOWER SIDE BODY PROTECTION - RUB RAIL**

OnScene Solutions rub rails shall be provided below the compartment door openings on both the streetside and curbside.

The rub rail shall be fabricated from 6063 extruded aluminum, measuring approximately 2-3/4" high x 1-3/8" thick with tapered aluminum end caps. The rub rail shall be bolted to the body using stainless steel bolts and 1-1/2" diameter x 5/8" thick rubber mount isolators to prevent damage to the body.

The rails shall incorporate LED clearance marker lighting recessed into the rail fascia to avoid damage to the light in case of impact. The rub rail shall have an accessory mounting track integrated into the backside of the rail to allow mounting of accessories such as ground lighting.

#### **FRONT PROTECTION PANELS**

To protect areas subject to intensive wear, scuffing or abuse, protection panels shall be installed on the front vertical body panels and wrapped around to the front compartment door opening. The protection panels shall be fabricated from 1/8" aluminum treadplate.

#### **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.

#### **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 eight (8) 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.

Location(s):

Two (2) rear of body approximately 18" above rear step.

Four (4) front of body streetside.

Two (2) front of body curbside.

## **LOW VOLTAGE ELECTRICAL SYSTEM- 12 VDC**

### General

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

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

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

### Wiring

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

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

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

### Wiring and Wire Harness Construction

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

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

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



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

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

Circuits shall be provided with properly rated low voltage 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:

- SAE J156, *Fusible Links*
- SAE J553, *Circuit Breakers*
- 1) SAE J554, *Electric Fuses (Cartridge Type)*
- 2) SAE J1888, *High Current Time Lag Electric Fuses*
- 3) 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:

- 4) The propulsion engine and transmission
- 5) All legally required clearance and marker lights, headlights, and other electrical devices except windshield wipers and four-way hazard flashers
- 1) 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)
- 2) 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
- 3) The minimum optical warning system, where the apparatus is blocking the right-of way
- 4) The continuous electrical current required to simultaneously operate any fire pumps, aerial devices, and hydraulic pumps
- 5) Other warning devices and electrical loads defined by the purchaser as critical to the mission of the apparatus

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

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

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

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

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

### Electromagnetic Interference

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

### Wiring Diagram

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

### Low Voltage Electrical System Performance Test

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

## **12 VOLT MULTIPLEX CONTROL CENTER**

The apparatus shall be equipped with a Weldon V-MUX multiplexed 12 volt electrical system that will provide complete diagnostic capability, No Exception. The system shall have the capability of delivering multiple signals via a CAN bus, utilizing specifications set forth by SAE J1939. The system shall be node based to maximize stability so that failure of one node does not affect the operation of the other nodes. The system shall use shielded twisted-pair wire for transmission of system function signals. The shielded wire shall provide protection against EMI and RFI noise interruptions.

The multiplex system shall be responsible for providing power management functions as well as load shedding. The warning light system shall be controlled by the multiplex system. The system shall be capable of displaying text and/or graphic messages on a display module. The system shall be based on solid-state technology and shall include self-contained diagnostic indicators.

## **WELDON CERTIFICATION**

A letter shall be provided with bid submittal that the Contractor has successfully completed the Weldon training requirements for Level 1 of the V-MUX Certified Supplier Program and is authorized to design, build, and service V-MUX electrical systems.

The apparatus shall be equipped with a Weldon V-MUX multiplexed 12 volt electrical system that will provide complete diagnostic capability, No Exception. The system shall have the capability of delivering multiple signals via a CAN bus, utilizing specifications set forth by SAE J1939. The system shall be node based to maximize stability so that failure of one node does not affect the operation of the other nodes. The system shall use shielded twisted-pair wire for transmission of system function signals. The shielded wire shall provide protection against EMI and RFI noise interruptions.

The multiplex system shall be responsible for providing power management functions as well as load shedding. The warning light system shall be controlled by the multiplex system. The system shall be capable of displaying text and/or graphic messages on a display module. The system shall be based on solid-state technology and shall include self-contained diagnostic indicators.

### **MULTIPLEX SYSTEM INTERFACE DISPLAY**

The Weldon V-MUX Vista IV multiplex system interface display(s) shall be provided by the cab/chassis manufacturer. The full-color Vista interface display allows the user to control warning and scene lighting, HVAC controls (when specified), and view on-board diagnostics including service information. This display has a wide operating temperature range, automatic screen switching in response to current conditions, and a sleep mode option to eliminate night glare. The following features shall be included;

- 6) 800 x 480 resolution
- 7) Four video ports
  - Flash updates with USB memory stick
  - Display inside and outside temperature (when specified)
  - Automatic climate control (when specified)
  - 100% Configurable (OEM Level)
  - Field re-programmable
  - Peer to peer network
  - On-board diagnostics / service information
  - Colors change to indicate button status
  - Video Ready for: Backup camera, Thermal camera, DVD, GPS...

### **OVERHEAD ROCKER SWITCH PANEL**

The control of specified 12 volt equipment installed on chassis and body shall be located in the cab overhead of driver.

The individual rocker style switches shall be located on a separate electrical panel, complete with backlit name tags describing function of each individual switch. The back lighting shall have two (2) levels of intensity, low level lights activated when the vehicle lights or ignition switch is turned "On", and high level lights activated when individual switch is turned "On".

Switch circuitry shall be on a printed circuit board. The lights shall be solid state type and have a 100,000 hour life span.

Overhead switch panel shall provide switching for;

- Engine Jake Brake
- Transmission PTO
- Mud/Snow Switch
- Left Telescopic Light
- Right Telescopic Light
- AM/FM Radio Kill Switch

### **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:

- A master body disconnect switch that disconnects all electrical loads not provided by the chassis manufacturer
- 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.

### **BATTERY SWITCH**

One (1) "battery disconnect on" switch in cab located within easy reach of Driver with indicator light that is visible from the driver's position shall be provided. The switch and indicator light shall be supplied and installed by the cab/chassis manufacturer.

### **BATTERY SOLENOID**

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

### **BATTERY CONDITIONER**

The battery conditioner shall be supplied and installed by the cab chassis manufacturer.

### **ENGINE COMPARTMENT LIGHT**

Engine compartment light(s) shall be supplied and installed by the cab chassis manufacturer.

**CAB HAZARD WARNING LIGHT**

A red flashing or rotating light, located in the driving compartment. The light shall be furnished by the cab/chassis manufacturer. The light shall be illuminated automatically whenever the vehicles parking brake is not fully engaged and any of the following conditions exist:

- 1) Any passenger or equipment compartment door is not closed.
- 2) 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 ft<sup>3</sup> (0.1 m<sup>3</sup>).
- The compartment has an opening less than or equal to 144 in.<sup>2</sup> (92,900 mm<sup>2</sup>).
- 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".

**BACK-UP ALARM**

An electronic back-up alarm shall be supplied and installed by the cab/chassis manufacturer. The back-up alarm shall actuate automatically when the transmission gear selector is placed in reverse.

**REAR VIEW CAMERA**

The cab chassis provided rear view camera shall be installed on the rear of the body.

**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 M6 Series M6T amber LED turn lights
- Two (2) Whelen M6 Series M6BTT red LED stop/tail lights
- Two (2) Whelen M6 Series M6BUW clear LED back-up lights with clear lens

Each light above shall be mounted in an M6FC chrome finish bezel.

**MIDSHIP MARKER/TURN SIGNAL**

Two (2) Whelen model T0A00MAR 2" round amber LED midship body clearance marker/turn signal lights shall be provided and installed, one (1) light on each side of the body, in forward wheel well of rear axle. Midship marker/turn lights shall be wired to the headlight circuit of the chassis.

**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.

### **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**

The siren control head shall be supplied and installed by the cab/chassis manufacturer. Siren power shall be wired through the master warning light switch.

### **SIREN SPEAKER**

The siren speaker(s) shall be supplied and installed by the cab/chassis manufacturer.

### **FRONT CAB MOUNTED SCENE LIGHT(S)**

Floodlight(s) shall be provided on the front of the cab by the cab/chassis manufacturer. Scene lights shall be provided with a lens or a means for preventing damage from water spray and shall be listed for wet location usage.

Each light shall be wired directly to the 12 VDC electrical system with stranded copper wire. The floodlights shall be protected with circuit breakers rated at the proper amperage and wire size.

One (1) switch shall be provided for front scene lights.

### **REAR SCENE LIGHTS**

Two (2) Fire Research Spectra model SPA900-Q70 LED lights shall be provided on the upper rear body to light the work area immediately behind the vehicle to a level of at least 3 fc (30 lx) within a 10 ft x 10 ft (3 m x 3 m) square. The lights shall be mounted with four (4) screws to a flat surface. It shall be 6 3/4" high by 9" wide and have a profile of less than 1 3/4" beyond the mounting surface. Wiring shall extend from a weatherproof strain relief at the rear of the lamphead.

Each light shall have twenty-four (24) white LEDs. It shall operate at 12/24 volts DC, draw 6/3 amps and generate 7000 lumens of light. The lens shall redirect the light along the vehicle and out onto the working area. The lamphead housing shall be aluminum with a chrome colored bezel.

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.

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

### **SCENE LIGHTS**

The scene lighting shall be provided with specified upper side and/or rear warning lights.

## **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.

## **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**

The light bar shall be supplied and installed by the cab/chassis manufacturer.

### **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 (M6R) provided, one (1) each side. Each light shall have a red lens and chrome flange.

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

#### UPPER FORWARD CORNER WARNING LIGHTS

There shall be two (2) Whelen M6 series red linear Super-LED lights (M6R) provided, one (1) each side. Each light shall have a red 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 V-series combination 180° red linear Super-LED warning lights with 45° perimeter scene lights (M6V2R) provided, one (1) each side. Perimeter scene lights will be turned on with specified scene lighting. Each light shall have a red lens over warning light and clear lens over perimeter light and chrome flange.

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

#### 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

The warning lights shall be supplied and installed by the cab/chassis manufacturer. They shall be Whelen lights to complete an NFPA compliant lower level warning light system.

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

The warning lights shall be supplied and installed by the cab/chassis manufacturer. They shall be Whelen lights to complete an NFPA compliant lower level warning light system.

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

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 switched at the Vista display in the cab.



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

There shall be two (2) Whelen 500 series (5" x 2") red Linear Super-LED lights (50R02ZRR) provided, one (1) each side. Each light shall have a red lens and chrome 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 (M6R) provided, one (1) each side. Each light shall have a red lens and chrome flange.

The lights shall be switched at the Vista display in the cab.

**LINE VOLTAGE ELECTRICAL SYSTEM****HYDRAULIC GENERATOR SYSTEM**

A Harrison HydraGen model 10.0MAS-16D, hydraulic driven generator set shall be installed on the vehicle. The generator shall be rated at 6,000 watts at 120/240 VAC, 50/25 amps, single phase. Current frequency shall be stable at 60 hertz. Unit shall be 31.00" L x 18.00" W x 14.13" H and weigh 247 lbs.

A means shall be provided to activate the hydraulic generator system.

If the hydraulic generator system is not capable of output as stated on the power source specification label at all engine speeds, an automatic engine speed control system shall be provided.

If the vehicle is equipped with a fire pump driven by the chassis engine, the generator shall be capable of output as stated on the power source specification label with the engine at idle.

**GENERATOR BONDING**

A minimum of four (4) 16" x 2 gauge copper ground straps shall be bolted to body sub-frame and chassis sub-frame for proper bonding of high voltage system. The conductor shall have a minimum amperage rating, as defined in 310.15, "Ampacities for Conductors Rated 0–2000 Volts," of *NFPA 70*, of 115 percent of the rated amperage on the power source specification label.

**GENERATOR MOUNTING**

The hydraulic generator module shall contain all system components necessary to comprise a complete hydraulic generating system. The components shall be grouped and assembled into a compact modular unit.

The generator unit shall be modular, packaged with a heavy steel protective frame. All connections to the module (both hydraulic and electrical) shall be easily removable for easy removal of unit from compartment.

Hydraulic oil reservoir and filter shall be easily accessible with adequate clearance to facilitate oil filling and filter changing.

**WARRANTY PERIOD**

Provided such goods are operated and maintained in accordance with Harrison's written instructions, Harrison warrants that the MAS series hydraulic generators shall be free from defects in material and

workmanship for a period of two (2) years or two thousand (2,000) hours, whichever comes first, from the date of delivery to the first purchaser.

### **HYDRAULIC COMPONENTS**

A hydraulic system filter and strainer shall be provided and shall be located in a readily accessible area.

Hydraulic hose shall meet the hydraulic pump manufacturer's recommendations for pressure, size, vacuum, and abrasion resistance. Hydraulic fittings shall meet the hydraulic pump manufacturer's recommendations for pressure, size, and the type of hose used.

Where the hydraulic hose comes into contact with other surfaces, the hose shall be protected from chafing.

The generator shall be engaged at the 12 volt control panel in the cab.

### **GENERATOR MOUNTING**

The generator shall be mounted in an upper dunnage area or roof compartment on rubber vibration isolators. The compartment shall be reinforced and ventilated where necessary to hold weight and provide cooling air for the generator. A valve shall be provided on the generator oil drain outlet and piped to underside of generator compartment with flexible hose and plug. The drain shall be located where easily accessible for generator service.

### **MANUALS AND SCHEMATICS**

Two (2) complete manuals on parts list, maintenance, wiring schematics, hydraulic schematics, circuit boards, voltage regulator board and other components shall be provided on delivery.

### **POWER-TAKE-OFF GENERATOR DRIVE**

There shall be a "Hot Shift" power-take-off (PTO) installed on the transmission PTO opening of the chassis. The "Hot Shift" PTO is provided to allow the engagement of the PTO at higher engine RPM speeds. The PTO output shall be connected to the generator through hollow tube type driveline with heavy duty universals.

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 or via the V-Mux screen if so equipped.

The power supply to the PTO engagement control shall be wired to the parking brake and a neutral position transmission switch to prevent engagement unless the vehicle is stopped and transmission has been placed in neutral.

The installation of the engine, transmission, driven accessories (power takeoffs (PTO), etc.) shall meet the engine and transmission manufacturers' installation recommendations for the service intended.

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.

### **LOADCENTER**

The load center shall be a Cutler Hammer, BR Series, specifically designed for protection and distribution of 120/240 volt AC, such as lighting and small motor branch circuits. The load center enclosure shall be

made of 16 gauge galvanized sheet steel. The galvanized coating provides corrosion protection and as such does not require paint. All trims used on the BR Load center shall be chromate sealed and finished with electro disposition epoxy paint (ASA61) which exceeds requirements for outdoor and indoor applications. A combination surface/flush cover with integral door shall be supplied.

The load center shall be UL/CSA listed, **NO EXCEPTIONS** will be allowed.

### **GENERATOR MONITORING PANEL**

To properly monitor the generator performance and load demand during operation, the generator installation shall be equipped with a full instrument monitor panel.

- Generator frequency in hertz
- Line 1 current in amperes
- Line 2 current in amperes
- Generator voltage in volts

The program shall support the accumulation of elapsed generator hours. Generator hours shall be displayed.

### **SHORE POWER INLET - BATTERY CHARGER**

The above mentioned shore power inlet, and battery conditioner shall be specified in the 12 volt section.

### **LINE VOLTAGE ELECTRICAL SYSTEM**

#### **GENERAL REQUIREMENTS**

##### Stability

Any fixed line voltage power source producing alternating current (ac) shall produce electric power at 60 Hz,  $\pm 3$  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  $\pm 10$  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.

### 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.

### 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:

- Voltmeter
- Current meters for each ungrounded leg
- Frequency (Hz) meter
- 1) 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.

### 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 amperage rating and shall be sized to carry not less than 115 percent of the amperage 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 amperage 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.

#### Panelboards

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

- 2) All line voltage power connections are made through receptacles on the power source and the receptacles are protected by integrated over current devices.
- 3) 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:

- 4) 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)
- 1) 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:

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

#### 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.

##### 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;



- 2) Pictorial representations of circuit logic for all electrical components and wiring
  - 1) Circuit identification
  - 2) Connector pin identification
- (a) Zone location of electrical components
- (b) Safety interlocks
- (c) Alternator–battery power distribution circuits
- (d) Input/output assignment sheets or equivalent circuit logic implemented in multiplexing systems

## **120/240 VAC SCENE LIGHTING**

### **SIDE UPPER RECESSED SCENE LIGHTS**

Four (4) Fire Research Spectra Max LED Scene Light model SPA260-J20 surface mount light(s) shall be installed. They shall be equally divided between the curbside and streetside. The light(s) shall be mounted with four (4) screws to a flat surface and require a cutout for the electronics box. It shall be no more than 6" high by 14 1/2" wide and have a profile of less than 1 3/4" beyond the mounting surface. Wiring shall extend from the electronics box at the rear of the lamphead.

The lamp head shall sixty (60) ultra-bright white LEDs, 48 for flood lighting and 12 to provide a spot light beam pattern. It shall operate at 240 volts AC, draw 0.7 amp, and generate 20,000 lumens of light. The lamphead shall have a unique lens that directs flood lighting onto the work area and focuses the spot light beam into the distance. The lamphead shall be powder coated. The LED scene light shall be for fire service use.

Scene lights shall be provided with a lens or a means for preventing damage from water spray and listed for wet location usage.

- (e) The above lights shall be controlled by two (2) switch(es) at streetside pump panel.
- (f) The above lights shall be controlled by two (2) rocker switch(es). The rocker switch(es) shall be located in the cab within reach of the Driver and/or Officer.

### **REAR UPPER RECESSED SCENE LIGHTS**

#### **REAR OF CAB SCENE LIGHTS**

Two (2) Fire Research Spectra LED light(s) model SPA600-K20 telescopic light(s) shall be provided. The light pole shall be anodized aluminum and have a knurled twist lock mechanism to secure the extension pole in position. The extension pole shall extend 40" and rotate 360 degrees. An internal brake shall slow the extension pole during lowering. The outer pole shall be a grooved aluminum extrusion. The fully extended system shall exceed a height of 11'. Wiring shall extend from the pole bottom with a 4' retractile cord.

The lamphead shall have sixty (60) ultra-bright white LEDs, 48 for flood lighting and 12 to provide a spot light beam pattern. It shall operate at 120 volts AC, draw 2 amps, and generate 20,000 lumens of light. The lamphead shall have a unique lens that directs flood lighting onto the work area and focuses the spot light beam into the distance. The lamphead angle of elevation shall be adjustable at a pivot in the mounting arm and the position locked with a round knurled locking knob. The lamphead shall be no more than 5 3/8" high by 14" wide by 3 3/4" deep and have a heat resistant handle. The lamphead and mounting arm shall be powder coated. The LED scene light shall be for fire service use.

A weatherproof on-off toggle switch shall be mounted in a switch box below the lamphead. A wire guard shall be furnished to protect the lamphead glass.

A truck mount bracket set shall be provided for each light. Each set shall include a lower base plate, an upper lock with a quick release spring loaded locking pin, and a shim set.

ON/OFF rocker switches shall be provided at the pump panel for the left and right side lights.

### **SIDE MOUNT PUMP MODULE**

The 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:

- (g) Electric primer.
  - Pump and plumbing area service lights.
  - Pressure control device and throttle control.
- 1) Fire pump and engine instruments.
- 2) Pump intakes and discharge controls.
- 3) Master intake and discharge gauges.
- 4) Tank fill control.
- 5) Tank suction control.
- 6) Water tank level gauge.
- 7) Pump panel lights.

### **PUMP MODULE SERVICE ACCESS**

The front of pump module shall have a large removable service access door. The door shall be easily removable with lift/turn style latches. Door shall be fabricated from 1/8" treadplate aluminum.

### **PUMP MODULE DUNNAGE AREA**

There shall be an open dunnage area located directly above the pump panels to store miscellaneous Central Nyack Fire Department supplied equipment. The interior dunnage area side walls shall be fabricated from 1/8" aluminum tread plate, and the walking surface shall be fabricated from 3/16" aluminum NFPA compliant tread plate.

### **PUMP PANEL - SIDE MOUNT**

The pump operator's panel, along with the lower streetside and curbside pump panels shall be constructed of smooth plate aluminum with powder coated paint finish, 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.

**CURBSIDE PUMP PANEL - BOLTED**

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

**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.

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

**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.

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

**PUMP MODULE FINISH**

The upper exterior sides above pump panels shall be constructed of 1/8" smooth plate aluminum and painted body color. The upper exterior front and rear of pump module shall be constructed of 1/8" treadplate aluminum.

PUMPS

**WATEROUS CU FIRE PUMP**

A mid-ship mounted Waterous CU series full body fire pump shall be provided. The pump 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 1,500 GPM (6,000 LPM) to 2,250 GPM (9,000 LPM) depending on final configuration.

**WATEROUS PUMP ANODES**

There shall be two (2) anodes provided with the fire pump. One (1) anode shall be installed in the left steamer port and one (1) shall be installed in the right steamer port.

**IMPELLERS**

The pump impellers shall be bronze, specifically designed for the fire service and accurately balanced for vibration free running. The stripping edges shall be located on opposite sides of the impellers to reduce shaft deflection.

The impeller shaft shall be stainless steel, accurately ground to size and supported at each end by oil or grease lubricated anti-friction ball bearings for rigid, precise support. The bearings used on the impeller shaft shall be automotive type bearings, easily cross-referenced and readily available at normal parts or bearing stores.

### **FLAME PLATED IMPELLER HUBS**

The impeller hubs shall be flame plated with tungsten carbide to a hardness approximately twice that of tool steel to assure maximum pump life and efficiency. During the flame plating process the base metal shall not be allowed to exceed a temperature of 300 degrees Fahrenheit to prevent altering the metallurgical properties of the impeller material

### **IMPELLER WEAR RINGS**

The pump shall be equipped with replaceable bronze wear rings for increased pump life and minimum maintenance cost. The wear rings shall be designed to fit into a groove in the face of the impeller hubs forming a labyrinth that, as the clearance increases with age, directs water from the discharge side in several directions eventually exiting outward, away from the eye of the impeller hub.

### **PUMP CASING**

The pump casing shall be cast as two (2) horizontally split pieces. The casing shall be made of high tensile, close-grained gray iron with a minimum tensile strength of 40,000 PSI.

### **PUMP MANUAL**

Two (2) Pump Operation & Maintenance manual(s) shall be supplied at the time of delivery.

### **PAINT FINISH**

The paint finish will be red primer from pump manufacturer.

### **PUMP TRANSMISSION**

The pump transmission shall be of the latest design, incorporating a high strength involute tooth-form Morse Hy-Vo chain capable of operating at high speeds while providing smooth and quiet transmission of power. Drive and driven sprockets shall be made of alloy steel with teeth of an involute form. Driveline shafts shall be made from alloy steel forgings, hardened and ground to size. Deep groove, anti-friction ball bearings shall be used throughout the pump transmission. The pump shift engagement shall be accomplished by a free sliding collar that uses an internal locking mechanism to insure that the collar will stay in road or pump position.

An interlock system shall be provided to prevent the pump drive system from being shifted out of "pump engaged" pumping mode of operation when the chassis transmission is in pump gear per NFPA 1901 section 16.

Primary lubrication for the pump transmission bearings, sprockets and chain shall be provided by a splash system. A supplementary pressure system shall also be employed which shall include a strainer, an oil circulation pump driven by the impeller shaft, and a spray bar inside the case to apply oil to the inside of the chain just before it engages the driven sprocket.

The pump and transmission shall be easily separable. A two-piece shaft shall be splined allowing for individual repair of either the pump or transmission, to keep down time to a minimum.

All driveline components shall have a torque rating equal to or greater than the final net engine torque.

### **AIR OPERATED PUMP SHIFT**

The pump shift actuating mechanism shall be air operated from a valve in the cab identified as "PUMP SHIFT". Full instructions for shifting the pump shall be inscribed on the valve plate.

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

Two (2) green indicator lights shall be supplied at the Pump Operator's panel adjacent to the engine throttle controls; one (1) light shall indicate when the pump drive has been engaged and labeled "THROTTLE READY", and one (1) light shall indicate when both the chassis transmission is in neutral and the pump drive (PTO) has been engaged and labeled "OK TO PUMP".

### **PUMP SHIFT MANUAL OVERRIDE**

A manual pump shift override system shall be provided should a problem develop in the chassis air brake system. Controls for the override shall be located at the lower right hand corner of the left side pump panel. A "MANUAL PUMP SHIFT" label shall be provided near the pump shift controls.

The "Pump Engaged," "OK to Pump," "OK to Pump-and-Roll," and "Throttle Ready" indicators and the pump operator's panel engine speed advancement interlock system shall be operationally functional when the manual override device is used to shift the pump.

### **PAINT FINISH**

The paint finish will be red primer from pump manufacturer.

### **PUMP DRIVELINE**

The pump transmission driveline shall be supplied with 1710 series yokes and bearings to match the cab chassis driveline.

### **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.

### **SINGLE STAGE FIRE PUMP**

The pump shall be a single stage centrifugal class "A" rated fire pump, designed specifically for the fire service

### **THERMAL PROTECTION**

A Waterous Overheat Protection Manager (OPM) shall be supplied on pump to act as a safety device by releasing water from the discharge side of the pump to the ground or back to a water tank once the internal pump water temperature reaches 140°F (60°C).

#### **System Components:**

**Thermal Relief Valve:** Opens and releases water from the pump when the water temperature reaches 140°F (60°C).

**Thermal Switch:** Activates a flashing red light on the control panel when the water temperature reaches 180°F (82°C). This is an additional safety function to alert the operator that the water temperature is continuing to rise.

**Optional Audible Alarm:** Will sound in conjunction with the flashing red light and provide an additional warning that the water temperature is rising.

**Control Panel:** Contains the red flashing light as well as a test circuit for the light.

#### **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 Central Nyack 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.

#### **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 5,000 feet (1,525 meters) 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.

### **ELECTRIC PRIMING PUMP CONTROL AT PUMP PANEL**

The Waterous priming system shall include an oil-free rotary vane priming pump rigidly attached to the pump transmission and activated by a vacuum-activated priming (VAP) valve. Valve actuation may be accomplished while the main pump is in operation, if necessary to assure a complete prime.

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.

### **PRIMER CONTROL**

The priming system shall be controlled at the pump operator's panel. The control shall be provided in the form of a momentary push button that is easily actuated with a gloved hand.

### **DISCHARGE RELIEF VALVE**

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

### **6" SUCTION INLET - STREETSIDE**

One (1) 6" (150 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 6" NH male threads.

The intake shall be provided with a removable screen.

### **LONG SUCTION TUBE**

The specified pump intake shall be provided with a long suction tube. Suction tube shall have built-in zinc anode protection and multiple suction flanges per pump configuration.

**6" SUCTION INLET - CURBSIDE**

One (1) 6" (150 mm) un-gated suction intake shall be installed on the curbside pump panel to supply the fire pump from an external water supply. The threads shall be 6" NH male threads.

The intake shall be provided with a removable screen.

**LONG SUCTION TUBE**

The specified pump intake shall be provided with a long suction tube. Suction tube shall have built-in zinc anode protection and multiple suction flanges per pump configuration.

10) Front bumper intake swivel shall be painted to match lower chassis color.

**5" SUCTION INLET - FRONT BUMPER**

One (1) 5" (150 mm) un-gated suction intake(s) shall be installed on the front bumper to supply the fire pump from an external water supply. The threads shall be 5" NPT male threads.

The intake(s) shall be provided with a removable screen.

**5" MIV ELECTRIC VALVE**

There shall be one (1) Waterous 5" MIV valve(s) provided on specified intake(s) of the pump.

- The intake shall be provided with a 5" NPT x 5" NH 90 degree swivel elbow.

**5" SUCTION INLET - FRONT BUMPER**

One (1) 5" (150 mm) un-gated suction intake(s) shall be installed on the front bumper to supply the fire pump from an external water supply. The threads shall be 5" NPT male threads.

The intake(s) 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 an Akron model 59 intake relief valve factory set to 125 PSI installed on the suction side of the pump. The system shall be controlled by an adjustable valve and designed to prevent vibration from altering the setting of the valve. Provisions for adjusting or servicing the valve {will/shall} be provided. 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".

**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.

### **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.

### **INTAKES**

The pump shall have a sufficient number and size of intakes to perform the apparatus pump system certification test. The intakes shall have male National Hose Threads (NST) if the apparatus is to be used in the United States.

If the couplings on the suction hose carried on the apparatus are of a different size from that of the pump intake(s) or have means of hose attachment other than that provided on the intake(s), an adapter(s) shall be provided to allow connection of the suction hose to the pump intake(s).

A sign shall be provided on the pump operator's panel that states the following:

**WARNING:** Death or serious injury might occur if proper operating procedures are not followed. The pump operator as well as individuals connecting supply or discharge hoses to the apparatus must be

familiar with water hydraulics hazards and component limitations.

Each intake shall have a removable or accessible strainer inside the connection. The strainer(s) shall restrict spherical debris that is too large to pass through the pump.

At least one valved intake shall be provided that can be controlled from the pump operator's position. The valve and piping shall be a minimum 2-1/2 in. (65 mm) nominal size.

If the intake is 2-1/2 in. (65 mm) nominal size, the intake shall be equipped with a female swivel coupling with NH threads. Any 3 in. (75 mm) or larger intake valve except the tank-to-pump intake valve shall be a slow-operating valve.

Each valved intake shall be equipped with a bleeder valve having a minimum 3/4 in. (19 mm) pipe thread connection to bleed off air or water. The bleeder valve shall be operational without the operator having to get under the apparatus. If a valved appliance is attached to an intake, it shall be equipped with a 3/4 in. (19 mm) bleeder valve on each intake. Bleeder valves for valved intakes 4 in. (100 mm) and larger not located at the pump operator's panel shall be located where the bleeder valve controls are visible and operationally functional while the operator remains stationary at the valved intake position.

Each valved intake having a connection size larger than 3 in. (75 mm) shall be equipped with an adjustable automatic pressure relief device installed on the supply side of the valve to bleed off pressure from a hose connected to the valved intake.

All intakes shall be provided with caps or closures capable of withstanding a hydrostatic gauge pressure of 500 psi (3400 kPa). Intakes having male threads shall be equipped with caps; intakes having female threads shall be equipped with plugs. Where adapters for special threads or other means for hose attachment are provided on the intakes, closures shall be provided for the adapters in lieu of caps or plugs. Caps or closures for intake connections smaller than 4 in. (100 mm) shall remain secured to the apparatus when removed from the connection.

If the suction inlets are to be equipped with a valve, Siamese, or adapter that will remain in place while the apparatus is in motion, that valve, Siamese, or adapter shall not project beyond the apparatus running board. The purchaser shall specify if any valve, Siamese, or adapter is to be permanently installed on an intake and identify the brand and model of such item.

The completed apparatus shall have the following intake(s);

### **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) 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. Valves shall be located on bottom of pump panel and plumbed to 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) 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. Valves shall be located on bottom of pump panel and plumbed to drain the lowest point in the plumbing.

**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 4" (100 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.

- Akron valve(s) shall be controlled with a remote handwheel connected to the gear actuated valve.
- An Akron portrait layout with 5" handwheel actuator with NFPA compliant valve position indicator shall be located on the pump operator's panel.

**DISCHARGES**

A minimum of two 2-1/2 in. (65 mm) outlets shall be provided on any pump rated at 750 gpm (3000 L/min) or greater, and a minimum of one 2-1/2 in. (65 mm) outlet shall be provided on any pump rated at less than 750 gpm (3000 L/min).

All 1-1/2" (65 mm) or larger discharge outlet connections shall be equipped with male National Hose Threads (NST). Adapters with special threads or other means for hose attachment shall be permitted to be attached to any outlets.

The piping and valves supplying any preconnected 1-1/2 in. (38 mm), 1-3/4 in. (45 mm), or 2 in. (52 mm) hose line, including the piping to the preconnected hose storage areas shall be at least 2 in. (52 mm) in size.

All discharge outlet connections, except connections to which a hose will be preconnected, shall be equipped with caps or closures capable of withstanding a hydrostatic gauge pressure of 100 psi (700 kPa) over the maximum pump close-off pressure or 500 psi (3400 kPa), whichever is greater.

Where adapters are provided on the discharge outlet connections, the closures shall fit on the adapters.

Caps or closures for outlet connections smaller than 4 in. (100 mm) shall remain secured to the apparatus when removed from the connection.

Each discharge outlet shall be equipped with a valve that can be opened and closed smoothly at pump discharge gauge pressures of 250 psi (1700 kPa).

The flow-regulating element of each valve shall not change its position under any condition of operation that involves discharge pressures to the maximum pressure of the pump; the means to prevent a change in position shall be incorporated in the operating mechanism and shall be permitted to be manually or automatically controlled.

Any 3 in. (75 mm) or larger discharge valve shall be a slow-operating valve.

All 1-1/2 in. (38 mm) or larger discharge outlets shall be equipped with a drain or bleeder valve having a minimum 3.4 in. (19 mm) pipe thread connection for draining or bleeding off pressure from a hose connected to the outlet.

Any 2 in. (52 mm) or larger discharge outlet that is located more than 42 in. (1070 mm) off the ground to which hose is to be connected and that is not in a hose storage area shall be supplied with a sweep elbow of at least 30 degrees downward.

The completed apparatus shall have the following discharge(s);

### **FRONT DISCHARGE**

There shall be one (1) 2" (52 mm) gated discharge(s) 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" (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. Valves shall be located on bottom of pump panel and plumbed to drain the lowest point in the plumbing.
- One (1) Innovative Controls/NoShok 2-1/2" liquid filled gauge(s) with white LED backlighting.
  - 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.

### **STREETSIDE DISCHARGE**

There shall be one (1) 2-1/2" (65 mm) gated discharge(s) 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 push/pull type chromed "T" handle with adjustable linkage connected to the valve. The control handle shall be located adjacent to the plumbing connection.
- 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) 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. Valves shall be located on bottom of pump panel and plumbed to drain the lowest point in the plumbing.
- One (1) Innovative Controls/NoShok 2-1/2" liquid filled gauge(s) with white LED backlighting.
  - 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.

### **CURBSIDE DISCHARGE**

There shall be one (1) 4" (100 mm) gated discharge(s) 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 slow-operating, actuated type 4" (100 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.
  - Akron valve(s) shall be controlled with a remote handwheel connected to the gear actuated valve.
- An Akron portrait layout with 5" handwheel actuator with NFPA compliant valve position indicator shall be located on the pump operator's panel.

- Each discharge shall have a 4" (100 mm) rocker lug NSTF swivel x 4" (100 mm) Storz hardcoat finish 30 degree downsweep elbow provided.
  - The specified elbow shall be provided with a 4" (100 mm) Storz cap hardcoat finish with chain.
- One (1) Innovative Controls model 3003000, ¾" 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. Valves shall be located on bottom of pump panel and plumbed to drain the lowest point in the plumbing.
- One (1) Innovative Controls/NoShok 2-1/2" liquid filled gauge(s) with white LED backlighting.
  - 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.

### **REAR STREETSIDE DISCHARGE**

There shall be one (1) 2-1/2" (65 mm) gated discharge(s) 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 push/pull type chromed "T" handle with adjustable linkage connected to the valve. The control handle shall be located adjacent to the plumbing connection.
- 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) Innovative Controls model 3003000, ¾" 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. Valves shall be located on bottom of pump panel and plumbed to drain the lowest point in the plumbing.
- One (1) Innovative Controls/NoShok 2-1/2" liquid filled gauge(s) with white LED backlighting.
  - 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.

**REAR CURBSIDE DISCHARGE**

There shall be one (1) 2-1/2" (65 mm) gated discharge(s) 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 push/pull type chromed "T" handle with adjustable linkage connected to the valve. The control handle shall be located adjacent to the plumbing connection.
- 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) 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. Valves shall be located on bottom of pump panel and plumbed to drain the lowest point in the plumbing.
- One (1) Innovative Controls/NoShok 2-1/2" liquid filled gauge(s) with white LED backlighting.
  - 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.

**MISCELLANEOUS DISCHARGE****2" CROSS LAY(S)**

There shall be two (2) 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.

- Two (2) of the discharge(s) shall flow water only.
- Two (2) 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.

- Two (2) 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. Valves shall be located on bottom of pump panel and plumbed to drain the lowest point in the plumbing.
- Two (2) Innovative Controls/NoShok 2-1/2" liquid filled gauge(s) with white LED backlighting.
  - 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.

### **DECK GUN**

There shall be one (1) 3" (75 mm) gated discharge located on the upper deck above the pump compartment. Piping shall rise high enough for a mounted deluge gun to be operated in a 360 degree circle to a lower angle of 15 degrees without being impeded by any part of the apparatus or equipment.

The discharge plumbing shall terminate as required by deck gun model. The discharge shall include:

- One (1) of the discharge(s) shall flow water only.
- One (1) Akron Brass 8900 series Gen II slow-operating, actuated type 3" (75 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.
  - Akron valve(s) shall be controlled with a remote handwheel connected to the gear actuated valve.
  - An Akron portrait layout with 5" handwheel actuator with NFPA compliant valve position indicator shall be located on the pump operator's panel.
- 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. Valves shall be located on bottom of pump panel and plumbed to drain the lowest point in the plumbing.
- One (1) Innovative Controls/NoShok 2-1/2" liquid filled gauge(s) with white LED backlighting.
  - 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.

### **DECK GUN MONITOR**

An Akron Apollo Hi-Riser model 3433 lift-off style deck monitor with 1,250 GPM capacity, manually controlled deck gun shall be provided with ability to rise over obstacles on top of the apparatus. To elevate pull a pin and raise the discharge 24" above the deck. Hi-Riser also rotates easily down to a low



profile position for portable operation and comes complete with automatic drain valve. The deck gun shall have the following features;

- 360° rotation when mounted in the deck mode, 180° in the portable mode
- Vertical travel from 90° above to 45° below horizontal, with built-in 35° safety stop
- 3" waterway with cast-in turning vanes for efficient flow
- Direct mount - a combination 3" NPT female and 3" flange
- Can be used in portable mode with standard Apollo ground bases

### **TELESCOPING WATERWAY**

No deck gun riser shall be provided on completed unit.

### **DECK GUN STOW LIGHT**

The specified deck gun shall be provided with a deck gun stow light and wired to cab hazard warning light in cab.

### **MASTER STREAM TIP**

The specified deck gun shall be provide with an Akron Akromatic model 5160 Pyrolite automatic, master stream tip capable of flowing 1,250 GPM.

### **STACKED TIPS**

The specified deck gun shall be provide with an Akron model 2499 Pyrolite quad stacked deluge tips, and an Akron model 3488 Pyrolite, 3-1/2" F x 3" M cast discharge pipe.

### **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.

### **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 PBA401-D00 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:

• 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.

### **MASTER INTAKE GAUGE**

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

### **MASTER DISCHARGE GAUGE**

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

Master pump intake and pump discharge pressure gauges shall be located within 8 in. (200 mm) of each other, edge to edge, with the intake pressure gauge to the left of or below the pump discharge pressure gauge.

- Gauge(s) shall have a white background with black text.
  - Gauge(s) shall have a range from -30" to 600 PSI.
  - The gauge shall have a die cast zinc, chrome plated bezel with color-coded labels insert. Labels shall be UV and scratch resistant and meet SAE standards where applicable.
- The cab tilt control connection to be located on curbside pump panel.

### **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.

### **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**

A switch to activate the cab/chassis air horn(s) shall be provided on pump panel. Switch shall be constantly illuminated and labeled.

### **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.

## **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.

## **WATER TANK LEVEL GAUGE**

There shall be one (1) Innovative Controls SL series 10-LED water tank level gauge(s) for indicating water tank level. The tank level gauge shall indicate the liquid level on an easy to read display.

Each tank level gauge system shall include:

- A pressure transducer that is mounted on the outside of the tank in an easily accessible area.
- A super bright LED bar graph display with a visual alarm at 1/4 of a tank. The display shall also provide an output to activate an audible alarm or secondary visual alarm at 1/4 of a tank.
- A set of weather resistant connectors to connect the digital display to the pressure transducer and to the apparatus power.

### **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.

### **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 but activated automatically when the vehicle park brake is set.

### **FILL TOWER PROTECTION**

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

### **HOSE BED STORAGE**

The following fire hose shall be stored in hose bed storage area;

- Eight (8) 50' lengths of 1-3/4" double jacket hose, dead lay.
- Ten (10) 50' lengths of 2-1/2" double jacket hose, dead lay.

- Fourteen (14) 50' lengths of 4" double jacket hose, dead lay.

### **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.

### **VINYL HOSE BED COVER**

A red marine grade vinyl hose bed cover shall be provided.

### **VINYL CROSSLAY COVER**

A red marine grade vinyl crosslay cover shall be provided.

### **EQUIPMENT PAYLOAD WEIGHT ALLOWANCE**

In compliance with NFPA 1901 standards, the pumper shall be designed for an equipment loading allowance of 2,000 lbs. of Central Nyack Fire Department provided equipment based on the body having less than 250 cu. ft. of storage space.

### **EQUIPMENT**

The following equipment shall be furnished with the completed pumper 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) Zico SAC-44-E NFPA approved folding 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 chock(s) shall be mounted ahead of rear wheels, below body on streetside.
- Ladders shall be supplied by Fire Department after delivery.
- Six (6) Streamlight Fire Vulcan C4 LED flashlight(s) with shoulder strap shall be provided with 80,000 candela and 3 hour run time. Each flashlight shall be orange in color and have a 12 volt DC charger and vehicle mount kit. Each flashlight shall have an LED spotlight style bulbs and reflectors. The flashlight(s) shall be wired to battery direct unless otherwise specified by Central Nyack Fire Department.
  - The flashlight(s) shall be mounted in the cab. Driver light to be mounted on engine cover, aft of diver elbow. Officer light to be mounted on engine cover, aft of officer elbow. Four crew area lights mounted two each side, on rear cab interior wall between jump seats and entry doors.
- Suction Hose(s) shall be supplied by Fire Department.
- Central Nyack Fire Department supplied NFPA required fire hose and nozzles shall be provided on completed unit before placing vehicle in service.

### **REMAINING NFPA MINOR EQUIPMENT BY PURCHASER**

All other minor equipment not specified above, but required by NFPA 1901 for pumpers, section 5.9.4 shall be supplied and mounted by Central Nyack Fire Department before the unit is placed in emergency service.