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1 **Length Restriction**

2 The overall length of the finished apparatus shall not exceed **(29' 6")** twenty nine feet six inches.

3 **CUSTOM CHASSIS MANUFACTURER REQUIREMENTS**

4 The cab and chassis will be designed for and manufactured specifically for use in the fire service and meet
5 the requirements of the 2016 edition of **NFPA 1901** Standard.

6 The custom chassis shall be manufactured within the borders of the United States of America.

7 The bidder shall specify the manufacturer of the cab and chassis.

8 The cab shall be custom manufactured, medium four doors, full tilt, and aluminum construction, with a
9 contour windshield.

10 The cab will be fully enclosed, capable of comfortably seating Six (6) fire fighters in full firefighting
11 turnout gear. Cab will be of the cab over engine design, with integral tilt mechanism and engine access.

12 Cab will be a mid-size M.F.D. four (4) -door designs, with four (4) side-opening doors. (No Exceptions)

13 The cab interior will be the "Open-Space" design with no wall or window between the front and rear crew
14 area to allow direct communication, better visibility and air circulation in the cab.

15 **CAB DIMENSIONS**

16 The Bidder shall specify the following Cab dimensions:

17 Overall external width	_____
18 Inside width across ceiling	_____
19 Front area floor to ceiling	_____
20 Top of front seat to ceiling	_____
21 Inside width from door to engine enclosure at floor	_____
22 Forward door opening	_____
23 Forward door recessed step	_____
24 Rear door opening	_____
25 Rear door recessed step	_____
26 Crew seat area width	_____
27 Crew area floor to ceiling	_____
28 Top of crew seat to ceiling	_____
29 Outer crew seat risers to rear wall	_____
30 Center crew seat risers to rear wall	_____

31 ***BIDDER SHALL SUPPLY GLASS DIMENSIONS:***

32 Windshield (Contour)	_____	sq. in.
33 Side door window, retractable	_____	sq. in. each
34 Side crew windows	_____	sq. in. each

36 **CAB MATERIAL**

37 The cab shall be fabricated from a minimum 3/16" (.188) thick, 5052-H32 alloy, marine grade aluminum
38 sheets.

39 ***CAB - BASE CONSTRUCTION***

40 Cab sub frame will be fabricated of 6063 structural aluminum alloys. This frame will extend the full
41 length and width of the cab and be secured to the chassis frame through two (2) rear self-centering load
42 cushions, two (2) forward pivot brackets, and two (2) cab locks.

43 The front cab wall will be of double wall type construction featuring an inner and outer panel.

CAB ROOF

The cab roof will be ribbed internally for maximum stiffness, with radiused forward and side edges for a pleasing streamline appearance.

Provide a full-length aluminum rain gutter running horizontally along each side of the cab, over the doors and side windows.

Provide a minimum of a ten (10") inch raised roof over the rear crew area to ensure adequate headroom and maneuverability. A minimum floor to ceiling height of 59 inches shall be provided in the front and 65 inches floor to ceiling height in the rear crew area.

CAB DOORS (Barrier Type)

Provide four (4) side-opening doors. The cab doors shall be totally aluminum construction with an extruded aluminum frame and a 3/16" aluminum door skin. Doors will be barrier height from the top of the exposed step to the cab roof rain gutter. The doors shall provide approximately 32 inches of clearance from the ground to the bottom of the door so the cab doors may open unhindered. The forward cab door opening will be a minimum of 37" wide, and the rear cab door opening will be a minimum of 33" wide. The rearward cab doors will have a radius cutout allowing the door opening to protrude forward over the cab wheel well, while providing full access to the rear crew area.

Provide each side cab door with a fully retractable window operated by an electrical mechanism. The doors shall close flush with the side of the cab. Provide heavy duty 6" wide belting material to prevent the cab doors from opening greater than 90 degrees. Provide two (2) large chrome plated grab handles on the interior of each cab door, positioned to assist cab entry/egress and closing of the door.

ELECTRIC OPERATED CAB DOOR WINDOWS

All four (4) cab doors shall be equipped with electric operated windows with one (1) flush mounted automotive style switch on each door. The driver's door shall have four (4) switches, one (1) to control each door window.

Each switch shall allow intermittent or auto down operation for ease of use. Auto down operation shall be actuated by holding the window down switch for approximately 1 second.

ENTRY STEP AREA

Each of the forward entrance steps will be a minimum of 9" deep x 29" wide with the floor board recessed a minimum of 3" to avoid "shin knocking". Each step will be fabricated of aluminum tread plate. The cab step risers will be overlaid with aluminum tread plate.

Each of the rear entrance steps will be a minimum of 2" deep x 22" wide. An intermediate step will be provided between the lower entrance step and the crew area floor for ease of entry and egress. Each set of steps and respective step risers will be fabricated of aluminum tread plate.

REAR CAB WINDOWS

Provide Two (2) windows on the outer and upper portion on the rear wall of the cab. These windows are to provide visibility to the back of the apparatus for the safety of members exiting the crew area.

DOOR LATCHES

Provide heavy-duty cast paddle latches on the exterior of each cab door. A flush polished stainless steel paddle latch will be provided on the interior panel of each cab door.

INTERIOR DOOR LOCKS

All doors shall have interior door locks and exterior keyed door lock controls. The door locks and the finished door assemblies shall be in conformance with FMVSS 206, with specific adherence to 49 CFR 571.206 Section 4.1.3 requiring that "Each door shall be equipped with a locking mechanism. With an interior operating means in the vehicle". All doors shall be keyed alike. The doors shall be equipped with appropriate safety interlocks to prevent accidental locking of the doors when closed.

DOOR SCUFF PLATES

Each door interior will have aluminum scuff plates to provide lower and be full width for wear protection. Reflective STOP signs shall be provided to meet **NFPA 14.1.6**.

CAB CORROSION PROTECTION

A corrosion preventative material shall be applied during cab construction. A ten-(10) year warranty against corrosion perforation shall be provided for the cab.

WINDSHIELD/GLASS

Safety plate glass will be used in the windshield with tempered glass being used for the side windows, door glass, and side crew area glass. All glass will be tinted.

The windshield will be of a contour design for improved visibility and style. Provide a two-piece slide-open type window on each side of the cab behind the forward cab doors. These windows will provide additional ventilation for the enclosed cab.

WINDSHIELD WIPER AND WASHER

Provide dual, electric operated, pantographic type windshield wipers. Wipers will have "HI/LO" and "INTERMITTENT" operating speeds. "HI/LO" speeds will be controlled by a dash mounted rocker switch. "INTERMITTENT" operation will be controlled by a dash mounted "paddle/lever" switch. The wipers will be of the self-parking type.

Windshield washers will be electric operated wet-arm type with a washer fluid reservoir, readily accessible in the cab, behind the officer's seat. The washer control is integral with the intermittent wiper control switch.

Provide removable panels on the front face of the cab for access to the wiper motor assemblies.

113 ***INTERIOR GRAB RAIL***

114 A YELLOW rubber covered grab handle will be mounted on the lower portion of the driver's side cab
115 entrance to assist in entering the cab. The grab handle will be securely mounted to the post area between
116 the door and steering wheel column.

117 A long rubber grab handle will be mounted on the dash board in front of the officer.

118

119 **MOUNTING PLATE ON ENGINE TUNNEL**

120 Equipment installation provisions shall be installed on the engine tunnel.

121 A .25" smooth aluminum or poly plate shall be bolted to the top surface of the engine tunnel. The plate
122 shall follow the contour of the engine tunnel and shall run the entire length of the engine tunnel. The
123 plate shall be spaced off the engine tunnel 1.00" to allow for wire routing below the plate.

124

125 **WHEEL WELL LINERS**

126 The front cab wheel wells shall be equipped with removable, aluminum or poly, inner wheel well liners.

127 ***FENDERETTES***

128 Provide flexible rubber replaceable type federates installed around the front wheel openings.

129 ***MUD FLAPS***

130 Provide heavy-duty anti-sail type mud flaps behind the front wheels.

131 **CAB MIRRORS**

132 A Retractable, Model 613425, dual vision, motorized, lighted, west coast style mirror, with chrome finish,
133 shall be mounted on each side of the front cab door with spring loaded retractable arms. The flat glass
134 and convex glass shall be heated and adjustable with remote control within reach of the driver.

135 ***FDNY EIGHT INCH CONVEX MIRROR***

136 An 8.00" diameter round convex mirror will be provided over the officer's side front corner of the cab.
137 The mirror will provide the driver with a view of the front bumper and the area several feet in front of the
138 truck.

139 The mirror housing, tubing, clamps, and hardware will be constructed of corrosion resistant stainless
140 steel.

141 The mirror will be heated with the control inside the cab.

142 **Extreme duty INTERIOR CAB TRIM**

143 Provide a dashboard of custom formed material to create an ergonomically designed interior to be user
144 friendly and functional for the driver and officer. The instrument cluster will be centered in front of the
145 driver, and all gauges will be custom fitted in a non-glare panel. All warning lights and indicators will be
146 clustered in the lower center portion for easy identification and will be backlit for easy identification when
147 activated.

148 Provide for provisions for mounting of an additional switch panel in the center of the dash between the
149 driver and officer. Provide for easy access to the main chassis wiring panels and breaker panels.

150 Provide a compartment provided under each front seat with a latched access door. The compartment
151 under the driver seat will measure approximately 13"W x 12"D x 9"H. The radio compartment under the
152 officer seat that will measure approximately 19"W x 12"D x 9"H.

153 The entire interior rear wall of the cab will be covered with a smooth aluminum painted panel to match
154 interior cab finish.

155

156 **CLEAN CAB**

157 The interior finishes and materials shall be of the latest design and industry standards as to provide for an
158 ease of cleaning and decontamination. To reduce and or prohibit the absorption of hazardous chemicals
159 “clean cab concept”.

160 ***CAB AIR FILTRATION SYSTEM (HEPA)***

161 Provide an HEPA air filtration system in the cab.
162

163 **FLOORING (CLEAN CAB)**

164 The floor of the driver’s / officers compartment and the floor of the crew area shall be covered with an
165 aluminum diamond plate material. Surface shall sealed and provide for a hose washout capability. The
166 edges of the insulation shall be trimmed with aluminum-extruded angle and sealed for a pleasing
167 appearance the material shall comply with NFPA noise and heat requirements.

168 ***ENGINE ENCLOSURE***

169 Engine enclosure shall be fabricated from materials compatible with the basic cab material. The forward
170 portion of the engine enclosure will be covered with formed vinyl to match the balance of the cab interior.
171 The engine enclosure will not significantly obstruct the driver's vision in any direction. Inside of
172 enclosure will be insulated to protect against heat and noise.
173 The rear top section of the engine enclosure in the rear crew area shall provide access to the engine,
174 transmission and power steering reservoir dipsticks.

175 **CAB SEATING**

176 **H.O. BOSTROM ZIP CLEAN TANKER 500 CAB SEATING**

177 Seating shall be H.O Bostrom Durawear Plus seating with Zip Clean Cushions.

178 ***DRIVER SEAT***

179 A seat will be provided in the cab for the driver. The seat design will be a cam action type, with air
180 suspension. The manual horizontal control will be a towel-bar style located below the forward part of the
181 seat cushion. To provide flexibility for multiple driver configurations, the seat will have an adjustable
182 reclining back. The seat back will be a high back style with side bolster pads for maximum support. The
183 seat will include the following features incorporated into the side roll protection system:

- 184 • Side air curtain will be mounted integral to the outboard bolster of the seat back. The air curtain
185 will be covered by a decorative panel when in the stowed position.
- 186 • A suspension seat safety system will be included. When activated in the event of a side roll, this
187 system will pretension the seat belt and retract the seat to its lowest travel position.

188 The seat will be furnished with a 3-point, shoulder type seat belt. The seat belt will be furnished with
189 dual automatic retractors that will provide ease of operation in the normal seating position.

190 ***OFFICER SEAT***

191 A seat will be provided in the cab for the passenger. The seat will be a fixed type, with no suspension.
192 To ensure safe operation, the seat will be equipped with seat belt sensors in the seat cushion and belt
193 receptacle that will activate an alarm indicating a seat is occupied but not buckled.

194 The seat back will be an SCBA back style.

195 The seat will include the following features incorporated into the side roll protection system:

- 196 • Side air curtain will be mounted integral to the outboard bolster of the seat back. The air curtain
197 will be covered by a decorative panel when in the stowed position.

198

• A seat safety system will be included. When activated, this system will pretension the seat belt. The seat will be furnished with a 3-point, shoulder type seat belt. The seat belt will be furnished with dual automatic retractors that will provide ease of operation in the normal seating position.

REAR FACING DRIVER SIDE OUTBOARD SEAT

There will be one (1) rear facing seat provided at the driver side outboard position in the crew cab. The seat will be a fixed type, with no suspension. To ensure safe operation, the seat will be equipped with seat belt sensors in the seat cushion and belt receptacle that will activate an alarm indicating a seat is occupied but not buckled.

The seat back will be an SCBA back style.

The seat will include the following features incorporated into the side roll protection system:

- Side air curtain will be mounted integral to the outboard bolster of the seat back. The air curtain will be covered by a decorative panel when in the stowed position.
- A seat safety system will be included. When activated, this system will pretension the seat belt. The seat will be furnished with a 3-point, shoulder type seat belt. The seat belt will be furnished with dual automatic retractors that will provide ease of operation in the normal seating position.

REAR FACING PASSENGER SIDE OUTBOARD SEAT

There will be one (1) rear facing seat provided at the passenger side outboard position in the crew cab. The seat will be a fixed type, with no suspension. To ensure safe operation, the seat will be equipped with seat belt sensors in the seat cushion and belt receptacle that will activate an alarm indicating a seat is occupied but not buckled.

The seat back will be an SCBA back style.

The seat will include the following features incorporated into the side roll protection system:

- Side air curtain will be mounted integral to the outboard bolster of the seat back. The air curtain will be covered by a decorative panel when in the stowed position.
- A seat safety system will be included. When activated, this system will pretension the seat belt. The seat will be furnished with a 3-point, shoulder type seat belt. The seat belt will be furnished with dual automatic retractors that will provide ease of operation in the normal seating position.

FORWARD FACING CENTER SEATS

There will be two (2) forward facing foldup seats provided at the center position in the crew cab. To ensure safe operation, the seats will be equipped with seat belt sensors in the seat cushion and belt receptacle, which will activate an alarm indicating a seat is occupied but not buckled.

The seats will include the following feature incorporated into the side roll protection system:

- A seat safety system will be included. When activated, this system will pretension the seat belts around the occupants to firmly hold them in place in the event of a side roll. The seats will be furnished with a 3-point, shoulder type seat belts. The seat belts will be furnished with dual automatic retractors that will provide ease of operation in the normal seating position.

WALKAWAY BRACKET

All SCBA type seats in the cab shall have a "Hands-Free" auto clamp style bracket in its backrest. For efficiency and convenience, the bracket shall include an automatic spring clamp that allows the occupant to store the SCBA bottle by simply pushing it into the seat back. For protection of all occupants in the cab, in the event of an accident, the inertial components within the clamp shall constrain the SCBA bottle in the seat and shall exceed the NFPA standard of 9G. Bracket designs with manual restraints (belts, straps, buckles) that could be inadvertently left unlocked and allow the SCBA to move freely within the cab during an accident, shall not be acceptable.

The bracket will accommodate a customer supplied 4500 PSI, 45 minute SCBA with composite cylinders, total of five (5) brackets.

SEAT BELTS

Provide three-point, fully retractable, shoulder harness type seat belts for all riding positions color RED.

SHOULDER HARNESS HEIGHT ADJUSTMENT

All seating positions furnished with 3-point shoulder type seat belts will include a height adjustment. This adjustment will optimize the belts effectiveness and comfort for the seated firefighter.

UPHOLSTERY

All seating shall be Grey tweed Durawear. With Zip-off seat covers a foam block encapsulated barrier shall be provided. All ABS formed material will be medium gray in color, as well as the seating and upholstery. The cab upholstered overhead and rear wall portions will be gray.

Replacement seat covers

Replacement covers shall be provided for each seat on the apparatus allowing for the apparatus to remain in service while cleaning.

OCCUPANT PROTECTION

The vehicle shall include the Protection System which shall secure belted occupants and increase the survivable space within the cab. The system 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:

- Driver steering wheel airbag
- Driver dual knee air bags (patent pending) with energy management mounting (patent pending) and officer knee airbag.
- Driver and officer large side curtain airbags
- SYSTEM 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.

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

294
295 In the event of a qualifying offset or other non-frontal impact, the RCM shall determine and intelligently
296 deploy the front impact protection system, the side impact protection system, or both front and side
297 impact protection systems based on the inputs received from the outboard crash sensors.
298

299 **HELMET HOLDERS**

300 Provide six (6) Zico UHH-1 helmet holders mounted in the cab / crew area the location to be determined
301 during preconstruction conference.

302 **ANTENNA INSTALLATION**

303 Seven (7) customer furnished antennas will be mounted on the cab roof and will be located as noted on
304 the final approval drawing. The antennas will be furnished to the manufacturer prior to construction of the
305 custom chassis. The attached antenna wires will be run to the right side cab behind the officer's seat,
306 unless otherwise specified. (TBD Preconstruction conference)

307 **RADIO CABLE INSTALLATION**

308 Four (4) remote head radio cables will be furnished to the manufacturer prior to construction of the
309 custom chassis. The wires will be run from behind the officer's seat, to the dashboard area for installation
310 of customer radios. Unless otherwise specified. (TBD Preconstruction conference)
311

312 **INSTRUMENT PANELS**

313 The main instrument panel will be centered in front of the driver and shall be removable with sufficient
314 slack on wire and cables to service the instrumentation attached. The cab dash panel will be an anti-glare
315 surface. The instrument panel will include the following gauges and indicators:
316

- 317 Dual needle air pressure gauge
- 318 Low front air warning light (red) in blacked out warning block
- 319 Low rear air warning light (red) in blacked out warning block
- 320 Low air audible alarm
- 321 Oil pressure gauge with integral low pressure warning light (red)
- 322 Low oil pressure audible alarm, between oil pressure gauges and transmission
- 323 Temperature gauge
- 324 Transmission temperature gauge with integral high temperature warning light (red)
- 325 High transmission temperature audible alarm
- 326 Voltmeter with color-coded dial and integral high/low voltage warning light (red)
- 327 High/low voltage audible alarm
- 328 Fuel gauge with integral low fuel warning light (red)
- 329 Water temperature gauge with integral high temperature warning light (red)
- 330 High water temperature audible alarm
- 331 Electronic speedometer with LCD totaling odometer and trip odometer
- 332 Tachometer with integral engine hour meter
- 333 Air restriction indicator.
- 334 Headlight rocker switch with integral backlit label
- 335 Dash light dimmer slide with integral backlit label
- 336 Headlight high-beam indicator light (blue) in blacked out warning block

337 Two directional indicator lights (green) in blacked out warning block
338 Windshield wiper rocker switch with integral backlit label
339 Windshield wiper delay slide and momentary washer with integral backlit label
340 Ignition on/off switch
341 Ignition "ON" light (yellow) in blacked out warning block
342 Battery "ON" light (green) in blacked out warning block
343 Engine start rocker switch with integral backlit label
344 Parking brake warning light (red) in blacked out warning block
345 Electric horn/air horn selector switch with integral backlit label
346 **"Cab not latched"** warning light (red) in blacked out warning block
347 300 amp Ammeter

348 The warning lights and indicators will be clustered in the lower center portion of the dash.
349 Below the main dash panel, and to the left of the steering column, will be the location for the pump shift
350 control with indicator light. To the right of the steering column below the main dash panel will be the
351 parking brake control valve. Additional auxiliary control switches can also be provided in these vertical
352 panels below the main dash panel.

353 **CLASS 1 ULTRAVIEW TOUCH 4.3**

354 The apparatus shall be equipped with a Class 1 to display apparatus speed and systems status. The display
355 shall be a rectangular shaped, weatherproof, digital display with super-bright digits at least 1/2" high. The
356 display shall be capable of showing speed in either MPH or KPH. It shall be located for easy viewing by
357 the officer in the right front seat.

358 **COMPUTER BRACKET (OFFICER POSITION)**

359 Provide an IPORT - LAUNCH Rugged System for iPad 10.2-inch (8th gen) on the dash in front of the
360 officer's position. (Location to be determined at pre construction.)

361 **SWITCH PANELS**

362 The built-in switch panels shall be located in the lower console or overhead console of the cab. Switches
363 shall be rocker type with an indicator light, of which is an integral part of the switch.

364 **DUAL USB SOCKET**

365 There shall be four (4) Blue Sea, Model 1016, dual USB type A charger sockets installed two in
366 dashboard, and one in driver's side and passenger EMS compartment . The socket shall be powered
367 directly to the battery power.

368 **VEHICLE DATA RECORDER (VDR)**

369 The apparatus shall be equipped with an on-board vehicle data recorder (VDR) to monitor critical driving
370 habits and the status of safety belt use. The VDR shall be capable of recording and storing the following
371 apparatus and drive train data via the SAE J1939 network and hardwired inputs in accordance with the
372 requirements of **NFPA 1901 Section 4.11.**

373 **DEFOGGER FANS**

374 Provide two (2), six (6) inch defogger fans in addition to the standard windshield defroster. They will be
375 located in the cab overhead, one (1) each side of the heater/defroster unit. A single switch located for easy
376 access of the driver shall control the units.

377 **CREW AREA FANS**

378 Provide two (2), six (6) inch fans. They will be located in the crew area, one (1) each side on the rear wall.
379 A switch located on the unit shall control the fan.

380

HEATING AND AIR CONDITIONING

The cab's climate control system shall use three (3) heater-air conditioner units divided into two separate circuits. The front circuits use two (2) small heater-air conditioning units, one (1) mounted under the dash on the driver's side and one (1) under the officer's side dash. These units shall have a minimum rating of 24,000 BTU and 2 tons cooling. These units shall be plumbed to their own compressor and serpentine fin design condenser. The units blow toward the windshield through vents in the dash. There shall be two (2) adjustable vents installed to direct air at the lower portion of the driver and officer seating areas. Three switches on the dash, including low/med/high, right/left, and heat/off/cool, control these units.

The rear circuit shall use one large heater air conditioner unit shall have a minimum rating of 2 tons of cooling and 48,000 BTU heating. It shall be mounted under the forward facing rear seats. Ducting shall run up the rear wall to adjustable vents (minimum of six) mounted at the ceiling. This unit shall also utilize its own separate compressor and serpentine fin condenser. Two (2) switches on the seat base, including low/med/high and heat/off/cool, control this unit.

A blend air switch shall be installed on the dash that simultaneously operates the front heating and cooling systems. This provides hot and dry air for defogging purposes.

All units utilize permanent magnet motors. Climate control system using dual compressors or dual condensers plumbed into a single circuit are not acceptable since the failure of one unit shut down the entire system.

CAB TILT ASSEMBLY

Provide a cab tilt mechanism custom designed for ease of maintenance consisting of two (2) hydraulic cylinders. Each cylinder will have an attached hydraulic locking mechanism, in the event of a hydraulic failure. Hydraulic cylinders will be detachable to allow removal of the engine for major service. A mechanical cylinder stay bar and release will be provided to insure a positive lock in the tilted position.

Two (2) rear outboard cab latches will be of the hydraulic pressure release, automatic re-latching type and provide an automatic positive lock when the cab is lowered. The latch must not disengage or experience any damage when subjected to a pull apart tensile load of 6,000 lbs. The tilt pump will be electric over hydraulic type. A safety interlock switch will be provided to prevent accidental tilting of the cab.

AUXILIARY MANUAL CAB LIFT

An auxiliary manual cab lift back up system will be furnished for use in the event of total electrical shutdown.

CHASSIS FRAME

The chassis frame shall be fabricated in its entirety in the factory of the chassis manufacturer. This will prevent any split responsibility in warranty or service. Provide warranty on chassis frame.

The frame shall consist of two channels fastened together by cross members. All structural fasteners used in the frame will be Grade 8 with vibration resistant aircraft nuts. Hardened steel washers will be used under all bolt heads and nuts to avoid stress concentrations. Top flange will be free of bolt heads. All spring hangers will be steel castings. Hanger or other weldments will not be acceptable.

The minimum frame side rails shall be "C" channel type, 10.25" x 3.5" x .38" 110,000 psi minimum yield high strength steel with a RBM of 1,827,257 inch pounds and a section modulus of 16.61 cubic inches.

Formed frame rails or a fish-plated frame will not be acceptable.

The entire chassis frame assembly consisting of frame rails, cross members, axles and steering box, will be hot dipped galvanized before installation of any electrical wiring, fuel system components, or air system components.

FRONT BUMPER

A full width, FDNY heavy-duty 80,000 psi structural steel front bumper painted to the body color, will be provided.

FRONT BUMPER NOTCH

The front bumper shall be notched for recessing of the Q2B siren. The notch shall be designed so that the bumper is one continuous piece. The notch shall be welded in place for strength with a continuous top and bottom flange. All welds shall be metal finished for appearance. The siren shall be located center of the bumper.

SIDE ZONE LIGHT MOUNTING

The front lower warning lights on each side shall be recessed into the side of the bumper extension to protect the light from damage. The recessed bracket shall be made of painted smooth aluminum.

FRONT TOW HOOKS

Provide two (2) front forged steel tow hooks fastened directly to the frame web recessed behind the front bumper.

FRONT AXLE

Provide a front axle of sufficient capacity as determined by the COLCHESTER FIRE DEPARTMENT loading requirements. The measured load during acceptance shall not exceed 95% of the axle capacity.

The front axle shall not be less than a Meritor (Rockwell) MFS-20 with 20,000-pound capacity.

Provide Stemco premium oil seals with hubcap window.

STEERING SYSTEM

The steering system shall be a package certified by TRW for the application. All components from the steering column to the drag link shall be manufactured by TRW. A non-certified system shall not be acceptable.

The steering system shall use a TAS-65 steering gear with an RCS-55 slave gear which has the capacity to static steer the chassis loaded to 21,500 pounds with 425-size tire. The use of two equal size gears or a single gear with an assist cylinder shall not be acceptable.

STEERING

Provide a front axle powered steering system of sufficient capacity as determined by the Colchester Fire Department loading requirements. The measured load during acceptance shall not exceed 95% of the axle capacity. The steering shall be an integral power assist type utilizing an engine driven hydraulic pump with a maximum operating pressure of 2000 PSI. Steering design will permit a maximum of 5.6 turns from stop to stop. Steering system components will be mounted in accordance with the manufacturer's instructions.

Provide a vinyl padded steering wheel, minimum 18" diameter, with a center hub mounted horn button. Provide a self-canceling directional signal lever and a traffic hazard switch on the steering column. Pulling the directional signal lever toward the driver will control the high beam activator. Provide a steering column with tilting and telescoping capability.

FRONT BRAKES

Front brakes shall be determined by selected load capacity of the front axle. Arvin / Meritor 16.5" x 6" S-cam type with Arvin / Meritor automatic slack adjusters. Drums are to be outboard mounted.

FRONT SUSPENSION

The front springs shall be semi-elliptical, minimum of 4" wide x 54" long (flat), minimum of 11 leaves x .499" thickness with a capacity of 20,000 pounds. Grease fittings for lubrication shall be installed in the spring pins. Double acting shock absorbers shall be installed. Axle stops with energy absorbing bounce bumpers shall be supplied on the spring top pad.

Provide double acting hydraulic shock absorbers on the front axle. Shock absorbers shall match the capacity of the front axle and have a minimum bore of 1.38" and an outside diameter of approximately 3 1/4".

FRONT SHOCK ABSORBERS

Two (2), nitrogen gas charged shock absorbers shall be part of the front axle suspension.

REAR AXLE

Provide a rear axle of sufficient capacity as determined by the COLCHESTER FIRE DEPARTMENT loading requirements. The measured load during acceptance shall not exceed 95% of the axle capacity. The rear axle shall not be less than a Meritor RS-26-185 Rear Axle 27,000 # GAWR with a capacity of 27,000 lbs. The axle shall be a single reduction axle with hypoid gearing and oil lubricated wheel bearings. Heavy-duty 27,000 lb. rear suspension will be provided. Shall be geared to provide maximum acceleration while maintaining a top road speed not less than 63 Mph. and not greater than 68 Mph.

REAR SUSPENSION

Provide the rear suspension of a leaf type variable rate with a 27,000 lb. rating. The rear suspension shall include a main spring pack with 14 leaves, and an auxiliary spring pack with four leaves. The suspension shall be a self-leveling slipper type with torque leaf and variable rate. The rear suspension shall have a ground rating of 27,000 lbs.

REAR BRAKES

Rear brakes shall match the capacity of the selected rear axle. The brakes shall be "S" Cam, minimum size 16-1/2" x 7" cast shoes with 36 /36 chambers and shall be full air actuated with automatic slack adjusters. Drums are to be outboard mounted.

503 **BRAKE SYSTEM**

504 The braking system shall be full air type in compliance with FMVSS-121. They will be direct air type
505 with dual air treadle in the cab.

506 **ABS SYSTEM**

507 Provide an ABS system to improve braking control and reduce stopping distance. This braking system
508 shall be fitted to all axles. All electrical connections will be environmentally sealed, water weatherproof
509 and vibration resistant.

510
511 The system shall constantly monitor wheel behavior during braking. Sensors on each wheel transmit
512 wheel speed data to an electronic processor which will sense approaching wheel lock and instantly
513 modulate brake pressure up to 5 times per second to prevent wheel lockup. Each wheel will be
514 individually controlled. To improve service trouble shooting, provisions in the system for an optional
515 diagnostic tester will be provided. The system will test itself each time the vehicle is started and a dash-
516 mounted light will go out once the vehicle is moving above 4 mph. To improve field performance the
517 system will be equipped with a dual circuit design. The system circuits will be configured in a diagonal
518 pattern. Should a malfunction occur, that circuit would revert to normal braking action. A warning light
519 will signal malfunction to the operator. The system will consist of a sensor clip, sensor, and electronic
520 control unit and solenoid control valve. The sensor clip will hold the sensor in close proximity to the
521 tooth wheel. An inductive sensor consisting of a permanent magnet with a round pole pin and coil will
522 produce an alternating current with a frequency proportional to wheel speed. The unit shall be sealed,
523 corrosion resistant and protected from Electromagnetic interference. The electronic control unit will
524 monitor the speed of each sensor wheel slip. A deviation will be corrected by cyclical brake application
525 and release. If a malfunction occurs, the circuit will signal the operator and the malfunctioning half of the
526 system will shut down. The system is installed in a diagonal pattern for side-to-side control. The system
527 will insure that each wheel is braked in optimum efficiency up to 5 times a second.

528
529 The system shall also control application of the auxiliary engine brake to prevent wheel lock.

530 **AUTOMATIC TRACTION CONTROL (ATC)**

531 Provide automatic traction control, (ATC); to further improve vehicle drive characteristics. This system
532 shall control drive wheel slip during acceleration from a resting point. An extra solenoid valve will be
533 added to the ABS system. The system will control the engine and brakes to ensure efficient acceleration.
534 The system will include a dash-mounted light that will come on when ATC is controlling drive wheel slip

535 **ESC ELECTRONIC STABILITY CONTROL**

536 The apparatus shall have a Wabco ABS-based Electronic Stability Control (ESC), which offers another
537 level of vehicle control. This automatic braking management system reduces the possibility of a side
538 rollover and assists in the directional stability of apparatus. Upon reaching critical lateral acceleration
539 thresholds, the system intervenes to regulate the vehicle's deceleration and braking functions by reducing
540 the engine RPMs by overriding the foot throttle input and applying the engine retarder (if equipped) to
541 slow the apparatus giving the driver added control and maneuverability. The ESC shall also apply braking
542 power to selective wheel of the front and rear axles to assist in stabilizing the apparatus to its intended
543 direction. This selective braking application and reduction of speed and torque reduces the possibility of
544 spinouts and side rollovers even in adverse conditions

545 **AUTOMATIC TIRE CHAIN**

546 Provide an automatic tire chain system for the rear axle with a driver-controlled switch in the cab. Switch
547 shall be provided with a protective flip cover. Air supply shall come from the additional 1,200 cu.in. air
548 tank.

549 **BRAKE AIR RESERVOIRS**

550 Provide a minimum of three (3) air reservoirs installed in conformance with best automotive practices.
551 Reservoir capacity will be a minimum of 4,400 cubic inches.

552
553 Provide an additional 1200 cu. in. air reservoir for the accessory air outlet, location to be determined, for
554 air horns and drop down chains. This tank shall be fitted with a high flow check stop.

555 ***AIR DRYER***

556 Provide a Bendix #AD-9 heated air dryer. Provide an automatic moisture ejector on the primary, or wet
557 tank.

558 ***AIR LINES***

559 Provide the entire chassis air system plumbed with reinforced Synflex airlines. All of the airlines will be
560 color coded to correspond with an air system Schematic and shall be adequately protected from heat and
561 chafing.

562 ***AIR COMPRESSOR***

563 Provide an air compressor with the capacity of a minimum of 16.0 cu. ft. per minute. The air brake system
564 will be the quick build up type.

565 **PARKING BRAKE (* NOTE LOCATION REQUIREMENTS)**

566 The parking brake shall be of the spring-actuated type, mounted on the rear axle brake chambers. The
567 parking brake control and red application warning light will be mounted on the cab instrument panel. It
568 shall be so located as to allow for application of the parking brake from both the driver's and officer's
569 position.

570 **KUSSMAUL AIR PUMP**

571 Provide a Kussmaul 12 volt air pump, model 091-9, complete with 091-9G airline filter and 091-9H
572 mounting plate. Unit to be completely automatic and controlled by integral pressure switch. Provide a
573 separate 12V fused circuit for this air pump. Mount under driver's seat.

574 **WHEELS AND TIRES**

575 Provide Alcoa Aluminum Dura Bright hub piloted front and rear wheels of sufficient capacity as
576 determined by the Colchester Fire Department loading requirements. The measured load during
577 acceptance shall not exceed 95% of the wheel and tire capacity. Tires and wheels will be balanced.
578 The two (2) front tires shall be Michelin 425 x 65R, 22.5 tubeless radials, XZY 3, with a rating of 11,400
579 lbs. for each tire.
580 The four (4) rear tires shall be Michelin 12R, 22.5 XDS mud and snow tubeless radials, with a rating of
581 6,780 lbs. for each tire in a dual configuration.

582 **TIRE PRESSURE MONITORING**

583 There shall be a Vecsafe LED tire alert pressure management system provided that shall monitor each
584 tire's air pressure. A chrome plated brass sensor shall be provided on the valve stem of each tire for a total
585 of six (6). The sensor shall calibrate to the tire pressure when installed on the valve stem for pressures
586 between 20 and 120 psi. The sensor shall activate an integral battery operated LED when the pressure of
587 the tire drops 8 psi. Removing the cap from the sensor shall indicate the functionality of the sensor and
588 battery. If the sensor and battery are in good working condition, the LED shall immediately start blinking.
589 Pressure to be determined after the apparatus has been live loaded.

590 **TIRE PRESSURE LABELS**

591 Provide over each wheel well a Permanent label indicating the proper inflation pressure for each tire or set

592 of tires. Sample shown:



593
594 **ENGINE**

595 Engine shall be a diesel, turbocharged, with the following minimum specifications.

596 Min. Horsepower - 500 HP
597 Governed Speed - 2100 RPM
598 Torque - 1695 - lb-ft
599 Cylinders - Six (6)
600 Operating Cycles - Four (4)

601
602 The engine shall be installed in accordance with engine manufacturer's instructions, and the chassis
603 manufacturer will be able to furnish proof of engine installation approval by the engine manufacturer. The
604 engine controls shall be programmed for fire service application.
605

606 ***ENGINE BRAKE***

607 Provide an engine brake for six (6) cylinders for increased braking capabilities. It will be controlled by an
608 on/off and low/med/hi switch on the dash and activated by releasing the throttle pedal to idle.
609 Wire the engine brake in such a manner so as to illuminate the chassis brake lights when the engine brake
610 is engaged and operating.

611 ***ENGINE FAST IDLE***

612 Provide a fast idle for the electronic controlled engine. An ON/OFF switch located on the dashboard shall
613 control the fast idle. Setting for the fast idle must produce a slight battery charge with all electrical
614 components including air conditioning operating.
615

616 Provide an electronic interlock system that will prevent the fast idle from operating unless the
617 transmission is in "Neutral" (or "Park" if so equipped) and the parking brake is fully engaged. If the fast
618 idle control is used in conjunction with a specified engine/transmission driven component or accessory,
619 the fast idle control shall be properly interlocked with the engagement of the specified component or
620 accessory.

621 ***RADIATOR***

622 The radiator and the complete cooling system will meet or exceed NFPA and engine manufacturer
623 cooling system standards. The cooling system will be designed for a minimum of seven (7) PSI operation.
624 There will be a sight glass in the radiator to check the coolant level without removing the radiator cap.
625 The core construction will be tube and fin with a minimum of four (4) tubes per row and a minimum of
626 ten (10) fins per inch.
627

628 Provide a one and one-half (1-1/2) gallon coolant recovery system located inside the engine enclosure that
629 is accessible from the access hatch located at the rear of the engine enclosure.
630

631 Provide silicone rubber hoses and appropriate hose clamps for the engine and heater system.
632

633 Provide an engine water filter as required by the manufacturer.
634

635 Provide a coolant additive to the cooling system as recommended by the engine manufacturer for -35

636 degrees F.

637 ***AIR CLEANER***

638 Provide an engine air cleaner of a dry type element. The air cleaner shall be sized and installed in
639 accordance with the engine manufacturer's recommendations.

640 **TRANSMISSION**

641 The transmission shall be an Allison 4000 EVS five (5) speed automatic with electronic controls.
642 The transmission will have two (2) 10-bolt PTO pads, one (1) at the 8-o'clock position and the other at the
643 1-o'clock position.
644 The transmission shall be equipped with an air to oil transmission cooler located below the radiator
645 allowing a single depth core and efficient cooling package. The transmission cooler shall be mounted in a
646 manner to allow maximum approach angle by not protruding below the frame more than an inch. The
647 transmission cooler shall be constructed completely of aluminum with welded side tanks. The
648 transmission shall have two (2) internal oil filters.
649 Fourth gear hold-in range may be accomplished through wiring for a pumping application.
650 The transmission gear ratios shall be:
651 1st 3.51:1
652 2nd 1.91:1
653 3rd 1.43:1
654 4th 1.00:1
655 5th 0.74:1
656 Rev 4.80

657 ***TRANSMISSION SHIFTER / MODE***

658 The transmission shall be controlled by an Allison push button type shift control. It shall be
659 internally illuminated for night operation. It shall be mounted to the right of the steering
660 column on the driver's dash console. The transmission, upon start-up, shall select four-(4th)
661 gear operation. By pressing the "mode" switch on the shift pad (mode on) provides five-(5th)
662 gear (overdrive operation) for highway speeds.

663 ***TRANSMISSION WARRANTY***

664 The Allison 4000 EVS series transmission shall be warranted for a period of five (5) years with unlimited
665 mileage. Parts and labor shall be included in the warranty.
666 The transmission must be filled with TranSynd synthetic fluid or approved equal.
667 Transmission installation shall be in accordance with the transmission manufacturer's specifications. The
668 transmission will be readily and easily removable for repairs or replacement.

669 **DRIVELINES**

670 Drivelines shall be Dana (Spicer) 1810 series. The chassis manufacturer shall utilize an electronic type-
671 balancing machine to statically and dynamically balance all drive shafts. The chassis manufacturer must
672 provide proof of compliance with all drive shaft manufacturer's standards and specifications. (No
673 Exceptions)
674

675 **EXHAUST SYSTEM**

676 Provide an aluminized exhaust system installed in accordance with the engine manufacturer's
677 requirements and meet all Environmental Protection Agency and State noise level requirements. Exhaust
678 system components will be securely mounted and easily removable.

679 The muffler will be fabricated from steel sheet and of a size compatible with the engine exhaust discharge
680 flow and back flow restrictions.

681 All exhaust tubing will be a minimum of 16 gauge aluminized cold rolled steel. Any flexible exhaust
682 tubing will be H D stainless steel type. All flex tubing clamps will be Flex-Seal II, packed with a pliable
683 sealant, creating an emission type joint. To minimize heat build-up, exhaust tubing within the engine
684 compartment will be wrapped with insulating pads that are easily removable.

685 Provide exhaust discharge on the right side of the apparatus forward of the rear axle. Provide a formed
686 aluminum tread plate heat shield/exhaust deflector shall be installed between the floor of the body
687 compartment and the top of the exhaust outlet. Provide an angled, chrome plated, exhaust deflector on the
688 exhaust outlet.

689 **FUEL TANK**

690 Provide a fuel tank with a minimum of 50-gallon capacity. The fuel filler neck shall be 2" ID minimum.
691 Provide a ½" minimum diameter drain plug. The tank will be fabricated from hot rolled, pickled and
692 oiled steel. Provide a fuel level float.

693 Install the fuel tank behind the rear wheels between the frame rails. All lines to and from the engine shall
694 be medium pressure aircraft type wire braid hoses.

695 Fuel filtration shall meet the requirements of the engine manufacturer.

696 Provide a fuel line shut-off valve between the fuel tank and the heated fuel/water separator.

697 A Racor model B32002 fuel water separator shall be installed. A water-sensing probe, along with a dash
698 mounted warning light shall be supplied.

699 ***FUEL POCKET***

700 Provide a fuel fill on the left side rear wheel well area. Provide a Cast Products heavy-duty cast
701 aluminum spring loaded hinged fill door, labeled "Diesel Fuel Only". Fuel fill shall not interfere with air
702 bottle compartments.

703 **VEHICLE FLUIDS PLATE**

704 As required by N.F.P.A., the contractor will affix a permanent plate in the driver's compartment
705 specifying the quantity and type of the following fluids used in the vehicle:

706 A permanent plate in the driving compartment will specify the quantity and type of the following fluids
707 used in the vehicle:

708 A) Engine oil

709 B) Engine coolant

710 C) Chassis transmission fluid

711 D) Pump transmission lubrication fluid

712 E) Pump primer fluid

713 F) Drive axle(s) lubrication fluid

714 G) Air-conditioning refrigerant

715 H) Air-conditioning lubrication oil

716 I) Power steering fluid

717 J) Cab tilt mechanism

718 K) Transfer case fluid

719 L) Equipment rack fluid

720 M) Air compressor system lubricant

721 N)

722

CHASSIS ELECTRICAL SYSTEM

All electrical wiring in the chassis will be SXL cross link-insulated type. Wiring is to be color-coded and include function codes every three (3) inches on both sides. Wiring harnesses will be routed in protective heat resistant loom securely and neatly installed. Two power distribution centers will be provided in central locations for greater accessibility. The power distribution centers contain automatic thermal self-resetting breakers, power control relays, flashers, diode modules, daytime driving light module and engine and transmission data links. All breakers and relays utilized in circuits will have amp loads that are substantially lower than the respective component rating thus ensuring long component life. Power distribution centers will be composed of a system of interlocking plastic modules for ease in custom construction. The power distribution centers are function oriented. The first is to control major truck function and the second will control switching and interior operations. Each module shall be single function coded and labeled to aid in troubleshooting. The centers also have accessory breakers and relays for future installations. All harnesses and power distribution centers will be electrically tested prior to installation to ensure the highest system reliability.

All external harness interfaces will be of a triple seal type connection to ensure a proper connection. The cab/chassis and the chassis/body connection points will be mounted in accessible locations. Complete "as built" chassis wiring schematics shall be supplied with the apparatus.

The bidder shall supply with their bid photographs of their wiring centers as well as a copy of a wiring schematic from a competed apparatus.

SPARE 12 VOLT CIRCUIT - CAB

Provide seven spare 12V circuits sized and supplied for the interior of the custom cab for customer-supplied equipment. These circuits shall be wired to an area(s) determined at time of pre-construction. COLCHESTER FIRE DEPARTMENT to provide list of equipment to be used prior to pre-construction. (Laptop computer / portable radio chargers etc.)

RADIO 12 VOLT CIRCUITS

A 12-volt, 60 amp radio circuit with four (4) post fusible block and grounding for department's two-way mobile radios shall be provided and installed (location to be determined during preconstruction). The circuit shall be activated with the master disconnect switch.

INTERCOM SYSTEM – SIX SEATED POSITION

A FIRECOM custom designed intercom six-position communication system shall be provided and installed on the apparatus as follows.

INTERCOM- FIRECOM 5200D

A FIRECOM model 5200D DIGITAL INTERCOM 2 RADIO monitoring and primary transmit selection intercom shall be provided and installed in the unit. To include antenna and all necessary cabling and interface with Kenwood TK series mobile radios.

WIRELESS BASE STATION WB505R

Provide (2) WB505R wireless base stations to allow for the 6 members to be connected wirelessly.

HEADSET - FIRECOM SERIES- UHW 505 – WIRELESS DRIVER POSITION

There shall be a model UHW 505 wireless headset provided for the driver position. It shall have a (PTT) "Push to Talk" located on the dome. The headset shall come with an adjustable volume, noise canceling electric microphone, adjustable head strap, and flexible style boom for rotation of right or left dress. The headset shall provide high clarity speakers and fully shielded EMI/RFI protected cabling to maximize performance. The liquid foam ear, seals along with the system provides a 24 dB noise reduction.

HEADSET - FIRECOM - UHW 505 – WIRELESS OFFICER POSITION

There shall be a model UHW 505 wireless headset provided for the officer's position. It shall have a (PTT) "Push to Talk" located on the dome. The headset shall come with an adjustable volume, noise canceling electric microphone, adjustable head strap, and flexible style boom for rotation of right or left dress. The headset shall provide high clarity speakers and fully shielded EMI/RFI protected cabling to maximize performance. The liquid foam ear, seals along with the system provides a 24 dB noise reduction.

HEADSET - FIRECOM - UHW 503 - CREW POSITION –INTERCOM ONLY

There shall be four (4) model UHW 503 headset(s) provided for a crew-seated position. The headset shall wireless intercom transmit headset. It shall have a (PTT) "Push to Talk" located on the dome. The headset shall come with an adjustable volume, noise canceling electric microphone, adjustable head strap, and flexible style boom for rotation of right or left dress. The headset shall provide high clarity speakers and fully shielded EMI/RFI protected cabling to maximize performance. The liquid foam ear, a seal along with the system provides a 24 dB noise reduction. Each headset shall have a one-(1) year warranty.

HEADSET HANGER - FIRECOM SERIES-HGR-1

There shall be six (6) yellow rubber coated headset hanger hooks.

EMI/RFI PROTECTION

The apparatus shall incorporate the latest designs in electrical systems with state of the art components to insure that radiated and conducted electromagnetic interference (EMI) and radio frequency interference (RFI) emissions are suppressed at the source.

The apparatus proposed shall have the ability to operate in the environment typically found in fire ground operations with no adverse effects from EMI/RFI.

EMI/RFI susceptibility is controlled by utilizing components that are fully protected and wiring that utilizes shielding and loop back grounds where required. The apparatus shall be bonded through wire braided ground strsystem. Relays and solenoids that are possible generators of spurious electromagnetic radiation are to be diode protected to prevent transient voltage spikes.

WIRING HARNESS DESCRIPTION

The wiring harness contained on the chassis shall be designed to utilize wires of stranded 100% copper of a gauge rated to carry 125% of maximum current for which the circuit is protected without exceeding 10% voltage drop across the circuit. Wiring shall be uniquely identified by color code or circuit function code, and labeled at a minimum of every three (3) inches. The identification of the wiring shall be referenced on an "as built" wiring diagram. All wires conform to SAEJ1127 (Battery Cable), SAEJ1128 (Low Tension Primary Cable), SAEJ1560 (Low Tension Thin Wall Primary Cable).

Provided covering of all wiring harnesses shall be moisture resistant loom with a minimum rating of 289 Degrees Fahrenheit and a flammability rating of VW-1 as defined in UL62. The wire insulation of jacketed cable shall have a minimum rating of 289 degree Fahrenheit.

All harnesses must be securely installed in areas protected against heat, liquid contaminants and damage. The harness connections and terminations shall utilize a method that provides a positive mechanical and electrical connection and shall be connected in accordance to the device manufacturer's instructions. No connections within the harness shall utilize wire nuts, insulation displacement or insulation piercing. All circuits shall conform to SAEJ1292. All circuits shall be provided with low voltage over current protective devices. These devices shall be readily accessible and protected against heat in excess of component rating, mechanical damage, and water spray. Star washers shall not be used for ground connections.

812 **12 VOLT BODY ELECTRICAL SYSTEM**

813 All electrical circuits in the pump house and fire body shall be protected by automatic circuit breakers,
814 conveniently located to permit ease of service. Flashers, heavy solenoids and other major electrical
815 controls will be located in a central area near the circuit breakers.
816 All pump house and fire body electrical wiring shall conform to the requirement as set forth in "WIRING
817 HARNESS DESCRIPTION" description above. A complete "as built" wiring diagram will be supplied
818 with the apparatus.
819 Wiring shall be carefully protected from weather elements and be sufficiently supported from ice buildup
820 and snagging. Heavy-duty wire loom shall be used for the entire length. Grommets will be utilized
821 where wiring passes through panels, cabinets or other sheet metal or structural members.
822 To minimize the risk of heat damage, wires run in the engine compartment area will be carefully installed
823 and suitably protected by the installation of heat resistant shielded loom.
824 All electrical equipment shall be installed to conform to the latest federal standards as outlined in
825 N.F.P.A. #1901 2016 edition.

826 ***BODY ELECTRICAL JUNCTION COMPARTMENT***

827 Provide a weather tight electric junction compartment. Provide an easily accessible enclosure to house all
828 of the body wiring junction points, terminal strips, solenoids, etc. The design of this compartment will
829 not decrease the storage capacity area of the compartment in which it is located. Provide a removable
830 panel for access to this compartment.

831 ***12 VOLT ELECTRICAL SYSTEM TESTING***

832 The apparatus low voltage electrical system shall be tested and certified. **The bidder shall state the**
833 **nature or types of the tests to be conducted as well as the criteria for pass/fail with their bid.** The
834 certification will be provided with the apparatus. All tests will be performed with air temperature
835 between 0 and 100 degrees F and logged at the time testing.

836 **ALTERNATOR**

837 Provide a Niehoff™ #C680, or equal, 430 amp minimum, dual belt driven alternator. The installation will
838 include an integral self-diagnostic regulator and rectifier for compact installations. The alternator
839 installation shall be designed to provide a minimum output of 180 amps at engine idle speed to meet the
840 minimum continuous electrical load of the apparatus as required.
841

842 **AMP DRAW REPORT**

843 The bidder will provide, at the time of bid and delivery, an itemized print out of the expected amp draw of
844 the entire vehicle's electrical system.

845 The manufacturer of the apparatus will provide the following:

- 846 • Documentation of the electrical system performance tests.
- 847 • A written load analysis, which will include the following:
 - 848 ○ The nameplate rating of the alternator.
 - 849 ○ The alternator rating under the conditions specified per:
 - 850 ■ Applicable NFPA 1901 (Current Edition).
 - 851 ○ The minimum continuous load of each component that is specified per:
 - 852 ■ Applicable NFPA 1901 (Current Edition).
 - 853 ○ Additional loads that, when added to the minimum continuous load, determine the total
854 connected load.
 - 855 ○ Each individual intermittent load.

856 All of the above listed items will be provided by the bidder per the applicable NFPA 1901 (Current
857 Edition).
858

859 **BATTERY SYSTEM**

860 The battery system shall be a single system consisting of six-(6) Group 31, 12-volt DC, heavy-duty, high
861 cycle automotive batteries. The battery bank shall have a group rating of 3750 cold cranking amperes
862 (CCA) @ 0 degrees and a reserve of 1,080 minutes at 80 degrees Fahrenheit.

863 ***BATTERY STORAGE***

864 Provide battery storage in a securely mounted fixed stainless steel ventilated trays located on each side of
865 the chassis frame. Visual access shall be provided through a hinged drop down door in each of the rear
866 crew step risers. Complete access will be provided when the cab is fully tilted. Batteries shall be
867 mounted on non-corrosive matting material.

868 ***BATTERY DISCONNECT SWITCH***

869 Provide the chassis batteries parallel wired to a single 12-volt electrical system controlled through a
870 heavy-duty "Guest" brand rotary type master disconnect switch. The master disconnect switch will be
871 located within easy access by the driver upon entering or exiting the cab. All electrical circuits shall be
872 disconnected, except the engine and transmission battery, when the switch is in the "OFF" position. The
873 alternator shall be connected to the engine and transmission battery.

874 ***SHORELINE AUTO-EJECT***

875 A KUSSMAUL Auto Eject with Deluxe Cover- Bar Graph, Dual Output model 63-11-8106, with
876 weatherproof yellow cover shall be mounted on the cab exterior immediately adjacent to the rear of the
877 driver's door. The Super Auto Eject is to be completely sealed to prevent internal contamination of the
878 working components.

879 The internal switch arrangement of the Super Auto Eject shall be designed to close and open the 120-vac
880 A.C. circuit after the mating connector is inserted and before the connector is removed. This design shall
881 prevent arcing at the connector contacts to provide long life.

882 The electrical connection shall be provided as a 120 VAC - 20-amp type using a NEMA 5-20P connector.

883 **BATTERY CHARGER SYSTEM**

884 Provide a Kussmaul model # 091-66-12" Auto Charge D" charger system for maintaining the vehicle
885 batteries. This system is designed to provide up to 20 amperes to the main chassis batteries and a separate
886 circuit providing up to 3 amperes to the isolated battery utilized for the engine and/or transmission
887 electronics systems. The charger will be equipped with remote battery sensors to ensure proper charge.
888 Install if possible in the compartment under the driver's seat.

889 A dual LED bar graph display shall be located in the compartment under the driver's seat adjacent to the
890 shoreline connection to monitor each set of batteries charging status. The display will be labeled
891 "Vehicle" and "Engine" battery.

892 When the charger is connected to the 110 volt AC shoreline, a 5-ampere "Battery Saver" will be provided
893 to power rechargeable 12 VDC accessories. The "Battery Saver" automatically disconnects these
894 accessory loads from the batteries and powers them from an internal supply. Wiring lay out for or these
895 accessory loads shall be determined at pre-bid conference.

896 ***BATTERY SAVER***

897 Provide a Kussmaul model # 091-256-12 "battery saver VHO" charger system connected to the 110-volt
898 shoreline disconnect to power rechargeable hand lights, portable radios and any other 12 VDC
899 accessories.

900 **LIGHTING - CAB INTERIOR**

901 Provide four (4) combination red/white dome lights in the cab, two (2) in the forward section and two (2)
902 in the rear section. Each dome light will have an integral 3-way (red-off-white), selector switch. Each
903 dome light will also activate when the respective, adjacent cab door is opened.

904 Provide a shielded light in each side opening, cab doorstep well. These lights will activate with the
 905 respective doorjamb switch.
 906 Provide two (2) red dome lights with individual lens mounted switches be recessed into the cab headliner
 907 in the rear cab area.

908 **CAB MAP LIGHT**

909 Provide a high intensity gooseneck map light located at the right side of the cab dash.

910 **CREW SAFETY LIGHT**

911 One (1) Green LED Whelen light shall be provided and be mounted in the interior cab ceiling area in a
 912 location visible to all firefighters seated in the jump seats. This light will illuminate GREEN whenever the
 913 parking brake is applied.

914 **CAB MARKER LIGHTS AND REFLECTORS**

915 Provide five (5) LED amber FMVSS marker lights on top of the cab above the windshield area. Provide
 916 one (1) amber directional light mounted on each side of the cab above the front wheel well area. FMVSS
 917 reflectors will be installed as required.

918 **BODY MARKER LIGHTS AND REFLECTORS**

919 Provide clearance and license plate lights along with reflectors along the length of the body and at the rear
 920 of the body wired in accordance with federal regulations.
 921 The rear mounted lower marker lights and reflectors shall be recess mounted in the vertical surface of the
 922 rear step for protection from breakage.
 923 Provide rear marker lights at each side of the outermost practical mounting location at the top of the body.
 924 Provide a secondary turn signal / clearance light below each side of the body in the area forward of the
 925 rear axle.

926 **CAB HEAD LIGHTS**

927 There will be four (4) Truck-Lite®, rectangular LED lights mounted in the front quad style chrome
 928 housing on each side of the cab grille:

929 • the outside light on each side will contain a part number 27640C low beam module
 930 • the inside light on each side will contain a part number 27645C high beam module

931 The low beam lights will be activated when the headlight switch is on.
 932 The high beam and low beam lights will be activated when the headlight switch and the high beam switch
 933 is activated.

934 ***DAYTIME RUNNING LIGHTS***

935 Provide the chassis head lights with integrated circuitry to actuate the low beam headlights at a maximum
 936 of 80 percent of capacity whenever the chassis engine is running. Daytime lights shall be turned off with
 937 the activation of the parking brake.

938 ***SECONDARY DUAL LIGHT MODULE***

939 Provide two (2) amber arrows outlined turn signals, one (1) in each side of the dual light module above
 940 the headlights in matching chrome-plated bezels.
 941 Provide the NFPA required Zone "A" lower warning lights incorporated into each side dual light module
 942 noted above.

943 **ALTERNATE FLASHING HEADLIGHT SYSTEM**

944 Provide an alternate flashing headlight wig-wag system. This wig-wag system shall be individually
 945 switched at the master light console and wired through the load management system to be shut down
 946 when load management is required. The alternating flashing system will be automatically disabled during

947 the "Blocking Right of Way" mode.

948 **TAIL, STOP, TURN AND BACK-UP LIGHTS**

949 **Whelen M6FCV4** Composite Housing for Vertical Mount, Four Lamp with Whelen Series M6 LED
950 M6BTT brake / tail, M6 Series LED M6T amber turn, M6 Series LED M6BUW back up light.

951 **EMERGENCY SWITCHES**

952 Provide a switch control console within easy reach of the driver's position. This console will separate the
953 emergency / auxiliary electrical functions from the regular chassis functions. A minimum of eight (8)
954 rocker type switches with integral indicator lights shall be provided, in addition to the Load Manager
955 indicator.

956 Provide a master switch which will allow pre-setting of emergency lighting switch(s) and shall contain a
957 red integral indicator light. A primary emergency lighting switch shall be provided next to the master
958 switch. A total of eight (8) load manageable emergency switches will be provided. The last remaining
959 switch shall be designated as the ground light switch. All switches (other than the master switch) shall
960 have switch function labeling and an amber integral indicator light.

961

962 **WHELEN - NFPA CERTIFIED LED LIGHTING PACKAGE (CANTROL)**

963 The following warning light package includes the entire minimum warning light and actuation
964 requirements for the 2016 edition of the **NFPA 1901** Fire Apparatus Standard.

965 Provide the following lighting as specified. It shall meet the requirements for both "Clearing Right of
966 Way" and "Blocking Right of Way" as noted.

967 ***LIGHT PACKAGE ACTUATION CONTROLS***

968 The entire warning light package shall be actuated with a single warning light switch in the cab switch
969 panel. The wiring for the warning light package will engage all of the lights required for "Clearing Right
970 of Way" mode when the vehicle parking brake is not engaged. An automatic control system will be
971 provided to switch the warning lights to the "Blocking Right of Way" mode when the vehicle parking
972 brake is engaged.

973 **ZONE A (FRONT - UPPER)**

974 ***CAB ROOF LIGHT BAR***

975 Whelen Freedom® IV Rota-Beam™ Super-LED Model F4R7RRRR light bar red and white with clear
976 lens are to be mounted on the cab roof. As required by NFPA Pamphlet #1901, the white sections will
977 automatically turn off when in the blocking right-of-way mode. Pre wired for GTT Opticom F4R795H

978 ***GTT OPTICOM***

979 Provide a GTT 795H Opti-com system installed in roof light bar as detailed in "NFPA Lighting Package"
980 section.

981 ***ZONE A (UPPER- SIDE)***

982 Provide two (2) Whelen model M6V2RC LED, mounted one (1) each side above the crew cab window in
983 the Composite Housing. Clear lenses shall be provided.

984 **ZONE A (FRONT - LOWER)**

985 **HEAD LIGHT BEZEL MOUNTED WARNING LIGHTS**

986 Provide two (2) Whelen # M6HDLTMK M6RC-Series headlamp bezel mounted LED light heads and
987 mounted with M6HDLMTK bracket one in each side of the headlamp module adjacent to the amber turn
988 signal. Clear lenses shall be provided.

989 **ROTO-RAY 4000W**

990 Provide one (1) Roto-Ray 4000W with chrome housing to be mounted center of cab just above the grill
991 and below the windshield. Color shall be red, red, and white with clear lenses. The unit will automatically
992 turn off when in the blocking right-of-way mode.

993 **ZONE C (REAR - UPPER)**

994 ***REAR STANCHION WARNING LIGHTS***

995 Two (2) (21") twenty one inch Whelen Mini Freedom® IV Rota-Beam™ Super-LED red with amber
996 center and clear lens shall be provided on light pedestals, one (1) each side at the upper rear sides of the
997 apparatus. The light pedestals will be fully enclosed so as not to expose wiring.
998

999 **ZONE C (REAR - LOWER)**

1000 ***REAR WARNING LIGHTS***

1001 Provide two (2) Whelen model M6 series M6V2RC LED, mounted one (1) each side the rear body
1002 taillights in the **Whelen M6FCV4** Composite Housing. Clear lenses shall be provided.

1003 **ZONE B & D (SIDE REAR - LOWER)**

1004 ***SIDE REAR WARNING LIGHTS***

1005 Provide two (2) Whelen Ion LEDs with composite mounting flanges mounted one (1) each side on the
1006 rear body fender or as close to the rear of the unit as practical and facing to each side of the unit. The
1007 lights shall be equipped with clear lenses.

1008 **ZONE B & D (SIDE FRONT - LOWER)**

1009 ***SIDE INTERSECTION WARNING LIGHTS***

1010 Provide two (2) Whelen model # M6 series M6V2RC LED with composite mounting flanges mounted
1011 and recessed, one (1) on each side of the front bumper extension facing to each side of the unit. The lights
1012 shall be equipped with clear lenses.

1013 **ZONE B & D (SIDE CENTER - LOWER)**

1014 ***SIDE CAB WARNING LIGHTS***

1015 Provide two (2) Whelen model # M6 series M6V2RC LED with composite mounting flanges mounted
1016 with one (1) each side of the center of the cab facing to each side of the unit. The lights shall be equipped
1017 with clear lenses.

1018 **WARNING LIGHT SYSTEM CERTIFICATION**

1019 The warning light system specified will have a total amperage draw of 45 AMPS with all lights activated
1020 in either the "Clearing Right of Way" or the "Blocking Right of Way" mode.

1021 The light system manufacturer shall meet all of the requirements as noted in chapter 13 of the Current
1022 edition of the **NFPA 1901** Fire Apparatus Standard shall certify this warning light system. Certification
1023 shall be supplied at the time of delivery.

1024 **REAR DIRECTIONAL LIGHT (WHELEN)**

1025 Provide one (1) Whelen TAZ86 Super-LED® Traffic Advisor™, 30" Long-Traffic Advisor, Amber, rear
1026 directional light. Light to be mounted in enclosure above the hose bed. A control module shall activate the
1027 directional light. The control module will be conveniently located near the driver's position. The rear
1028 directional light will be wired through the load management system of the unit.

1029 **FRC 360 INVIEW CAMERA SYSTEM**

1030 The system shall include the following (4) HD Ultra-wide 1080p Cameras, (1) ECU with built in DVR,
1031 (1) External GPS Receiver, (1) Green Pushbutton—Screen Control, (1) Red Pushbutton—Event, (1)
1032 Black Pushbutton—Overlay, (1) Standard Definition Splitter, (1) IR Sensor, (1) Remote Control. A 7 inch
1033 monitor mounted in the cab readily observable by the operator.

1034 **ELECTRIC HORN**

1035 Provide a single electric chassis horn activated by the steering wheel horn button installed in a functional
1036 location below the cab windshield. (See Q2B siren relay switching)

1037 **BACK-UP ALARM**

1038 Provide a solid-state back-up alarm installed at the rear of the apparatus under the tailboard. The back-up
1039 alarm shall activate automatically when the transmission is placed in reverse gear and the ignition is "on".

1040 **AIR HORN**

1041 One (1) Grover 1510 air horn or equal shall be installed on the apparatus. The sounding unit shall be die
1042 cast and easily separated for service. The solenoid air valve shall be a skinner V-5 or equal. The horn shall
1043 be mounted behind the cutout in the front bumper. A linemaster #632S foot switch or equal on the
1044 driver's side will control the air horn, in addition a push button shall be provided and accessible from the
1045 officer seat. Provide a manual shutoff valve to the horn air switch.

1046 ***PUMP PANEL AIR HORN BUTTON***

1047 Provide a single push button switch on the pump operator's panel to activate the air horn.

1048 **ELECTRONIC SIREN AND SPEAKER**

1049 Provide one (1) Whelen # **295SLSA1** 200 watt electronic siren featuring: flush mount remote control
1050 head recessed in center dash panel as space allows, "Si-Test" self-diagnostic feature, six function siren,
1051 radio repeat and public address.

1052 Provide one (1) Whelen # **SA122FMP** polished aluminum siren speaker, recessed in the front bumper and
1053 wired to the electronic siren.

1054 The electronic siren and speaker shall meet the NFPA required SAE certification to ensure compatibility
1055 between the siren and speaker.

1056 **Q2B MECHANICAL SIREN**

1057 Provide one (1) Federal Model #Q2B-P siren with chrome plated grille, in the front bumper. Activation
1058 shall be through the horn ring in the cab along with a push button siren brake switch on the cab dash. A
1059 dash-mounted horn/siren rocker switch shall control Q2B siren / chassis horn.

1060 The Q2B siren shall be wired through the load management system to prevent excessive amperage draw.
1061 The siren is provided in addition to the required minimum NFPA audible warning requirements.

1062 **UNDER CAB LIGHTS**

1063 Provide one (1) rubber mounted Whelen 20C0CDCR LED ground light under each side cab door entrance
1064 step, four (4) total. The ground lights shall activate automatically with each respective doorjamb switch
1065 and by a master ground light switch in the warning light switch console

1066 Each light will illuminate an area at a minimum 30" outward from the edge of the vehicle. The rear crew
1067 door ground lights will be positioned at an angle rearward to provide illumination at the pump panel and
1068 the front of the bodywork areas.

1069 **UNDERBODY LIGHTS**

1070 Eight (8) Whelen 20C0CDCR 2G series LED underbody "Ground Effect" light shall be installed at a
1071 location to be determined during the pre-construction conference. The underbody light shall illuminate the

1072 ground beneath the fire apparatus.

1073 **DECK LIGHTS/WORK LIGHTS/STEP LIGHTS**

1074 Provide Whelen 2G series three diode LED model 20C0CBCR with chrome mounting flange model
1075 2GFLANGC step lights controlled with marker light actuation. Step lights will be located to properly
1076 illuminate all body and chassis access steps and walkway areas.
1077

1078 ***SCENE LIGHTS***

1079 Provide four (4) Whelen Pioneer PCPSM2AC floodlights color white. Two (2) each side of the cab
 1080 directly behind the front cab entrance door. Two (2) each side upper rear corner of the fire body.
 1081 Individual switching shall be provided in both the master warning light switch console and in the
 1082 overhead on the officer's side of the cab. The scene lights which will be zoned off in front, left, right, and
 1083 rear. All scene lights will be wired through the load management system.

1084 ***BROW LIGHT***

1085 Provide one (1) PSL2B* light installed on the front center of the cab. The chassis manufacturer shall
 1086 determine the mounting bracket. A rocker switch in the master warning light switch console with
 1087 additional switching in the overhead on the officer's side of the cab shall control the scene lights. All
 1088 scene lights will be wired through the load management system.

1089 ***REAR UPPER***

1090 Provide two (2) Whelen Pioneer PCH1 (1) one mounted each side at the rear below the rear upper
 1091 warning lights with 15 degree angled housing. A rocker switch in the master warning light switch console
 1092 shall control the scene lights which will be zoned off in front, left, right, and rear. All scene lights will be
 1093 wired through the load management system.

1094 ***POLE LIGHTS***

1095 Provide two (2) Whelen Pioneer PCPSM2AC flood lights each mounted to pioneer telescoping poles.
 1096 Electromagnetic sensors shall indicate if the pole has been seated properly into the cradle for travel.
 1097 Mounting location to be determined at pre-construction.

1098 **STEP LIGHTS**

1099 Provide Whelen 2G series three diode LED model 20C0CBCR with chrome mounting flange model
 1100 2GFLANGC step lights controlled with marker light actuation. Step lights will be located to properly
 1101 illuminate all body and chassis access steps and walkway areas.
 1102

1103 **COMPARTMENT LIGHTS**

1104 Provide each exterior compartment with Two (2), Amdor Integral full height LED lights. Lights shall be
 1105 activated when the respective door is opened and the master battery switch is on.

1106 ***"DO NOT MOVE APPARATUS" WARNING LIGHT WITH AUDIBLE ALARM***

1107 Provide a red flashing warning light with an integral audible alarm, functionally located in the cab to
 1108 signal when an unsafe condition is present such as an open cab door or body compartment door an
 1109 extended ladder rack, an extended light tower or any other device which is opened, extended or deployed
 1110 which may cause damage to the apparatus if it is moved. This light shall be activated through the parking
 1111 brake switch to signal only when the parking brake is released. This light will be labeled "DO NOT
 1112 MOVE APPARATUS WHEN LIGHT IS ON".

1113 **PUMP ENCLOSURE WORK LIGHTS**

1114 Provide two (2) Whelen LED work lights mounted inside the pump enclosure one (1) each side. Each
 1115 light shall be individually switched.

1116 ***ENGINE COMPARTMENT LIGHTS***

1117 There will be one (1) Whelen, Model 3SC0CDCR, 12 volt DC, 3.00" white LED light(s) with Whelen,
 1118 Model 3FLANGEC, chrome flange kit(s) installed under the cab to be used as engine compartment
 1119 illumination. These light(s) will be activated automatically when the cab is raised.

1120 **FIRE PUMP**

1121 ***Waterous CSU 2000 GPM***

1122 The pump shall be of two piece construction and shall comply with all applicable requirements of the
1123 latest standards for automotive fire apparatus of the National Fire Protection Association, **NFPA 1901**,
1124 and shall have a rated capacity of 2000 GPM (CSU). The Pump shall be free from objectionable pulsation
1125 and vibration under all normal operating conditions.

1126 The pump must deliver the percentage of rated capacity at the pressure listed below:

1127 100% of rated capacity at 150 P.S.I. net pump pressure

1128 100% of rated capacity at 165 P.S.I. net pump pressure

1129 70% of rated capacity at 200 P.S.I. net pump pressure

1130 50% of rated capacity at 250 P.S.I. net pump pressure

1131 When dry, the pump will be capable of taking suction and discharge water with a lift of 10 feet in not
1132 more than 30 seconds through 20 feet of appropriate size suction hose.

1133 **PUMP ASSEMBLY**

1134 ***Pump Body***

1135 The pump body shall be close-grained, gray iron or have the option of being made of bronze and can be
1136 horizontally split in two sections for easy removal of the impeller assembly. All passageways are carefully
1137 matched to assure the very best hydraulic flow characteristics.

1138 ***Discharge Manifold***

1139 The discharge manifold shall be cast as an integral part of the pump body assembly and shall provide at
1140 least four full 3-1/2 inch openings for ultimate flexibility in providing various discharge outlets for
1141 maximum efficiency, and shall be located as follows:

1142 One outlet on the right side of the pump body

1143 One outlet on the left side of the pump body

1144 One outlet on the front of the pump body

1145 One outlet directly on top of the pump discharge manifold

1146

1147 ***Pump Transmission***

1148 The transmission case shall be made of an aluminum case (C20 Transmission). The pump transmission
1149 shall be rigidly attached to the pump body assembly and be of latest design incorporating a high strength,
1150 involute tooth form chain drive or gear drive capable of operating at high speeds to provide smooth, quiet
1151 transfer of power. The shift engagement shall be accomplished by a free-sliding collar to maintain ROAD
1152 or PUMP position.

1153 ***Pump Shift***

1154 The pump shift shall be pneumatically operated and shall use a standard automotive air valve to control a
1155 double-action, air-shift cylinder. The in-cab control valve shall include a detent lock to prevent accidental
1156 shifting.

1157

1158

1159 **STAINLESS STEEL PLUMBING, AND HOSE**

1160 All inlet and outlet lines will be plumbed with either stainless steel pipe, flexible polypropylene tubing or
1161 synthetic rubber hose reinforced with hi-tensile polyester braid. All hose's will be equipped with brass or
1162 stainless steel couplings. All stainless steel hard plumbing will be a minimum of a schedule 10 wall
1163 thickness.

1164 Where vibration or chassis flexing may damage or loosen piping or where a coupling is required for
1165 servicing, the piping will be equipped with victaulic or rubber couplings.

1166 Plumbing manifold bodies will be stainless steel..

1167 All drain lines will be extended with a hose to drain below the chassis frame.

1168 All water carrying gauge lines will be of flexible polypropylene tubing.

1169 All piping, hose and fittings will have a minimum of a 500 PSI hydrodynamic pressure rating.

1170

1171 **INTAKE RELIEF VALVE**

1172 The intake relief valve shall be a pilot-operated intake relief valve and shall be provided by the pump
1173 manufacturer. The pilot valve shall be mounted in a position specified by the purchaser, and allow
1174 adjustment from 50 P.S.I.G. to 250 P.S.I.G. A pilot-operated intake relief valve will allow full opening of
1175 the relief valve with a very small rise in intake pressure above set pressure.

1176 **MANIFOLD DRAIN VALVE ASSEMBLY**

1177 The manifold drain valve assembly shall consist of a stainless steel plunger in a bronze body with
1178 multiple ports. The valve shall be designed so that the pump discharge pressure prevents it from opening
1179 accidentally. The drain valve control shall be panel mounted, cable or rod operated and identified PUMP
1180 DRAIN.

1181 **TANK TO PUMP VALVE**

1182 The tank to pump valve shall be a ¼ turn open-close, full-flow, 4" inch diameter ball valve that is attached
1183 directly to the pump. The valve shall be operated by a rotary 12 volt electric actuator.

1184

1185 ***Auto Fill System (Rear Suction)***

1186 The Auto Tank Fill System shall be supplied with water by the rear suction piping and maintain tank
1187 water level between 50 and 80% of capacity: The system shall be calibrated for any shape or size tank,
1188 shall allow operator interaction while Auto Tank Fill System is in operation, operator shall have the
1189 ability to open or close the electric-actuated ball valve using the Electric Valve Position Control. The
1190 Auto Tank Fill System shall be equipped with the following items unless specified otherwise:

- 1191 • Pressure Transducer
- 1192 • Tank Level Display
- 1193 • Electric Valve Position Control
- 1194 • Auto Tank Fill Selector Switch (Green LED indicates Auto Tank Fill Mode)
- 1195 • Electric-Actuated Ball Valve (Furnished (3) valves)
- 1196 • Cables
- 1197 • The AutoFill direct tank fill valve, prior to the MIV-E mounted on the right-rear fire pump large
1198 diameter suction port. **MIV valves shall also be provided on the front, rear, right (curb side)**
1199 **suctions.**
- 1200

1201 ***Overheat Protection Manager (OPM)***

1202 The Watrous Overheat Protection Manager (OPM) shall act as a safety device by releasing hot water
1203 from the discharge area of the pump to the ground. The OPM shall consist of a valve that opens when the
1204 water in the pump reaches 140° F (60° C) and a warning light on the pump panel that is triggered by a
1205 thermal switch when the water in the pump reaches 180° F (82° C).

1206 ***Pump Intake Strainers and Anodes***

1207 The pump intake strainers shall be removable, die cast zinc screens that are designed to provide cathodic
1208 protection for the pump, thus reducing corrosion in the pump. Anodes are normally mounted on the pump
1209 intake piping, but they may also be installed in the discharge piping if no intake mounting locations were
1210 available. Physical mounting of the anode may be via an NPT tap or bolt-on flange.

1211 ***Intake Relief Valves***

1212 Provide (1) one, Akron Brass model 7982 “Revolution Intake Valve” with (Swivel Elbow Inlet) for the main pump
1213 inlet 6” NST X 5” storz.

1214 **COMPRESSED AIR FOAM SYSTEM – WATEROUS ECLIPSE**

1215 A Watrous Eclipse™ **200 CFM** compressed air foam system (CAFS) shall be installed to provide
1216 compressed air foam to 6 discharges.
1217

1218 ***SYSTEM DESIGN***

1219 The apparatus drive engine output, fire pump output, and air compressor output shall be designed to meet
1220 the criteria of CAFS performance required by applicable NFPA standards and the end user. The apparatus
1221 manufacturer shall specify these requirements before the installation of system components. Final
1222 performance of this requirement is to be verified by the end user. The following specification defines a
1223 fully integrated Compressed Air Foam System (CAFS) to be installed on the mid-ship fire pump within
1224 the fire apparatus. It shall be capable of providing foam solution or compressed air foam from any of the
1225 specified CAFS discharge simultaneously. In addition, the consistency of the compressed air foam
1226 (expansion ratio) shall be individually adjustable to each discharge.

- 1227 (2) 1-¾ inch Pre-connected cross-lays **CAFS**
1228 (1) Booster Line **Foam Solution Only Discharge**
1229 (2) 2½ inch (Street Side) bulk head rear discharge **CAFS**
1230 (2) 2-½ inch right (Curb Side) bulk head Rear Discharge **CAFS**.
1231

1232 The system shall be capable of solution flow rates between: 90-340 GPM, with air flow rates of: 40-170
1233 CFM at operating pressures: 100 to 150 PSI.

1234 CAFS hose line target flow rates.

Hose / discharge size	Air/Water	Solution	Concentrate	Compressed Air
1.75"	WET	90/ 120 GPM	0.5 % to 0.7%	40/60 CFM
2.0"	WET	130/150 GPM.	0.5% to 0.7%	70/80 CFM
2.0"	DRY	140/ 160 GPM.	0.5% to 1.0%	80 CFM
2.5" attack line	WET	220/240 GPM	0.5% to 0.7%	120 CFM
3.0" portable monitor	WET	300/340 GPM	0.5% to 0.7%	150/170 CFM

1235

1236

1237

Air Compressor

1238 The air compressor shall be an oil-flooded, rotary screw type, sized to supply a minimum of 200 CFM of
1239 free air at minimum of 125 P.S.I.G. The air compressor shall be capable of maintaining prolonged
1240 pressures from 100 to 175 P.S.I.G. throughout its service life. The air compressor shall be encapsulated
1241 within its own sump/pressure vessel constructed and stamped (175 P.S.I.G. working pressure) in
1242 accordance with ASME *Boiler and Pressure Vessel Code Sec. VIII, Div. 1*. The sump/pressure vessel
1243 shall have an oil level indicator, air pressure relief valve and threaded fill cap/plug.

1244

Pneumatic Modulating Inlet Valve

1245 The air compressor shall be controlled by a pneumatic modulating inlet valve mounted on the air end
1246 inlet. This controller shall sense air pressure and control the air delivery of the air end while maintaining
1247 constant pressure.

1248 Electric Auto Sync Balancing System

1249 Automatically maintains the air pressure within +/-5% of the water pump pressure throughout the
1250 pressure range. The Electric Auto-Sync Balancing System is located on the operator's panel and allows
1251 for the following modes:

1252 AUTOMATIC - Air pressure matched to water pressure

1253 FIXED -Air pressure defaults to manual setting on compressor mounted control valve

1254 UNLOAD -Air pressure reduced to 40 P.S.I.G. for standby operations

1255

Air Compressor Drive

1256 The air compressor shall be driven by the fire pump split-shaft transmission utilizing a synchronous drive
1257 with a pneumatic activated “hot shift” clutch. The clutch shall be a shaft end mounted, high speed clutch
1258 with HICO friction facings and shielded bearings. The compressor drive train shall include a means to
1259 adjust the tension of the synchronous drive. The air compressor drive system shall be designed to operate
1260 the air end at rated capacity when the fire pump is developing 130 to 140 P.S.I.G. in a “no flow” state.

1261

Air Compressor Oil System

1262 The air compressor system shall feature a spin-on, full-flow oil filter unit to control oil flow to the cooler.

1263

Modular Air/Oil Separator Unit

1264 **A.** Modular air/oil separator unit with spin-on element shall be provided with the sump tank. Replacement
1265 elements for the oil filter and separator shall be readily available.

1266 **B.** Oil Lines

1267 All oil lines shall be routed in braided hose conforming to SAE 100R1 standards for hydraulic hose.

1268

AIR COMPRESSOR COOLING SYSTEM

1269 The air compressor shall be cooled by the apparatus fire pump, utilizing an all copper and brass shell and
1270 tube heat exchanger. Water shall flow through the heat exchanger whenever the fire pump is operating.
1271 An in-line strainer shall be provided on the water inlet side of the heat exchanger to prevent clogging. The
1272 strainer shall be removable for cleaning.

1273 The compressor cooling system shall be capable of maintaining recommended operating temperatures
1274 throughout its full operating range at ambient temperatures up to 115°F.

1275

1276

1277 ***Air Controls and Instruments***

1278 The following shall be provided on the pump operator's panel, arranged in a logical and operator friendly
1279 manner:

1280 Air compressor clutch engagement switch with “ON” indicator light

1281 Auto Sync compressor controls (Auto/Unload/Fixed) with engraved instruction plate

1282 Air Compressor temperature gauge with warning light and audible alarm

1283 CAFSystem air pressure gauge Digital air flow meter (SCFM)

1284 **FOAM MANIFOLDS**

1285 Foam manifold shall be constructed of Schedule 10 316 stainless steel. Victaulic groove connections shall
1286 be provided at each end of the manifold for connection to the apparatus plumbing. 1000 GPM foam
1287 manifold capability.

1288 The manifold shall include an incoming water conductivity probe, paddlewheel flowmeter, foam injection
1289 check valve, Akron Brass waterway check valve and foam solution conductivity probe with temperature
1290 sensor.

1291 **AIR OUTLET (RIGHT SIDE PUMP PANEL)**

1292 Provide a female air outlet fitting with a valve on the right side pump panel. Air shall be from the
1293 onboard CAFS air compressor for operation pneumatic air rescue tools.

1294 **FOAM DISCHARGES**

1295 All foam discharges shall be equipped with brass or stainless steel check valves on the water/solution
1296 plumbing to isolate the individual discharges and prevent back-flow of air or CAF into the pump or
1297 neighboring discharges.

1298 **COMPRESSED AIR FOAM DISCHARGES**

1299 All compressed air discharges shall be equipped with brass or stainless steel check valve at the air
1300 injection points to prevent back-flow of foam solution into the air lines.

1301 **FOAM MANAGEMENT SYSTEM – AQUIS 3.0™ FULLY INTEGRATED FOAM**
1302 **PROPORTIONING SYSTEM**

1303 Digital Electronic Control Display. A fully automatic electronic direct foam injection system is furnished
1304 and installed. The system is capable of Class A foam concentrates and most Class B foam concentrates.
1305 An Operator Interface Terminal Digital Operation shall be incorporated into the Aquis 3.0 proportioner.
1306 This shall allow for push button control of Class A concentrate in infinite increments from .1% to 1%
1307 calibration of water flow rate, adjustable units of measure, simulated water flow, optional lockout. The
1308 system includes the following:

1309 The system shall be equipped with a digital electronic control display. It shall be installed on the pump
1310 operator’s panel and enable the pump operator to perform the following control and operation functions:

1311 Activate the foam proportioning system

1312 Select proportioning rates from 0.1% to 1.0% on Class A concentrate Calibration of water flow rate.

1313 Adjustable units of measurement.

1314 Warnings of low foam concentrate supply: flashes and displays a steady “low concentrate” warning when
1315 the concentrate tank runs low. The system will shut down after two minutes. There shall also be a warning
1316 that flashes a “no concentrate” warning when the concentrate tank is empty.

1317 ***12 Volt Electric Motor (1/2hp) - Model: AQUIS™ 3.0***

1318 A 12 volt electric motor driven displacement plunger pump shall be provided. The pump capacity shall be
1319 from 0.1 gpm (0.38 L/min) to 3.0 gpm (11.5 L/min) at 150 psi (10 bar) with a maximum operating
1320 pressure up to 450 psi (31 bar).

1321 **END USER OPERATION INSTRUCTION**

1322 Up to three (3) days of CAFS operation and maintenance instruction shall be provided. The instruction
1323 shall take place at the user's facility within 30 days of apparatus delivery.

1324 ***Manuals***

1325 Two complete operation and maintenance manuals shall be provided with the completed apparatus.
1326 Manuals shall include instruction in the operation and maintenance of the overall compressed air foam
1327 system and each major component.

1328 **PRIMING PUMP (TRIDENT EMERGENCY PRODUCTS)**

1329 The priming pump shall be a Trident Emergency Products auto prime 3 barrel 3 location compressed air
1330 powered, high efficiency, multistage venturi based AirPrime System, conforming to standards outlined in
1331 the current edition of NFPA 1901.

1332 All wetted metallic parts of the priming system are to be of brass and stainless steel construction.
1333 Each priming control shall open the priming valve and start the pump primer.
1334

1335 **SECONDARY PRIMING PUMP**

1336 A secondary priming pump shall be provided. It shall be oil-less, positive displacement vane type,
1337 electrically driven pump. One priming control will open the priming valve and start the priming motor.
1338 The primer will be capable of priming without the use of primer oil.
1339

- 1340 1. hose

1341 **VALVES**

1342 All discharge and auxiliary suction valves shall be full flow valves unless otherwise noted.

- 1343 1. Discharge and suction valves shall be of the quarter turn, ball type design, with a locking handle.
1344 2. All in-line valves on the apparatus shall be of the quarter turn, ball type design.
1345 3. The tank-to-pump valve shall be a 4-inch full flow ball valve piped through the front bulkhead of
1346 the tank with a 90-degree elbow down into the tank sump. A built in non-corrosive check valve
1347 shall be furnished in the pump body. The 4-inch full flow ball valve with 4 inch NPT or 5 inch
1348 flexible connection shall be provided for flows up to 1000 GPM (3785 LPM). The tank-to-pump
1349 line shall open automatically when the water pump is engaged. An override shall be furnished to
1350 open the tank to pump valve for water only operations. The air operated override control to
1351 remotely operate the tank to pump valve shall be located at the pump operator's panel.
1352 4. A direct tank fill valve with 3" inch NST connection and associated piping shall be provided for
1353 filling the water tank. This valve shall be used during CAFS operations to maintain the water
1354 supply on the truck and maintain the engine speed within the optimum range for compressor
1355 operation regardless of the inlet pressure. An automatic level control for the tank linked to the
1356 direct fill valve is optional.
1357 5. Check valves designed specifically for CAFS use shall be used. The check valves shall be made of
1358 a corrosion resistant material shall be spring loaded, equipped with soft seats compatible with the
1359 foam concentrates being used and have a bubble tight rating. Double check valves shall be used in
1360 main water/foam solution piping feeding the CAFS to prevent foam solution backflow into water
1361 pump piping.

1362 **PUMP RATIO**

1363 The pump ratio will be selected by the apparatus manufacturer to give maximum performance with the
1364 engine and transmission selected.

1365 The manufacturer will supply at time of delivery copies of the pump manufacturer's certification of
1366 hydrostatic testing, the engine manufacturer's current certified brake horsepower curve. PUMP SHIFT

1367 **CONTROL**
1368 The drive unit will be equipped with a power shift. The shifting mechanism will be a heat-treated, hard-
1369 anodized aluminum power cylinder with stainless steel shaft. An air operated in cab control for rapid shift
1370 will be provided that locks in road or pump, with a neutral position for use when manual override is
1371 required.

1372 ***MANUAL PUMP SHIFT***

1373 There shall be installed a manual pump shift that will be operated by a cable pull located conveniently on
1374 the left side pump panel.

1375 ***PUMP SHIFT INDICATOR LIGHTS***

1376 Three (3) green warning lights will be provided to indicate to the operator(s) when the pump has
1377 completed the shift for road to pump position. Two (2) green lights to be located in the truck driving
1378 compartment and one (1) green light on pump operator's panel adjacent to the throttle control. All lights to
1379 have appropriate identification/instruction plates.

1380 ***PUMP TRANSMISSION LOCK***

1381 The automatic transmission furnished in the chassis shall contain a lock-up assembly to prevent the
1382 transmission from shifting gears while in the pumping mode.

1383 ***BRAKING SYSTEM***

1384 A positive braking system shall be provided to prevent vehicle movement during pumping operations.
1385 The air brakes furnished will compensate for this requirement.

1386 ***PRESSURE RELIEF VALVE SYSTEM***

1387 The pump will be equipped with a master relief valve system to provide automatic protection against
1388 excess inlet or discharge pressure variations during pumping operations. This system will incorporate an
1389 operator's panel mounted pressure control valve with an easy to read and set pressure-adjusting scale.
1390 Automatic pressure sensing devices will be provided to monitor and control pressure changes on both
1391 sides of the pump to comply fully with **NFPA-1901** requirements. Excess pressures will be discharged to
1392 the right side running board with a minimum 2-1/2" N.S.T. adapter to route discharged water away from
1393 the pump operator's station. The master relief shall be capable of operating with rural water supplies
1394 without requiring disassembly for cleaning.

1395 The Total Pressure Master Relief valve control will eliminate the need for additional external mounted
1396 relief valves.

1397 ***PUMP MOUNTS***

1398 Extra heavy-duty pump mounting brackets shall be furnished. These shall be bolted to the frame rails in
1399 such a position to perfectly align the pump so that the angular velocity of the driveline joints will be the
1400 same on each end of the drive shaft. This will assure full capacity performance with a minimum of
1401 vibration. Bidder shall provide detail of mounting hardware.

1402 ***DUNNAGE AREA***

1403 A dunnage area will be provided above the pump enclosure for equipment mounting and storage. This
1404 area will be furnished with a removable aluminum tread plate.

1405 ***APPARATUS VALVES***

1406 The main pump discharges and all 1" or larger in-line, auxiliary suction and discharge valves will be full
1407 flow, gear actuated swing out style, to simplify servicing. Valves controls shall be Akron 8630 position
1408 indicator for gear actuated swing out valves.

1409 **PIPING (STAINLESS STEEL)**

1410 Provide type elbows shall be used. Where vibration or chassis flexing may damage or loosen piping
1411 fittings, all plumbing exiting the pump enclosure area shall be equipped with victaulic flexible type on the
1412 discharge side or rubber couplings on the suction side as necessary.

1413 Provide non all piping with heavy duty Schedule 40 stainless steel piping. To minimize friction loss, only
1414 sweep -hardening type thread sealant to all threaded fittings.

1415 The pump and associated piping shall be hydrostatically tested in accordance with the 2016 edition of
1416 **NFPA-1901.**

1417 ***MASTER DRAIN VALVE***

1418 Provide a master push-pull drain valve, controlled at pump panel. The valve will be located in the pump
1419 compartment lower than the main body and connected in such a manner as to allow complete water
1420 drainage. Water will be drained below apparatus body away from pump operator.

1421 ***INDIVIDUAL BLEEDERS AND DRAINS***

1422 All pump and associated piping and wet equipment shall drain through either the master drain valve or
1423 shall be equipped with individual drain valves, easily accessible and labeled.

1424 Provide one (1) individual "CLASS ONE" ¾" Automatic Drain for each cross lay.

1425 Provide one (1) individual "CLASS ONE" Lift Handle Ball Valve Drain valve for each 2-1/2" or larger
1426 discharge port and each 2-1/2" gated auxiliary suction.

1427 Drain/bleeder valves shall be located at the bottom of the side pump module panels.

1428 All drains and bleeders shall discharge below the running boards.

1429 ***SUCTION INLETS***

1430 Provide two (2) 6" N.S.T. suction inlets, one on the left pump panel and one on the right pump panel. A
1431 removable strainer and a chrome plated long handle cap will be installed on each.

1432 **FRONT SUCTION**

1433 A 6" N.S.T. front suction inlet will be provided with a 6" N.S.T. long handled chrome cap.

1434 The front inlet shall be located on the right hand side of the front bumper and will terminate with a
1435 suction hose attachment. The front inlet shall be plumbed utilizing 5" Schedule 40 Pipe, 45 degree weld
1436 elbows and a limited number of 90 degree sweep elbows in a welded assembly from the pump to the front
1437 of the cab.

1438 Provide a minimum of two (2) Victaulic flexible type couplings in this assembly to allow for flex and
1439 serviceability. Provide drains at all low points in this piping.

1440

1441 **GATED REAR SUCTION**

1442 The rear suction shall be provided with a full flow MIV valves with auto tank fill capabilities.
1443 A rear suction intake shall be provided with 5" NST male thread at the inlet. Room shall be provided
1444 around inlet to allow for standard hard suction or large diameter hose connections.
1445 A chrome-plated inlet fitting with 5" NST thread shall be provided, complete with a removable strainer
1446 screen. A 5"NST by 5" storz adapter with cap shall be provided. The suction pipe shall be Schedule 40, 5"
1447 ID in size, and shall be provided with a quarter-turn, bronze, flange mounted drain valve at all low points
1448 of the line.
1449 The suction shall be bolted to the pump and be assembled with a minimum of two (2) heavy duty
1450 Victaulic type couplings. The rear suction piping shall extend straight back through the passenger side
1451 rear of the body directly above the rear step.

1452 **RELIEF VALVE - WATEROUS - REAR SUCTION**

1453 There shall be a Waterous suction side relief valve provided on the pump system. The relief valve shall be
1454 plumbed with high-pressure rubber hose, stainless steel connections and terminate within view of the
1455 operator's panel. A drain valve shall be provided.

1456 ***2-1/2" AUXILIARY SIDE SUCTIONS***

1457 Provide all 2-1/2" auxiliary suction valves shall be piped 3.0" with 2.5" reducer and a removable strainer,
1458 chrome plated, 2-1/2" NST female swivel, with a chrome plated plug and retaining chain. All side 2-1/2"
1459 gated inlet valves shall be recess mounted behind the side pump panels or body panels. (No Exceptions)
1460 2-1/2" auxiliary suctions will be located as follows:
1461 Provide one (1) left side pump panel, to the rear of the main inlet and controlled at the valve.
1462 Provide one (1) right side pump panel, to the front of the main inlet and controlled at the valve.
1463 Each suction inlet shall be provided with a drain valve.
1464 Color code in accordance with **NFPA 16.9.1***

1465 **TANK TO PUMP**

1466 Provide one (1) 4" full flow tank to pump line piped through the front bulkhead of the tank with a 90-
1467 degree elbow down into the tank sump. This line shall be plumbed directly into the rear of the pump
1468 suction manifold. A 4-inch full flow ball valve with 4 inch NPT or 5 inch flexible connection shall be
1469 provided for flows up to 1000 GPM (3785 LPM)
1470 Provide a 4" electrically actuated full flow ball valve with a 4" swing check valve to prevent accidental
1471 pressurization of the water tank through the pump connection. The connection from the valve to tank will
1472 be made using a non-collapsible flexible rubber hose. Flow rate from tank to the pump shall be minimum
1473 of 1000 GPM.
1474 Provide an electrically actuated valve control located at the pump operator's panel along with a function
1475 plate.
1476 Color code in accordance with **NFPA 16.9.1***

1477 **TANK FILL**

1478 Provide one (1) 2" gated full flow pump to tank refill line controlled at the pump panel. Provide a
1479 deflector shield inside the tank. Tank fill plumbing shall utilize 2" wire braided hose for the tank
1480 connection to accommodate flexing between components.
1481

1482 **ANTI-CORROSION ANODES**

1483 Provide the pump with sacrificial galvanic anodes designed to help minimize corrosion in the pumping
1484 system. One anode will be installed on the suction side of the pump and one on the discharge side. Each
1485 anode shall be permanently mounted in a removable machined bronze plug. The anodes conform to MIL
1486 SPEC A18001.

1487 **PUMP COOLING LINE**

1488 A 3/8" cooling line shall be installed to re-circulate water from the pump back through the pump transfer
1489 case, to cool the pump during prolonged pumping operations. The cooling line shall be controlled at the
1490 operator's position with a Class 1 valve.

1491 **HEAT EXCHANGER DISCHARGE**

1492 A gated discharge line shall be installed to provide water from the fire pump to the chassis supplied heat
1493 exchanger to assist in engine cooling during pumping operations. The heat exchanger line shall be
1494 controlled at the pump operator's panel with a Class 1 valve.

1495 **DISCHARGES**

1496 All "two and one-half (2 1/2) inch" discharges shall be piped with two and one half (3") inch piping and 2
1497 1/2" full flow valves except as noted below.

1498 The main pump side discharges will be plumbed directly from the pump discharge manifold utilizing
1499 direct connect discharge valve flanges. The valves will be equipped with integral, 30 degree, 2 1/2" NST
1500 chrome plated "droop snoot" male outlets. Exception is the 2 1/2" Mid Ship Street Side Rear which piped
1501 from the foam manifold.

1502 All discharges will terminate with NST male thread in accordance with **NFPA 1901**.

1503 Provide two (2) 2 1/2" Piped 2 1/2" with a 2 1/2" full flow valves at the left side pump panel. Discharge
1504 will terminate with an integral, chrome plated, 30-degree elbow terminating with 2-1/2" M NST threads
1505 and 2 1/2" X 1 1/2" reducers, caps and retaining chains.

1506 Provide one (1) 2 1/2" Piped 2 1/2" with a 2 1/2" full flow valve at the right side pump panel, and plumbed
1507 through foam manifold. Discharge will terminate with an integral, chrome plated, 30-degree elbow
1508 terminating with 2-1/2" M NST threads and 2 1/2" X 1 1/2" reducers, caps and retaining chains.

1509 Provide one (1) 4" LDH discharge on the right side pump panel, plumbed with a 4"

1510 Electrically controlled valve fitted with a 4" 30 degree NST X 5" storz, with 5" storz cap and chain.

1511 **Hose bed forward bulk head terminated discharges (4) (near mid-ships)**

1512 The apparatus shall have four (4) rear discharges for two (2) 2" pre-connected hose lines on the
1513 left side of the apparatus and two (2) on the right for pre-connect 2.5" attack line and a pre-connected
1514 portable monitor. Provide two (2) **CAFS 2.5"** with a 2 1/2" full flow valve at the rear of body, on the left
1515 side of the hose bed. Discharges shall terminate with a 2.5" NSTF x 1-1/2" NSTM chrome reducer.

1516 Provide two (2) **CAFS 3"** with a 2 1/2" full flow valve at the rear body, on the right side. Provide a 3"
1517 NSTF x 2-1/2" NSTM chrome reducer w/cap.

300'	250'	LDH 5 “ Supply	250'	250'
2”	2”		3”	2-1/2”
S/B	V/S nozzle		RAM	325
266@50	200 gpm		XD 500	gpm
RED/ WHITE	YELLOW/ WHITE		gpm WHITE	BLUE

1518 **HORIZONTAL CROSS LAYS (CAFS)**

1519 Provide Two (2) transverse 1-3/4”cross-lays divided into two (2) sections designed as an integral part of
1520 the module design, located over of the pump. Hose deployment will be accomplished to either side of the
1521 apparatus.
1522 Provide these hose beds with removable slotted aluminum decking and a horizontal scuff plate at each
1523 side.
1524 The pre-connected hose storage area will have a minimum total capacity of 3.5 cubic feet as required by
1525 **NFPA 1901** to accommodate a minimum of 250 feet of Key “Combat Ready” 1 3/4” fire hose in each cross
1526 lays. Each cross lay shall have a minimum width of (7.5”) seven and one half inches.
1527 **Each cross-lay shall be plumbed with 2" piping and equipped with a 2" valve. Piping will terminate**
1528 **in the center of the transverse speed-lay with a 1-1/2" NST bronze hose swivel. Each speed-lay shall**
1529 **be individually controlled and gauged at the operator's panel.**

1530 **COLOR CODED DISCHARGES AND GAUGES**

1531 All discharge and intake control valves, gauges and discharges shall be color coded in accordance with
1532 **NFPA 16.9.1.***
1533 The following colors are to be assigned as noted to meet current department configuration. All other
1534 color-coding shall be left to the manufacturer.
1535 Pre-connect 1 3/4” cross lay color Red
1536 Pre-connect 1 3/4” cross lay color Black
1537 Deck gun color Silver
1538 LDH color yellow with white border

1539 ***Rear Discharges (4) located in the bulk head***

1540 Left rear discharge # 1, 2” color Red/White
1541 Left rear discharge # 2, 2” color Yellow/White
1542 Right rear discharge # 1 3”color White
1543 Right rear discharge # 2 2.5”color Blue
1544

1545 **DECK GUN DISCHARGE**

1546 Provide one (1) 3" deck gun discharge plumbed to the area Centered in dunnage area above pump control
1547 panels with an electrically controlled full flow valve with position indicator at the valve and gauged on
1548 the pump operator's panel. Provide a pedestal type, 1/4" steel plate support assembly to stabilize deck gun
1549 plumbing below deck gun mount flange. (Deck gun is an Akron Apollo Hi-Riser 3431 with an Akromatic
1550 1250 Master Stream Nozzle.

1551 **FOAM SUPPLY KIT (FROM CLASS B FOAM TANK)**

1552 An Elkhart Foam Supply Kit Type #2, (P/N-81232001), shall be installed on the pump panel of the
1553 apparatus (street side). The kit shall allow the use of the on-board Class-B foam concentrate tank with a
1554 portable in-line foam inductor, (Elkhart-240-125), attached to a pump side discharge. The quick-connect,
1555 pick-up tube assembly will permit switching from foam pails to the on-board supply tank and back again.
1556 The supply kit shall include a 3/4" quarter-turn inlet valve assembly with an elbow, a quick-connect
1557 female coupling, a quick-connect plug with a chain, a brushed stainless steel escutcheon plate, and a foam
1558 pick-up hose assembly with a quick-connect coupling between the hose and the pick-up tube.
1559 The installed unit shall be cast brass with chrome plated trim, while the 3' pick-up hose shall be 1" clear
1560 PVC with an 18" chrome plated brass pick-up wand.

1561 **BOOSTER REEL**

1562 A booster reel shall be provided and located in the dunnage area. The reel shall be a Hannay reel,
1563 model EPF28-25-26 with electric rewind complete with 250 feet of .75" ID lightweight rigid 1" OD
1564 diameter attack hose that meets the needs of municipal and forestry applications. Hose shall meet the
1565 following minimum Pressure Ratings: 300# Service Test Pressure, 600# Proof Test Pressure, 900#
1566 Burst Pressure. 1.0" NST couplings shall be provided.

1567 **VINYL CROSSLAY COVER**

1568 There shall be a 16 oz. Heavy-duty criss-crossed reinforced **Black** nylon cover provided. The cover shall be
1569 fire retardant vinyl and installed over hose bed for the triple cross lay hose bed with bungee cord loop hold
1570 downs, end covers shall be secured utilizing flexible bungee cords with loops

1571 **PUMP COMPARTMENT**

1572 An aluminum framework shall provide the support for the mounting of the pump lower panels.
1573 Aluminum structure shall be provided as a support behind all control push-pull handles enabling a firm
1574 foundation for operation of the valve control.
1575 An upper framework shall encompass the cross lays, hose, and gun. The floor of this section shall be a
1576 bolt-on design to provide access for major repairs and or service.
1577

1578 ***PUMP COMPARTMENT ACCESS***

1579 There shall be two (2) front access panels provided at the front of the body for access to the pump
1580 compartment. The access panel shall have a removable door. The access panel shall be manufactured from
1581 3/16" aluminum tread plate.

1582 ***PUMP PANEL RIGHT SIDE ACCESS***

1583 The upper portion of the right side pump panel shall have hinged double doors for access to the pump
1584 compartment. The door shall be made of aluminum.
1585

1586 **RUNNING BOARDS**

1587 The side running board at mid-ships shall be modified to allow for hose storage. The running boards shall
1588 be separate from the hose body, compartments, and pump compartment so that each may flex
1589 independently of the other and to allow water to flow freely away from the running board area.

1590 Separation of the running boards and support structure from the hose body, compartments and pump
1591 compartment is desired to provide field service of the running board without major repairs to the pump
1592 compartment in the event of an accident.

1593 The running board supports shall be a fabricated assembly of aluminum angles, and channels, which
1594 supports the running boards. These supports shall be bolted directly to the chassis frame rails to provide
1595 proper support. The running board step surface shall be covered in grip material that meets the **NFPA**
1596 **1901** 2016 requirements.

1597 ***RUNNING BOARD HOSE RESTRAINT***

1598 A pair of 2.00" wide black nylon straps with Velcro fasteners will be provided for each hose tray to secure
1599 the hose during travel. There will be Two (2) hose trays located one (1) in each side running board.

1600 ***HOSE TRAY***

1601 Two (2) free floating hose tray, to fit in the opening of the running board shall be provided one (1) each in
1602 the driver side and passenger side running board. The hose trays shall be diamond plate coated in Line-X
1603 or equivalent.

1604
1605 Capacity of the tray shall be 100' by 2.5" hose.

1606
1607 Drain holes and a rubber matting and drain hole shall be installed on the floor of the tray to provide for
1608 proper ventilation.

1609

1610 **RADIO COMPARTMENT**

1611 A fully enclosed radio compartment shall be furnished and installed in the left side of L-1 front
1612 compartment. The compartment shall have a hinged door with gasket and slam type latch. The radio
1613 compartment door shall open towards the pump panel.

1614 ***PUMP COMPARTMENT WORK LIGHT***

1615 The pump compartment shall have one (1) Truck Lite, model 40 clear work light to provide illumination of
1616 the pump compartment. The light shall have a weather resistant, toggle style on/off switch located inside
1617 the pump compartment adjacent to the door hinge area. The power for the pump module light shall be
1618 switched thru the battery master switch.

1619 ***PUMP PANEL FINISH***

1620 All pump panels shall have a black anodized finish.

1621 **PUMP CONTROL PANELS**

1622 All pump controls and gauges shall be located at the left (street) side of the apparatus and properly
1623 identified. The layout of the pump control panel shall be ergonomically efficient and systematically
1624 organized. The pump operator's panel shall be removable in two (2) main sections for ease of maintenance.
1625 The pump and gauge panels shall be constructed of Aluminum. The gauge panel shall contain a panel for
1626 mounting of all instruments; engine monitoring system, and pressure control system.

1627 The gauge panel shall be a double panel door design to protect in the enclosed door all gauge tubing, switch,
1628 and control wiring. The gauge panel exterior shall be made of aluminum. The inner pan shall bolt onto the
1629 stainless exterior panel. There shall be an access panel in the inner panel easily removable for control or
1630 gauge service or replacement.

1631 The lower section of the panel shall contain all inlets, outlets, and drains. All push-pull valve controls shall
1632 have quarter turn locking control rods with chrome plated zinc tee handles. Guides for the push-pull control
1633 rods shall be chrome plated zinc castings securely mounted to the pump panel. Push-pull valve controls
1634 shall be capable of locking in any position. The control rods shall pull straight out of the panel and shall be
1635 equipped with universal joints to eliminate binding.

1636 The identification tag for each valve shall be recessed in the face of the tee handle. All discharges shall have
1637 color-coded identification tags, with each discharge having its own unique color. Color- coding shall
1638 include the labeling of the outlet and the drain for each corresponding discharge.

1639 All line pressure gauges shall be mounted directly above the corresponding discharge control tee handles.
1640 There shall be an opening pump house service door on the curb (right) side of the pump house. Trim rings
1641 shall be installed around all inlets and outlets. The trim rings shall be stainless steel. Removal of the trim
1642 ring shall provide access for removal of the complete valve assembly behind the inlet and/or outlet.

1643 An assembly drawing of the pump operator panel must be supplied with the bid. This drawing must include
1644 the left side, right side and top view of the assembly. Generic drawings of like units are not acceptable.

1645 **CONTROLS AND GAUGES**

1646 The following shall be provided on the pump and gauge panels in a neat and orderly fashion. The gauge
1647 panel shall include the following:

1648 ***FRC TACHPLUS ENGINE MESSAGE CENTER***

1649 A **TACHPLUS** LED message center shall be provided. The message center is required for critical
1650 information in conjunction with the 2016 edition of **NFPA-1901**. The information center shall use the
1651 SAE J-1587 data bus for its information and not require any additional sensors to be mounted. The
1652 message center shall provide the following:

1653 Engine Oil Pressure: With visual LED message and audible warning.

1654 Engine Water Temperature: With visual LED message and audible warning.

1655 Voltmeter: With visual LED message and audible warning.

1656 Tachometer: With visual LED message.

1657 Provide secondary monitoring of the following: Fuel Level and Pump Overheat Display and Monitoring

1658

1659 **MASTER GAUGES**

1660 The Class 1, pump master vacuum and pressure gauges shall be 6" in diameter with white dial face gauges
1661 with black lettering and markings. The gauges shall be a compound style gauge with a vacuum / pressure
1662 range of 30" - 0 - 400 psig.

1663 The gauges shall be fluid filled with pulse and vibration dampening "Interlube" to lubricate the internal
1664 mechanisms to prevent lens condensation and to ensure proper operation to -40 degrees F. The cases shall
1665 be temperature compensated with an internal breathing diaphragm to permit fully filled cases and to allow
1666 a rigid lens with a distortion free viewing area. The gauge accuracy for the 6" gauge shall be plus or minus
1667 1% of full scale per ANSI B40.1, Grade 1A.

1668 To prevent internal freezing and to keep contaminants from entering the gauge, the stem and bourdon tube
1669 shall be filled with low temperature oil and be sealed from the water system using an isolating diaphragm
1670 located in the stem. A bright metal bezel shall be supplied for resistance to corrosion and to protect the lens
1671 and case from damage.

1672 **PRESSURE GAUGES**

1673 Each Class 1 "line" pressure gauge shall be mounted immediately above the push/pull control rod for the
1674 corresponding valve. The individual "line" pressure gauges for the discharges shall be 2-1/2" in diameter
1675 with white dial face gauges with black lettering and markings. The gauges shall be a compound style gauge
1676 with a vacuum/pressure range of 0 - 400 psig.

1677 The gauges shall be fluid filled with pulse and vibration dampening "Interlube" to lubricate the internal
1678 mechanisms to prevent lens condensation and to ensure proper operation to -40 degrees F. The cases shall
1679 be temperature compensated with an internal breathing diaphragm to permit fully filled cases and to allow
1680 a rigid lens with a distortion free viewing area. The gauge accuracy for the gauge shall be plus or minus
1681 2% mid-scale, plus or minus 3% balance, per ANSI B40.1, Grade 1A.

1682 To prevent internal freezing and to keep contaminants from entering the gauge, the stem and bourdon tube
1683 shall be filled with low temperature oil and be sealed from the water system using an isolating diaphragm
1684 located in the stem. A bright metal bezel shall be supplied for resistance to corrosion and to protect the lens
1685 and case from damage.

1686 **PUMP PANEL LIGHTS LED**

1687 Three (3) individual Whelen LED Strip Lights, Model PSCOCDCR light fixtures with on/off switch shall be
1688 mounted under each polished aluminum light shield extrusion. The lights shall be mounted at the upper portion of
1689 the pump panel to give the best light for night operations. The switch shall be located on the operator's panel for
1690 easy access

1691 **THROTTLE CONTROL**

1692 Provide a FRC Throttle Xcel hand throttle with micrometer adjustment and quick release button.

1693 **WATER TANK LEVEL GAUGE - Class One ITL LED**

1694 Three (3) Class One tank level indicators shall be installed. (2) bright LEDs gauges are to be located on
1695 each pump panel, mounting plate Blue in color and (1) One miniature display to be located in the cab,
1696 visible to the driver mounting plate blue.

1697 **FOAM LEVEL GAUGES - CLASS ONE ITL LED**

1698 The foam level gauges shall be a Class-One ITL with super bright LED's to show the tank volume. The
1699 display shall use a two-dimensional two-element lens to refract the light from the LED's to provide full
1700 180-degree visibility for the level indications with a red mounting plate clearly marked as "Class A" and
1701 "Class B" installed on the pump panel.

1702 **WATER TANK (2) ENGINES WITH 750 GALLONS – (1) ENGINE TANK AT 1,000 GALLONS**
1703 Provide a water tank with a capacity of 750/1,000 gallons water with Two (2) 30 gallon of foam tanks, (1)
1704 for Class “A” foam (CAFS), and (1) Class “B” constructed from UPF Poly IIE material.

1705 ***FOAM TANKS***

- 1706 a. An installer supplied 30-gallon Class “A” & “B” foam reservoirs conforming to NFPA standards
1707 shall be incorporated into the apparatus water tank with a separate fill tower and with 1- inch NPT
1708 minimum size bottom outlet(s). The reservoir shall hold a volume of concentrate that ensures
1709 compliance with NFPA requirements.
- 1710 b. A cover with vacuum breaker shall be provided on top of the fill tower.
- 1711 c. A ¼ inch (6.4 mm) mesh screen shall be incorporated into the fill tower to prevent debris from
1712 entering the tank.
- 1713 d. A low-level sensor switch shall be mounted in the tank to provide a feedback signal to the foam
1714 proportioner system electronic control. The sensor signal shall indicate when the foam tank is running low
1715 and shall shut down the foam concentrate pump if the tank is not refilled. The switch shall be located so
1716 that false alarms do not occur and there is (1) minute reserve capacity when switch trips.
- 1717 d. (See Page 52) Elkhart Foam Supply Kit Type #2 Class “B” tank.

1718 ***WATER TANK WARRANTY***

1719 Provide the UPF Poly IIE water tank with a lifetime warranty upon delivery.

1720 ***WATER TANK CONSTRUCTION***

1721 The UPF Poly IIE water tank shall be constructed from ½" thick PT2E polypropylene sheet stock. This
1722 material will be a non-corrosive stress relieved thermo-plastic, natural in color, and U.V. stabilized for
1723 maximum protection.

1724 The water and foam tanks shall be of a specific configuration and designed to be completely independent
1725 of the body and compartments. All joints and seams will be nitrogen welded and tested for maximum
1726 strength and integrity. The top of the booster tank is fitted with removable lifting eyes (provide at
1727 delivery) designed with a 3 to 1 safety factor to facilitate easy removal. The transverse swash partitions
1728 will be manufactured of 3/8" PT2E polypropylene (natural in color) and extend from approximately 4" off
1729 the floor to just under the cover. The longitudinal swash partitions will be constructed of 3/8" PT2E
1730 polypropylene (natural in color) and extend from the floor of the tank through the cover to allow for
1731 positive welding and maximum integrity. All partitions will be equipped with vent and air hoses to
1732 permit movement of air and water between compartments. The partitions will be designed to provide
1733 maximum water flow. All swash partitions interlock with one another and are welded to each other as
1734 well as to the walls of the tank.

1735 ***WATER TANK LID***

1736 The tank cover shall be constructed of ½" thick PT2E polypropylene, natural in color, and U.V. stabilized,
1737 to incorporate a multi three-piece design which allows for individual removal and inspection if necessary.
1738 The tank cover will be recessed 3/8" from the top of the tank and will be welded to both sides and
1739 longitudinal partitions for maximum integrity. Each one of the covers will have hold downs consisting of
1740 2" polypropylene dowels spaced a maximum of 30" apart. These dowels will extend through the covers
1741 and become welded to the transverse partitions. This will assist in keeping the cover rigid under fast
1742 filling conditions. A minimum of two lifting dowels will be drilled and tapped ½" X 13" to
1743 accommodate the lifting eyes.

1744

1745 **WATER TANK FILL TOWER**

1746 Provide the tank with a combination vent and manual fill tower. The fill tower shall be constructed of ½"
1747 PT2E polypropylene and will be a minimum dimension of 8" x 8" outer perimeter. Locate the tower in
1748 the left front corner of the tank. The tower will have a 1/4" thick removable polypropylene screen and a
1749 PT2E polypropylene hinged type cover. The fill tower cover shall be marked as a water tank fill point.

1750 **WATER TANK OVERFLOW AND VENT PIPE**

1751 Provide the fill tower with an integral 6" I.D. schedule 40 P.V.C. combination overflow/vent pipe running
1752 from the fill tower through the tank to a 6" coupling flush mounted into the bottom of the tank to allow
1753 water to overflow behind the chassis rear axle.

1754 Provide a secondary 1" tank vent plumbed from the rear of the tank to the fill tower to allow entrapped air
1755 to be released from the rear of the water tank.

1756 **WATER TANK SUMP AND CONNECTIONS**

1757 Provide one (1) standard sump per tank. The sump shall be a minimum of 10" wide, 10" long and 3" deep
1758 with a 3/4" bottom and is located in the left front quarter of the tank, unless specified otherwise in special
1759 provisions. On all tanks with a bulkhead suction inlet provide a 4" schedule 80 PVC pipe sweep from the
1760 front of the tank to sump location. The sump shall contain a minimum of 3" threaded plug located at the
1761 bottom for a tank drain. An anti-swirl plate shall be mounted inside the sump approximately 1" off the
1762 floor of the sump.

1763 **WATER TANK OUTLETS**

1764 Provide two (2) standard tank outlets; one for tank-to-pump suction line with a minimum of 4" coupling
1765 and one for a tank fill line with a minimum of a 2" N.P.T. coupling. All tank fill couplings shall be
1766 backed with flow deflectors to break up the stream of water entering the tank.

1767 **WATER TANK MOUNTING**

1768 The tank shall rest on the body cross members spaced a maximum of 22" apart, and shall be insulated
1769 from these cross members. The angles shall keep the tank from shifting left to right or front to rear. The
1770 tank is designed on the free-floating suspension principle and will not require the use of hold-downs. The
1771 tank will be completely removable without disturbing or dismantling the apparatus body structure. The
1772 hose bed cross braces will act as water tank retainers.

1773 **APPARATUS BODY DESIGN CONSTRUCTION**

1774 The body shall be completely modular in design allowing transfer of body components to a new chassis in
1775 the event of an accident or wear. Body components shall be removable from chassis without cutting or
1776 bending. The modular design shall also facilitate ease of repair or replacement of major or minor body
1777 parts. The mounting of the apparatus body shall be separate and distinct from the water tank mounting and
1778 the pump module mounting.

1779 The apparatus body shall be built of aluminum and shall be designed exclusively for Fire Service use. The
1780 overall body width shall be constructed in accordance with current **NFPA 1901** requirements. All metal
1781 work shall be free of sharp edges, objects or corners. No exceptions are allowed to this requirement.

1782 The body design shall be fully tested with proven engineering and test techniques such as finite element
1783 analysis, stress coating, and strain gauging. Engineering and test techniques shall have been performed
1784 with special attention given to fatigue life and structural integrity of compartments and body support
1785 system.

1786 The apparatus body shall be designed with the use of parametric modeling engineering software to ensure
1787 proper design of panel cuts and alignment of holes in mating parts. The entire apparatus body shall be a
1788 precision laser machined, properly reinforced with integral flanges eliminating the need for additional
1789 structural shapes. Hose body fabrications shall be free of all internal projections, which might injure
1790 personnel or fire hose.

1791 The pump module is to be completely separate from the main body to prevent damage due to flexing.

1792 **SUPER STRUCTURE – ALUMINUM**

1793 Provide the body super structure with an all welded configuration utilizing rectangular aluminum tubing.
1794 This structure shall be designed to totally support the full length and width of the body and will be welded
1795 to the body side compartments by use of reinforcement plates to incorporate the compartments into an
1796 integral part of the body weldments.

1797 All cross tubes of the structure shall be capped and butt welded at their point of termination to prevent
1798 water from laying inside the super structure. The super structure shall be bolted to the sides of the chassis
1799 frame at a minimum four (4) points.

1800 **REAR FENDERS AND FENDERETTES**

1801 Provide fully removable, bolt-in fender liners, which extend into the truck frame and have vertical splash
1802 shields inward of the wheels. The completely washable fender liners are designed to protect the front and
1803 rear compartments and main body supports from road salts, dirt accumulation and corrosion.

1804 The rear wheel wells shall be trimmed with bolt-in, replaceable type, rubber, federate.

1805 *****Adequate room shall be provided in the rear wheel wells for the application of single wheel St.***
1806 ***Pierre roller tire chains during winter operations.***

1807 **BODY RUB RAILS**

1808 Provide sacrificial rub rails made of poly hard plastic with reflective stripe material. The rail to be
1809 mounted at the base of the body, extend outward a minimum 3/4", downward 2", and flange inward 1".
1810 The rub rails shall extend the full length of the main body and wrap around the rear body corners. Rub
1811 rails will be designed to bolt to the body from the bottom side of the compartment area, so as not to
1812 damage the body side panels on initial impact and to provide for ease of replacement.

1813 ***REAR BODY PANEL***

1814 The rear body panel shall be fabricated and shall extend the full width between beavertails. This panel
1815 shall be full height from the rear step to the hose bed floor.

1816 ***REAR STANCHIONS***

1817 Provide two (2) light support brackets at the rear of the body, one each side. These brackets shall be
1818 trimmed with aluminum cover plates to protect stanchion light wiring.

1819 **REAR STEP**

1820 The rear step shall be twenty four (24) inches deep, fabricated of 3/16" polished tread plate, and rigidly
1821 reinforced. The rear edge of the step shall be designed to accommodate the rear clearance lights, recessed
1822 for protection in the step reinforcement channel. This step shall be bolted into place with a minimum ½"
1823 clearance gap between it and the body panel.

1824 Provide a Gripstrut or equal insert installed in the lower rear step.

1825 **INTERMEDIATE REAR STEP**

1826 Provide in the rear panel an integral eight (8) inches intermediate rear step platform for hose bed access.

1827 ***AUXILIARY STEPS LED LIGHTED***

1828 Provide large folding LED lighted steps with a minimum of 42 square inch surface conforming to NFPA
1829 requirements and made of high strength die cast aluminum, with a textured chrome plate finish. Steps are
1830 to be located on both sides of the rear of the apparatus. The steps will be mounted to accommodate access
1831 to the body hose bed area with a maximum 18" height between each step.

1832 Provide additional large folding LED lighted steps with a minimum of 42 square inch surface conforming
1833 to NFPA requirements on each side, and installed on the front of the side compartments. Steps are to be
1834 located on the left and right side and meet NFPA requirements allowing for access to the dunnage / deck
1835 gun area.

1836 **BODY PROTECTION PANELS**

1837 Provide on the front face of the side compartments, next to the left and right pump panels overlay with
1838 tread plate full height protection. This trim shall be rolled around the vertical outside radius to the
1839 forward compartment door openings on each side of the body.

1840 **CAB EXTERIOR HANDRAILS**

1841 A Hansen knurled aluminum handrails will be provided adjacent to each cab and crew cab door opening
1842 to assist during cab ingress and egress. Each handrail will be provided with red LED lights. The lights
1843 will be activated when the headlight switch is activated and the parking brake is applied. The LED lights
1844 may be load managed.

1845

1846 **HANDRAIL LOCATIONS**

1847 Provide two (2) Hansen knurled aluminum vertical rails mounted on the rear edge of the beavertails, one
1848 (1) each side.

1849 Provide one (1) Hansen knurled aluminum horizontal, full width handrail installed on the rear, below the
1850 level of the hose bed.

1851 Provide two (2) Hansen knurled aluminum vertical rails mounted at the front of the pump enclosure, one
1852 (1) each side, to assist entry into and egress from the apparatus walkway.

1853 Provide chrome plated "D" handle style handholds installed per customer requirements at the following
1854 locations:

1855 Provide eight (8) total and mounted as directed.

1856 ***REAR TOW EYES***

1857 Provide two (2) rear tow eyes, bolted directly to chassis frame protruding below the fire body at the rear
1858 most portion of the frame.

1859 ***BODY MUD FLAPS***

1860 Provide heavy duty, black rubber mud flaps behind the rear wheels.

1861 **HOSE BED**

1862 The hose bed shall be constructed in such a manner that will prevent damage to fire hose. The hose bed
1863 shall comply with the current NFPA requirements. The interior of the hose bed shall be free of projections
1864 such as nuts, sharp edges or brackets that may damage hose. The hose bed and walls shall be manufactured
1865 from aluminum. No exceptions to this requirement are allowed.

1866 An extrusion shall be installed over the rear opening of the hose bed to protect the body from wear. The
1867 hose bed bottom shall be fitted with removable slatted, ribbed 6" heavy-duty floorboards.

1868 The hose bed shall be designed to accommodate the following hose load:

1869 **HOSE BED CAPACITY**

1870 The hose bed shall be divided into five (5) hose compartments and shall have the capacity to hold the
1871 following quantities of hose.

1872	Quantity	Size of Hose	Brand Name of Hose		Width
1873	250'	2.0"	Key Echo 10	single stack	4.0"
1874	300'	2.0"	Key Echo 10	single stack	4.0"
1875	1500'	5"	Key LDH Echo 10	flat load	
1876	250'	2.5"	Key Echo 10	single stack	4.75"
1877	300'	3"	Key Echo 10	single stack	5.5"

1878 ***HOSE BED FLOORING***

1879 Provide the hose bed flooring with, properly spaced for ventilation and removable for access to the water
1880 tank. The flooring shall be smooth and free from sharp edges to avoid hose damage. A removable panel
1881 shall be provided in the floor to allow access to the water tank level gauge-sending unit, without removing
1882 the entire hose bed floor.

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HOSE BED PARTITIONS

Provide four (4) fully adjustable hose bed partitions. Partitions shall be removable for access to the booster tank. An additional anchoring point shall be provided on the bulk head to prevent “leaning” of the partitions.

*****The top and rear edge of each of the adjustable hose bed partitions shall be provided with an integral tubing reinforcement welded on for additional support to prevent bowing and movement from hose load shifts.*** Additionally notching shall be provide at the rear to allow for nozzles to be stowed in the hose bed.

APPLIANCE MOUNTING (REAR OF APPARATUS)

Mounting provisions shall be provided on the rear for the “mounting / securing” (1) Elkhart RAM XD portable monitor on a three inch line.

HOSE BED COVER

A Black hose bed cover constructed of 16 oz. Heavy-duty criss-crossed reinforced nylon shall be provided. Cover shall be fire retardant vinyl and installed over hose bed. The cover shall have heavy duty bungee ball tie down cords installed around the perimeter of the hose bed. The end of the hose bed cover shall be split into three section and be weighted and cover the hose bed opening. Additional cut outs shall be provided to allow access to water and foam tanks without removing the cover. Sewn in reflective identifier letters / numbers, color yellow shall be provided on the back of the hose bed cover. i.e. Eng 1-28, Eng 3-28, ET 4-28.

ROLL-UP DOORS (AMDOR) PAINTED BODY COLOR

The Amdor roll-up doors shall be constructed from anodized aluminum and pained body color, and extruded slats, which will have a flexible seal between each slat for proper sealing of the door.

Provide a seal each side, top and bottom edge of the door to prevent entry of dirt into the compartment.

The doors shall be equipped with a lift bar style latch mechanism, which will latch at the bottom of the door mounting extrusion.

The roll-up door assembly shall be furnished with a spring-loaded, counter balance assembly to assist in door actuation.

Roll-up doors shall contain a protected switch(s) to activated the compartment light(s) and provide a “door open” signal.

Amdor Roll-up doors shall be furnished in place of hinged door at the following locations:

- Left side front compartment L-1
- Left side rear compartment L-3
- Right side front compartment R-1
- Right side rear compartment R-3

SWEEP-OUT COMPARTMENT FLOORS WITH RECESSED SEAL SURFACE

Compartment floors shall be welded to the compartment walls, with the external floor flange stepped down, ½" high x 2" deep, to produce a sealing surface for the roll up doors below the compartment floor. The sweep out design will also permit easy cleaning.

COMPARTMENT TOPS

Provide compartment tops covered with polished aluminum protective plate on both sides. The compartment tops will be flanged up at hose bed wall, and shall have a 90 degree flange downward over the top of compartments with a 2" radius corner to provide a snag-free body design.

1925	<i>DRIP MOLDING</i>
1926	Provide the compartment tops over all side compartments with a 45-degree flange formed out to provide protection against water runoff. Provide a secondary extruded drip molding will be provided between low compartments and auxiliary high side compartments, when auxiliary compartments are provided.
1927	
1928	
1929	<i>COMPARTMENT LOUVERS</i>
1930	Provide machine stamped ventilating louvers in each compartment, and so located that water cannot normally enter the compartment. Provide a metal hat section will be fastened in place on the inside body wall to further prevent moisture from entering through the louver.
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1932	
1933	<i>ACCESS PANELS</i>
1934	Provide removable access panels in all lower compartments to access spring pins, fuel tank sender, electrical junction compartment and rear body mounts.
1935	
1936	Provide protective panels located in the rear compartments providing access to the lights and associated wiring. The covers will also serve as protective covers to prevent inadvertent damage to lights or wiring from tools or equipment located in the compartment.
1937	
1938	
1939	COMPARTMENT SIZE, CONSTRUCTION AND LOCATIONS
1940	The construction mythology and materials used by various manufacturers may have an impact on compartment layout. The dimensions listed below are <u>minimum excepted dimensions.</u>
1941	
1942	<i>EMS COMPARTMENT</i>
1943	One-(1) EMS compartment constructed of 1/8" smooth aluminum approximately 36" W X 21" D X 48" H shall be mounted in the cab in the area between the rear facing seats. This cabinet shall be installed over the (Engine Cover). Aluminum (7/8") unistruts shall be provided for future installation of storage trays. The cabinet shall be finished with a spray on polyurethane liner, color to match the interior.
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1948	<i>EMS COMPARTMENT LIGHT</i>
1949	One-(1) On-Scene Solution's full height LED tube lights. Lights shall be activated when the respective door is opened and the master battery switch is on.
1950	
1951	<i>EMS COMPARTMENT SHELVES</i>
1952	Two-(2) vertically adjustable shelves shall be installed in the EMS cabinet. The shelves shall be constructed of smooth aluminum and have a 2" lip at the front and rear of the shelf.
1953	
1954	<i>EMS COMPARTMENT 12V POWER SUPPLY</i>
1955	There shall be 2 circuits each shall be 12-volt 15 amp power installed in the EMS compartment.
1956	
1957	<i>L-1 LEFT SIDE FRONT COMPARTMENT</i>
1958	Provide one (1) front running board compartment forward of the rear wheels approximately 60" high x 30" wide x 24 " deep lower section and 14" deep upper section, with a single roll up door. Maximum clear door opening utilizing the latest rollup door technology.
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L-2 LEFT SIDE CENTER Tool Board COMPARTMENT

Provide one (1) Tool Board / high side compartment between the front and rear left side compartments, above the rear wheels. Approximate size **32" high x 52" wide x 14" deep**. This compartment is equipped with a standard horizontally hinged door. Provide door with a hold-open and chrome "D" ring latch operator. Mount "D" ring to the lower portion the door.

In the compartment provide a PAC TRAC 7000 Tool Board, full width and height of the compartment.

L-3 LEFT SIDE REAR COMPARTMENT

Provide one (1) rear running board compartment located at the rear of the rear wheels full width of the body with a roll up door. **62" high x 48" wide x 14" deep upper and transverse lower** Maximum clear door opening utilizing the latest rollup door technology.

HARD SUCTION STORAGE

Two compartments located to the rear of the apparatus and so configured as not to interfere with the water tank shall be provided one each side for the storage of (1) 10' length of 6" Kocheck Hard Suction in each.

HARD SUCTION TRAY OVER LEFT SIDE COMPARTMENTS

Provide a hard suction tray over the left side compartments for a 10' of 6" Kocheck Hard Suction.

HARD SUCTION FLEXIBLE HOSE

Provide three (3) Kocheck (2P601-10)10 foot sections of six (6) inch Kocheck (PVC) suction hose with lightweight hard coat couplings. Couplings shall include a long handle, female swivel on one end and a rocker lug male on the other end. All threads will be six (6) inch N.S.T.

STRAINER

Provide a Kocheck NH Long Handle Swivel Big Water Floating Strainer [FS602].

R-1 RIGHT SIDE FRONT COMPARTMENTS

Provide one (1) front running board compartment forward of the rear wheels approximately " **48"high x 30"wide x 26" deep lower section and 14" deep upper section**, with a single roll up door. Maximum clear door opening utilizing the latest rollup door technology.

R-2 RIGHT SIDE CENTER COMPARTMENT

Provide one (1) side compartment between the front and rear left side compartments, above the rear wheels. Approximate size "**16 high x 52"wide x 15" deep**. This compartment is equipped with a standard horizontally bottom hinged door. Provide door with a hold-open and chrome latch operator. Mount latch operator in the upper portion the door.

R-3 RIGHT SIDE REAR COMPARTMENTS

Provide one (1) rear running board compartment located at the rear of the rear wheels full width with a roll up door. **48" high x 50" wide x 14" deep upper and transverse lower** Maximum clear door opening utilizing the latest rollup door technology.

B-1 & B-2 BEAVER TAIL COMPARTMENT DOORS

Provide two (2) compartment doors approximate size 26" high x 44"wide to provide access to the transverse rear running board compartment of L-3 and R-3 Compartment doors are to be positive latching watertight panel doors and are hinged on the side.

AIR BOTTLE STORAGE COMPARTMENTS DOUBLE

There shall be three (3) double SCBA air cylinder storage compartments located in the rear wheel well area, capable of storing two (2) spare SCBA cylinders in each compartment. One (1) double compartment

2003 shall be located on the left side of the body forward of the rear wheels, and two (2) double compartments
2004 shall be located on the right side of the body each side of the rear wheels. The compartments shall be
2005 fabricated from 1/8" (.125") smooth aluminum, supported at the opening by seam welding the
2006 compartment to the wheel well. The bottom is supported to eliminate breakage from vibration, and is
2007 vented to facilitate moisture drainage. The compartment door shall be constructed of aluminum diamond
2008 plate with a positive mechanical latch. The bottom of the compartment shall be lined with a rubber
2009 material to protect the air cylinder finish.

2010 **NOTE:** Air bottles are 45 min 4,500 psi. SCI Dura-Lite 15. The O.D. is 6.32" and the OAL. is 20.57"

2011 **ADJUSTABLE SHELVING**

2012 Compartment shelves shall consist of 3/16" brushed finish aluminum, with a 2" lip on all four (4) sides.
2013 Shelves shall be vertically adjustable by mounting in heavy-duty aluminum unistrut "C" channel tracking
2014 material, securely fastened to the compartment walls. Shelves shall be located as follows:

2015 Provide Three (3) full width and depth, mounted in the Right Side Front R-1 compartment two (2) in the
2016 upper section and One (1) in the lower section.

2017 Provide One (2) full width and depth, mounted in the Right Side Rear R-3 compartment One (1) upper
2018 section and One (1) in the lower section.

2019 Provide Three (3) full width and depth, mounted in the Left Side Front L-1 compartment (2) in the upper
2020 section and One (1) in the lower section.

2021 Provide Three (3) full width and depth, mounted in the Left Side Front L-3 compartment (2) in the upper
2022 section and One (1) in the lower section.

2023 **ROLLOUT TRAYS**

2024 There shall be four (4) rollout trays supplied made out of 3/16" (.1875") aluminum plate. The tray will have
2025 a lip at the front and rear for added strength and it will be mounted on rollers with a combined capacity of
2026 250 pounds. The tray will be mounted in the four lower side compartments, L1, L3, R1 and R3 as specified
2027 by the department.

2028 **FLOOR COVERING MATERIAL**

2029 Provide "Dri-dek" compartment floor matting installed in each enclosed compartment and shelving.

2030 **COMPARTMENT POWER OUTLET**

2031 There will be four (4) Sentrex Model M620BZLS 18.00" long x 2.00" wide x 1.75" thick, surge protected
2032 receptacle strip(s) with six (6) 20 amp 120 volt AC straight blade receptacles provided to compartments
2033 specific locations to be **determined at plan review**.

2034 The strip(s) selected will be powered from shoreline power transfer switch through a receptacle located
2035 adjacent to the strip(s).

2036 There will be a label installed near the strip(s) that state the following:

- 2037 • Line Voltage
- 2038 • Current Rating (amps)
- 2039 • Phase
- 2040 • Frequency
- 2041 • Power Source

2042 **OPERATIONAL TESTING**

2043 The apparatus manufacturer shall perform the following operation test and certify that the power source
2044 and any devices that are attached to the line voltage electrical systems are properly connected and in
2045 working order.

2046 ***WIRING IDENTIFICATION***

2047 All line voltage conductors located inside the main breaker panel box shall be individually and
2048 permanently identified. When pre-wiring for future power wiring installations, the un-terminated ends
2049 will be labeled showing function and wire size.

2050 **PAINT, PREPARATION AND FINISH**

2051 All exposed welds shall be ground smooth for final finishing of areas to be painted. The compartments
2052 and doors are totally degreased and phosphatized. After final body work is completed, grinding and finish
2053 sanding will be used in preparation for priming.

2054 All removable items, such as brackets, compartment doors, etc. shall be painted separately to insure finish
2055 paint behind mounted items. All compartment un-welded seams exposed to high moisture environments
2056 shall be sealed using permanent pliable caulking prior to finish paint.

2057 The inside and underside areas of the complete body assembly shall be painted **body color yellow**, prior
2058 to the installation of the body on the chassis.

2059 The interior of the fire body compartments shall be painted.

2060 The compartment door inner panels and hose-bed partitions will have a "DA" brushed finish.

2061 The chassis frame rails; suspension and axles will be painted **body color yellow** with a polyurethane base
2062 paint prior to installation of any airlines or electric systems to ensure proper serviceability.

2063 **CAB INTERIOR PAINT**

2064 The metal surfaces of the cab interior shall be painted a flat finish, textured paint to match the cab interior
2065 upholstery color.

2066 **CAB EXTERIOR PAINT**

2067 The cab and body shall be finish sanded and prepared for final paint. Upon completion of final
2068 preparation, the cab exterior and body will be painted utilizing the highest quality, state of the art, base
2069 paint. Finish paint will be applied in multiple coats to ensure proper paint coverage with a high gloss
2070 finish.

2071 The cab exterior will be painted to match purchaser's furnished paint codes. A two tone paint finish will
2072 be provided with the break line located approximately 3" below the cab side windows.

2073 A Paint color sample for each color shall be provided to, and approved by the purchaser prior to the
2074 painting the chassis or fire body.

2075 The cab roof to just below cab windows shall be painted gloss White. A PPG paint code will be provided
2076 for matching or cross-referencing."

2077 The lower part of the cab and the fire body shall be painted YELLOW to match existing apparatus. A
2078 PPG paint code will be provided for matching or cross-referencing.

2079 ***PAINT FINISH WARRANTY***

2080 The finish paint on the unit shall be provided with a five (5) year paint finish guarantee, which will cover
2081 the finish for the following items:

2082 Peeling or delamination of the topcoat and/or other layers of paint.

2083 Cracking or checking.

2084 A copy of this warranty will be submitted with the proposal.

2085 **LETTERING AND STRIPING**

2086 Provide lettering and striping computer generated SCOTCH-LITE appliqué with a single color drop
2087 shadow and clear coat.

2088 Provide a maximum of sixty (60) three (3) inch letters will be provided to coincide with the Fire
2089 Department's existing logo and image. This shall be provided in two (2) locations. One (2) each side of
2090 the cab doors.

2091 Provide all lettering and striping with a clear coat with an acrylic enamel clear coat.

2092 Provide 16” reflective Yellow letters on the roof “E-28 / ET-28 for aerial identification. (Pre-
2093 construction final)

2094 Provide (2) 18” department’s Life Safety graphics as shown. Reflective color lettering and graphics as
2095 shown. The final image is subject to approval. Installed one (1) each side crew entry doors. (Pre-
2096 construction final)



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2101 Provide lettering centered on the front bumper “ENG _ INE” / ENGINE TANK” two colors. . (Pre-
2102 construction final)The “ENG _ INE” shall be provided with a single color drop shadow to match
2103 departments existing lettering. Detail graphics to be provided (Pre-construction final)

2104 ***Department graphics (front doors)***

2105 The department’s graphics (hand Pumper) and department name department name shall be provided on
2106 the 2 cab doors. The final image is subject to approval. Installed one (1) each side crew entry doors.
2107 Detail graphics to be provided, (Pre-construction meeting)

2108



2109

2110



2111 **3M™ SCOTCHLITE STRIPE**

2112 Provide a six (6) inch White triple trim 3M™ Scotchlite 680 stripe (White.)
2113

2114 The stripe shall be applied to at least 50 percent of the cab and body length on each side, and at least 25
2115 percent of the width of the front of the apparatus shall have the reflective material affixed to it.
2116

2117 Provide two (2) 1" 3M™ Scotchlite stripes incorporated into the 3M™ Scotchlite scheme to border the
2118 primary 4” 3M™ Scotchlite stripe on the top and bottom edges. The customer will determine final layout
2119 of this configuration.

2120 **CHEVRON STRIPING**

2121 Chevron striping shall be provided and installed across the rear of the apparatus. Striping will be 4" wide
2122 red/yellow reflective and installed in an inverted "V" pattern. Color shall be 3983 Yellow 3892 Red

2123 **SEATING POSITION LABELS**

2124 Provide Ten (10) permanent 3” X 5” engraved seating position labels Five (5) red and Five (5) blue.
2125 Verbiage for each label will be provided during the preconstruction conference. Labels to be mounted at
2126 the factory as directed.

2127 *Example of Seat Position 3” X 5” tags*

HOSE PERSON	
EQUIPMENT	RESPONSIBILITIES
Portable Radio	Assist with line stretch
Set of Irons	Direct Hose Team
Box Light	Evaluate effectiveness and progress
	Communicate with Operations Chief

2128 *Background **Red** tags for fire suppression activities and **Blue** for Technical Rescue Operations*
2129 *Final Design and Text subject to Customer approval.*
2130

2131 **ZICO 3097 QUIC-LIFT LADDER ACCESS SYSTEM**

2132 There shall be a ladder quick access system capable of storing (1) 24’ two section (1) 14’ roof with hooks
2133 and (1) 8’ closet ladder shall be installed on the right side of the apparatus above the lower compartments.
2134 The system shall be equipped with a safety interlock system to prevent collision with open compartment
2135 doors or the ladder access system. The ladder system, shall not interfere with the ladder storage system.
2136 The system shall be comprised of two (2), high strength aluminum castings with Warner 12 volt, high
2137 cycle, and linear actuators. The system shall lower the ladders 31" from the stored position. The system
2138 shall be controlled by a 20 amp momentary 2-position switch mounted outside the operational envelope of
2139 the system in a location that provides the operator with an uninterrupted view of the ladders during
2140 removal and storage operations. The rack shall be located on the right side of the body, and the controlling
2141 switch located on the right side pump panel (unless otherwise specified by the customer).

2142 There shall be a detent pin provided to remove and allow it to be manually lowered in the event of an
2143 electrical failure or breakdown. The suctions shall be secured in aluminum hard sleeve trays by means of
2144 high strength Velcro straps.

2145 **WHEEL CHOCKS**

2146 Provide two (2) Zico SAC-44-E folding wheel chocks with Zico SQCH-44-H horizontal mounting
2147 brackets mounted one (1) street-side forward of the rear wheels below the side running board
2148 compartments.

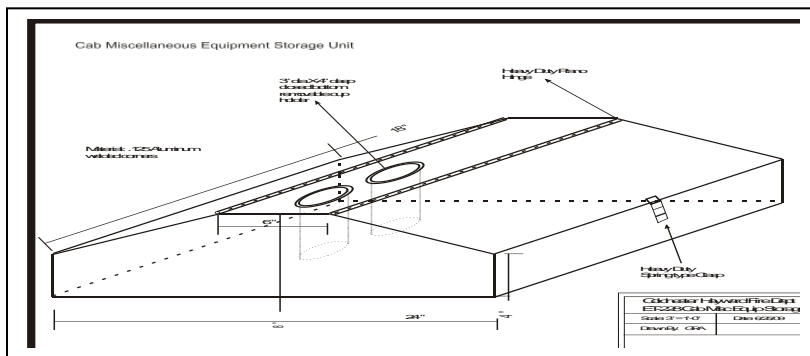
2149 **HAND LIGHTS**

2150 Provide six (6) Stream light Fire Vulcan Flashlights with flashing LED taillights - Vehicle Mount System
2151 - Yellow - and installed as directed by the purchaser. The light chargers shall be wired to the chassis
2152 battery saver. Location to be determined at pre construction conference.

2153 **Hinged Storage Box**

2154 Provide a storage box with two hinged, positive latching doors approximately 18” L X 24” W X 8” H to
2155 be mounted on the engine cover between the officer and driver as shown below.

2156



2157 **MANUFACTURER SUPPLIED, NFPA REQUIRED EQUIPMENT**

2158 Provide the following **NFPA-1901** required equipment with the unit at time of delivery, with mounting
2159 provisions furnished as noted for each individual component.

2160 **LADDERS**

2161 Provide one (1) Alco Lite PEL 24 two section 24' extension ladder.

2162 Provide one (1) Alco Lite PRL 14, straight roof ladder with folding hooks.

2163 Provide one (1) Alco Lite FL 08, 8 foot aluminum folding ladder with safety shoes mounted on the ladder
2164 rack.

2165 **ADDITIONAL ITEMS SUPPLIED WITH THE VEHICLE**

2166 One (1) quart of each exterior color paint for touch-up purposes will be supplied when the apparatus is
2167 delivered to the end user.

2168 **MANUALS**

2169 (2) - Pump Manuals

2170 (2) - UL Certificates

2171 (3) - copies of other documentation as required in "**Instructions to Bidders**"

2172 Instruction Manuals

2173 Electrical Schematic Diagrams

2174 **ROAD SAFETY KIT**

2175 Provide a road safety kit with the following equipment:

2176 1 - 2 ½ lb. B-C fire extinguisher

2177 3 - triangle safety reflectors

2178 **PIKE POLES**

2179 Provide Two (2) 6' Fire Hooks Unlimited New York roof hooks with PAC mounting brackets. To be
2180 installed one (1) each side on the outside and to the rear of the cab. Provide scuff plates to prevent hooks
2181 from causing paint/body damage.

2182 **BRACKETS**

2183 Provide one (1) PAC Ironslok® # K5003. To be mounted in the crew compartment on the passenger side.
2184

2185 **ADDITIONAL EQUIPMENT SUPPLIED / MOUNTED / INSTALLED (EACH ENGINE)**

2186

2187 The following listing of equipment shall be supplied as part of the contract requirements for each engine
2188 and shall be mounted, installed as required by the purchaser.

2189
 2190 One (1) 20# ABC fire extinguisher with vehicle bracket.
 2191 One (1) 15# CO2 fire extinguisher with vehicle bracket
 2192 One (1) 2-1/2 gallon pressurized water fire extinguisher with fire hooks unlimited shoulder strap #CH-312
 2193 and a vehicle bracket, to be mounted crew compartment.
 2194 One (1) 2-1/2 gallon pressurized AFFF fire extinguisher with fire hook unlimited shoulder strap #CH-312
 2195 and a vehicle bracket.
 2196 One (1) Fire Hooks Unlimited 8# fiberglass handle flat headed axes with PAC mounts, mounted L-2 tool
 2197 board.
 2198 One (1) Fire Hooks Unlimited 6# fiberglass handle pick headed axe with PAC mounts, mounted L-2 tool
 2199 board.
 2200 One (1) Fire Hooks Unlimited 30" Pro bar with mounting brackets, mounted L-2 tool board.
 2201 One (1) Fire Hooks Unlimited 40" "D" handled "all-purpose hook" with PAC mounts, mounted L-2 tool
 2202 board and (1) in outer cab storage compartment.
 2203 One (1) Zico 4095 Bolt cutter with PAC mounts, mounted L-2 tool board
 2204 One (1) Fire Hooks Unlimited 10Lb Sledge Hammer #SHF-10 with PAC mounts, mounted L-2 tool board
 2205

2206 **ADDITIONAL EQUIPMENT ALTERNATE # 1**

Qty	Description	Unit Cost	Total Cost
3	Elkhart RAM XD monitor. With 282-A – Mini stream shaper, 181-A deluge tip and 8296-MB truck mount bracket		
9	Elkhart Model #B-375-GA, 1-1/2" ball shutoff and pistol grips (3) Red / (3) Black, (3) uncolored. The lightweight, Elk-O-Lite shutoff shall have a Tab-shaped handle with double stops that controls a UHMWPE seat with a full round metal ball. The shutoff shall have a 1-1/2" NH free swivel base with a 1-1/2" NH male outlet and a 1-3/8" waterway.		
6	Elkhart Model # ST-185-XD-CAFS, handline tips. This tip shall have a 1-1/2" female NH base with a 15/16" & 1-1/8" discharge. The construction of this tip shall be lightweight, Elk-O-Lite with a black rubber bumper and gasket. The tip shall have a knurling design at the end of the tip for ease of handling and grip.		
9	Elkhart Model #281A, Mini Stream Shapers shall be provided. This stream shaper shall be used in conjunction with an Elkhart smooth bore tip. The tip shall be of Elk-O-Lite construction with a 1-1/2" NH female inlet and 1-1/2" NH male outlet with replaceable acetyl vanes.		
3	Elkhart Model #B-375-GA, 2-1/2" ball shutoff and pistol grips shall be provided NH free swivel base with a 1-1/2" NH male outlet and a Quarter turn, ball valve, hand line shutoff with 1.375" waterway; it shall be constructed of durable, hard anodized, lightweight Elk-O-Lite; shall have rugged aluminum bronze horseshoe handle with double stops; shall have a double actuating full round metal ball shutoff with a UHMWPE seat; The shutoff shall have an integral smooth bore tip size 1 1/4" machined into the outlet of the shutoff body; The shutoff shall have an Elk-O-Lite pistol grip handle. The shutoff shall have a 2.5" female threaded Miami Dade Style swivel inlet and 1.5" threaded male outlet		
3	Elkhart mini stream shaper shall have a replaceable Acetal vane with a 2.5" female inlet and 2.5" male outlet. The length of the stream shaper shall be 2.50" with a weight of 2.50 lb.		
3	Elkhart 4000-24 Hand line nozzle tip. With a protective BLUE urethane bumper with a 1.5" female threaded swivel base. The nozzle shall flow 300 GPM @ 75 psi		
3	Elkhart model B-100-A gated wye 2-1/2" NST F X (2) 1-1/2" NST M		
2	Elkhart model B-97-A, gated wye, 2-1/2" F.NST x (2) 2-1/2" M. NST		

2207

2208 **ADDITIONAL EQUIPMENT ALTERNATE # 1 CONTINUED**

Qty	Description	Unit Cost	Total Cost
3	2550-V18BL08ACSP Supervac Positive Pressure vans 9,600cfm		
3	Kocheck 5" Storz x 2 1/2" NH Female 3-Way Siamese-Clappered 30K0525		
9	Elkhart 2-1/2" X86A, hydrant gate valves		
3	Akron Brass LDH intake relief Revolution 7982		
3	6' Fire Hooks Unlimited New York roof hooks		
3	Fire Hooks Unlimited 8# fiberglass handle flat headed axes.		
3	Fire Hooks Unlimited 30" Pro bars with PAC mounting brackets,		
24	2-1/2" chrome plated #653 tri-loc mounting plates. South Park Chrome		
18	Kocheck K01 Spanners		
6	Milwaukee 2366-20 M18 ROVER Compact Lithium-Ion Dual Power 4000 Lumens Corded/ Cordless LED Flood Lights		
3	Kocheck spanner holder, K-48-3, complete with 2 KS3's and 1 hydrant wrench		
3	Kocheck (KS34) holders includes Set of (4) KS3 wrenches.		
3	Knox Keysecure boxes		
1	ES-100-28D Rescue Spreader		
1	ESLC-29D Rescue Cutter		
1	EBFCC-28-D Rescue Combi Tool		

2209