

**CITY OF GRANGER**

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## **Specification for: CITY OF GRANGER**

### **VM8 BASE MODEL**

#### **SIDE MOUNT PUMPER**

#### **NFPA 1901 COMPLIANT**

Unit will be manufactured and tested to current NFPA guidelines.

#### **INTERNATIONAL 2-DOOR**

International MV607 Conventional – 2021

Minimum GVWR: 2-door – 38,000 lbs.

#### **WHEELBASE**

2-door Side Mount models – Turning radius is considered critical for this apparatus, therefore the maximum wheelbase shall not exceed 191 inches.

2-door Top Mount models – Turning radius is considered critical for this apparatus, therefore the maximum wheelbase shall not exceed 222 inches.

#### **ENGINE**

Cummins L9 – 350EV HP @2000 RPM; 1000 lb./ft @ 1400 RPM

Maximum 68 MPH road speed limit (per NFPA 1901)

Side of hood air intake with NFPA compliant ember screen and fire-retardant Donaldson or equal air cleaner.

Minimum 325-amp alternator

Batteries: (3) 12-volt 1980 CCA total maintenance free with threaded studs mounted left side under cab

Battery disconnect switch cab mounted. Disconnects power to power distribution center. Indicator warning light with green ON indicator light mounted on left side of dash instrument panel.

Turbocharged 18.7 cfm air compressor with internal safety valve and mechanical governor.

Exhaust brake integral with variable geometry turbo. With ON/OFF dash switch. Must automatically activate apparatus stop lamps.

Right side outboard under step mounted horizontal aftertreatment system with horizontal tailpipe exiting forward of right rear wheels.

Engine aftertreatment device, automatic over the road active regeneration and dash mounted single regeneration request/inhibit switch.

Diesel exhaust fluid tank – 6 gallons under left cab aft of fuel tank with bright aluminum overlay

Horton Drive master ON/OFF fan direct drive, two-speed with residual torque device.

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1045 square inch louvered aluminum radiator with 373 sq.in. CAC and tank oil cooler.  
Electric grid air intake warmer

### **TRANSMISSION**

Allison 3000 EVS automatic  
PTO provision for Chelsea 280 series PTO (2)  
Vocation package 198 for fire vehicle applications  
Magnetic drain plugs  
Push-button electronic shift control – dash mounted.  
Water-to-oil cooler in radiator tank  
Synthetic fluid

### **FRONT AXLE**

2-door cab models - 12,000 lb. Set-back with drop  
16.5X5Q+ cast spider heavy duty cam front brakes, double anchor, fabricated shoes  
Fire and Emergency Severe Service, non-asbestos front lining  
Cast iron front brake drums.  
Front oil seals  
Vented oil front hub caps with window, center and side plugs  
Automatic slack adjusters with stainless steel clevis pins  
Power steering  
2-quart see-through power steering reservoir  
2-door – Minimum 12,000 lb. taper leaf suspension  
Maintenance-free rubber bushings  
Shock absorbers

### **REAR AXLE**

26,000 lb. T-Series fire vehicle service single  
5.25 rear axle ratio  
Iron carrier with standard axle housing  
Extended lube main driveline with half-round yoke  
Driver controlled traction differential lock with blinking lamp with each mode switch –  
differential unlock with ignition OFF, active <5 MPH  
16.6X7 P cast spider cam rear brakes, double anchor, cast shoes.  
Fire and Emergency Severe Service non-asbestos rear brake linings  
Brake cams and chambers on forward side of drive axle  
Rear oil seals

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Brake chambers – front: 20 sq.in long stroke; rear: 30/30 sq. in. long stroke with spring actuated parking brake

Automatic slack adjusters

### **BRAKE SYSTEM**

WABCO 4S/4M ABS

Air Compressor: 18.7 cfm

Air system pressure protection and 85 psi pressure protection for air horns

Relay valve with 5-8 psi crack pressure

Air Dryer - Bendix AD-9 with heater

Auto Drain valve – wet tank

### **FUEL TANK & SYSTEM**

Minimum 50 gallons/189-liter rectangular polished aluminum mounted beneath left front cab door.

Bright aluminum treadplate trim package will be installed beneath the cab doors above the secondary step and the bottom of the cab and the first and secondary step.

Fuel/water separator with water in fuel sensor with heater

High temperature reinforced nylon fuel line

Fuel cooler

### **TIRES & WHEELS**

Front: 12R22.5 Load Range H equal to Continental HSR2 (2)

Rear: 12R22.5 Load Range H equal to Continental HSR2 (4)

22.5x8.25 10-hub piloted steel disc (6) aluminum alloy disc

### **CAB EXTERIOR**

2-door cab models – 106-inch BBC flat roof aluminum conventional cab

Air cab mounting

Cab roof reinforcements for roof mounted lightbar

Left and right interior grab handles and exterior non-slip grab handles.

Chromed grille

Chromed air intake grille with ember screen

Fiberglass tilting hood.

Dual 25-inch round Hadley hood mounted air horns (one left and one right) with shields.

Left and right air horn foot switches with momentary dash switch for horn button

Door locks and ignition switch keyed alike.

Dual Aero pedestal mirrors; chrome; heated; left and right remote adjustment 8-inch bright finish convex mounted under primary mirrors.

## **Specification for: CITY OF GRANGER**

Aftertreatment system on right side with polished diamond plate cover

Tinted windshield and door glass

Manual door window regulators

Contoured chromed steel (delete if extended SST bumper is selected as option)

Front tow hooks – frame mounted (2)

### **CAB INTERIOR**

Molded inner door panels.

Gray vinyl interior

Black mats with single insulation

Heater, defroster and air conditioner with standard HVAC ducts and controls with recirculation switch

Premium cab insulation

Door activated dome lights, forward left and right and (if 4-door) rear left, right and center.

Manual cab door locks

Seats:

- Driver: Seats, Inc 911 Universal Series high back air suspension driver seat with NFPA 1901 compliant seat sensor
- Officer: Seats, Inc 911 Universal Series SCBA non-suspension with under seat storage and NFPA compliant seat sensor

Black Cordura Plus cloth seat covers.

NFPA compliant high visibility red seatbelts

All seating positions shall have a seat sensor that advises the driver through a visual display on the dash within the driver zone of seatbelt status for all positions in the apparatus. The sensors shall be connected directly to the VDR (vehicle data recorder (VDR) integrated into the dash. Connection for downloading recorded data shall be through the J1939 port.

Adjustable tilt and telescoping steering column with 4-spoke 18-inch steering wheel.

Driver and officer side interior sun visors

### **INSTRUMENTS & CONTROLS**

Engine remote interface with park brake interlock

Low air pressure indicator light and audible alarm

2 inch primary and secondary air pressure gauges

Engine compartment mounted air restriction indicator with graduations and warning light in dash

Woodgrain driver and center instrument panel

Electronic cruise control with switches in left switch panel

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Ignition switch with non-removable key

Heavy duty onboard diagnostics interface connector located below left dash.

2-inch fuel gauge

Engine remote interface for remote throttle

Engine remote interface connector in engine compartment

Engine coolant temperature gauge

Engine oil pressure gauge

2-inch transmission temperature gauge

Engine and trip hour meters integral within driver display

Power and ground wiring provision in overhead console

Electronic MPH speedometer with secondary KPH scale without odometer

Vehicle speed sensor

Electronic 3000 rpm tachometer

Digital voltage display integral in driver display.

Electric windshield wiper motor and display

Alternating flashing headlamp system with fire apparatus-controlled engagement.

Parking brake system with dash valve control auto/neutral and warning indicator

Self-cancelling turn signal switch with dimmer, washer/wiper and hazard in handle

### **CAB PAINT**

The cab will be painted by International.

### **CAB DOOR RETRO-REFLECTIVE STRIPING**

Chevron style retro-reflective striping will be added to the inside of the cab doors in accordance with NFPA requirements. It will cover not less than 96 sq.in of each door meeting MFPA 1901.

### **TIRE PRESSURE MONITORING SYSTEM**

There will be a Real Wheels LED Air Guard Set and Go, six (6) wheel stabilizer kit, for 2.00-inch round holes and LED indicators proper air pressure in the tire.

The inner tire on the rear dual axle will have an extension provided that will pass through the outside rim and attach to the stabilizer providing an unobstructed view for inspection of the inner tire air pressure.

The indicators will be installed by the department after the unit has been fully equipped and the tires set to the manufactures recommended pressure rating. The indicators will calibrate to that initial air pressure setting upon installation and will intermittently flash when the tire pressure is reduced by 5 to 10 psi from its original calibrated pressure.

### **AIR OUTLET**

A ¼" male plug air hose inlet will be connected to the air reservoir tank. A ¼" inline check valve will be installed in the line. Air hose connection will provide the capability of

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filling the air brake system with air from an outside source. It will be located beneath the driver's cab door above the fuel tank.

#### **ALUMINUM WHEELS**

Aluminum wheels will be supplied by the commercial chassis manufacturer. Includes front wheels and rear wheels.

#### **CAB COLOR**

The cab shall be painted by the OEM. One solid color - RED FLNA 3225E1



## **VM8 PUMP MODULE**

### **CROSSLAY PRECONNECTIONS**

Two (2) Crosslay hose beds shall be provided on the pump module. Each of the two (2) Crosslay areas shall have a capacity for up to 200' of 2.0" double-jacket fire hose double stacked. The Crosslay floor and side walls shall be constructed of 3/16" (.188) smooth aluminum plate. The floor shall be slotted to prevent the accumulation of water and allow for ventilation of wet hose. One (1) 1/4" (.25") smooth aluminum plate fixed divider with a sanded finish shall be provided to separate the two (2) hose storage areas.

The Crosslay hose bed shall consist of a 2" heavy-duty hose coming from the pump discharge manifold to the 2" swivel for each hose bed. The hose shall be connected to a manually operated 2" Akron valve. The valve shall be an Akron 8800HD series with a 316 stainless steel ball and dual polymer seats for ease of operation and increased abrasion resistance. The valve shall have a self-locking ball feature using an automatic friction lock design to balance the stainless-steel ball when in a throttle position with water flowing through it.

The valve shall be of the unique Akron swing-out design to allow the valve body to be removed for servicing without disassembling the plumbing.

The valve control shall be located at the pump operator's panel and shall visually indicate the position of the valve at all times.

All fabricated piping shall be a minimum of Schedule 10 stainless steel for superior corrosion resistance and decreased friction loss.

### **SIDE MOUNT PUMP MODULE**

#### **PUMP COMPARTMENT**

The complete apparatus pump compartment will be constructed of a combination of structural tubing and formed sheet metal. The same materials used in the body will be utilized in the construction of the pump compartment. The structure will be welded utilizing the same A.W.S. Certified welding procedure as used on the structural body module. These processes will ensure the quality of structural stability of the pump compartment module.

The pump compartment module will be separated from the apparatus body with a gap. This gap is necessary to accommodate the flexing of the chassis frame rails that are encountered while the vehicle is in transit so that harmful torsional forces are not transmitted into the structural framework.

The front of the pump module will be overlaid entirely above the frame rails with bright aluminum diamond plate fastened with mechanical stainless-steel fasteners.

#### **FLEX PUMP MODULE MOUNTING SYSTEM**

The entire pump module assembly will be mounted above the chassis frame rails exclusively with not less than four (4) torsion isolator assemblies to reduce the vibration and stress providing an extremely durable body mounting system.

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The pump module substructure will be mounted above the frame to allow independent flexing to occur between the body and the chassis. Each assembly will be mounted to the chassis frame rails with steel, gusseted mounting brackets. Each body mount bracket will be mounted to the side chassis frame flange with 5/8" Grade 8 Geomet coated (anti-corrosion) bolts. Each mounting bracket will be bolted to the frame using not less than four (4) bolts.

There will be no welding to the chassis frame rail sides, web or flanges, or drilling of holes in the top or bottom frame flanges between axles. All pump module to chassis connections will be bolted so that in the event of an accident, the module will be easily removable from the truck chassis for repair or replacement.

Because of the constant vibration and twisting action that occurs in chassis frame rails and suspension, the torsion mounting system is required to minimize the possibility of premature pump module structural failures.

### **LEFT SIDE OPERATORS PANEL & PUMP PANEL**

The pump operator's panel will be located on the left side of the apparatus pump compartment. The panel will be split into an upper and lower section.

The panels will be hinged minimum 14-gauge 304 stainless steel with brushed finish and thumb-release latches.

The upper panel will house gauges and controls and be hinged downward to allow easy access to mounted components. The door will have a stainless-steel hinge and push button latches.

The lower panel on the left side will be hinged as described above to allow swinging the panel toward the front of the apparatus.

### **AIR CHUCK OUTLET**

There will be a quick disconnect air chuck outlet provided and installed on the apparatus at the left side lower pump compartment panel/sill. The air chuck outlet will be plumbed to the chassis air system and have on/off valve and label.

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### **RIGHT SIDE PUMP PANELS STYLE**

There will be two (2) pump panels on the right side of the pump compartment, one (1) upper and one (1) lower. Each panel will be accessible by a quick-release mechanical type latch, closing against a door seal. Both panels will be easily removed for access to the pump for service.

### **RIGHT & LEFT SIDE BRUSHED STAINLESS-STEEL PANELS & OVERLAYS**

The panels for the pump compartment on the left and right side will be made from minimum 14-gauge 304 stainless steel capable of withstanding the conditions and effects of extreme weather and temperature changes.

### **RUNNING BOARDS**

The pump compartment running boards will be made of a structural tubular framework. They will be not less than 12 inches deep. The tubular frame support all loads by transmitting the loads through the pump compartment structure directly to the chassis frame rails.

The running boards will be independent of the apparatus body and will be integrated to the pump compartment structure only, eliminating any pump compartment to body interference. This is essential in keeping a truly 'modular' configuration. Slip-resistant abrasive adhesive materials will be applied to the top surface of the running board framework to provide a suitable stepping surface where applicable.

They will have a .188-inch embossed (no exceptions) aluminum diamond plate overlays installed.

### **PLUMBING SYSTEM - DSD 1500**

#### **MIDSHIP PUMP**

The pump will be a Hale single stage DSD mid-ship pump. The pump will have the capacity of 1500 gallons per minute, measured in U.S. Gallons.

#### **PUMP ASSEMBLY**

The entire pump will be assembled and tested at the pump manufacturer's factory. The pump will be driven by a drive line from the truck transmission. The engine will provide sufficient horsepower and RPM to enable pump to meet and exceed its rated performance.

The entire pump will be hydrostatically tested to a pressure of 600 PSI. The pump will be fully tested at the pump manufacturer's factory to the performance spots as outlined by (NFPA) 1901, Standard for Automotive Fire Apparatus. Pump will be free from objectionable pulsation and vibration.

The pump body and related parts will be of fine grain alloy cast iron, with a minimum tensile strength of 30,000 PSI (2069 bar). All metal moving parts in contact with water will be of high-quality bronze or stainless steel. Pump utilizing castings made of lower tensile strength cast iron not acceptable.

Pump body will be vertically split on a single plane for easy removal of entire impeller assembly including clearance rings.

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Pump shaft to be rigidly supported by two bearings for minimum deflection. The bearings will be heavy-duty, deep groove ball bearings in the gearbox, and they will be splash lubricated. Shaft seal comes standard with face-type, self-adjusting corrosion- and wear-resistant mechanical seals.

The pump impeller will be hard, fine grain bronze of the mixed flow design; accurately machines, hand-ground and individually balanced. The vanes of the impeller intake eye will be hand ground and polished to a sharp edge and be of sufficient size and design to provide ample reserve capacity utilizing minimum horsepower.

Impeller clearance rings will be bronze, easily renewable without replacing impeller or pump volute body.

The pump shaft will be heat-treated, electric furnace, corrosion resistant stainless steel. Pump shaft must be sealed with double-lip oil seal to keep road dirt and water out of gearbox.

### **GEAR BOX**

Pump gearbox will be of sufficient size to withstand up to 16,000 lbs. ft. of torque of the engine. The drive unit will be designed of ample capacity for lubrication reserve and to maintain the proper operating temperature.

The gearbox drive shafts will be of heat-treated chrome nickel steel and at least 2.75 inches in diameter, on both the input and output drive shafts. They will withstand the full torque of the engine.

All gears, drive and pump, will be of highest quality electric furnace chrome nickel steel. Bores will be ground to size and teeth integrated and hardened, to give an extremely accurate gear for long life, smooth, quiet running, and higher load carrying capability. An accurately cut spur design will be provided to eliminate all possible end thrust.

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

If the gearbox is equipped with a power shift, the shifting mechanism will be a heat treated, hard anodized aluminum power cylinder, with stainless steel shaft. An in-cab control for rapid shift will be provided that locks in road or pump.

For automatic transmissions, three green warning lights will be provided to indicate to the operator(s) when the pump has completed the shift from Road to Pump position. Two green lights to be located in the truck driving compartment and one green light on pump operator's panel adjacent to the throttle control. For manual transmissions, one green warning light will be provided for the driving compartment. All lights to have appropriate identification/instruction plates.

### **APPARATUS PLUMBING LABELING**

Verbiage tag bezels will be installed for each control. The bezel assemblies will be used to identify apparatus components. These tags will be designed and manufactured to withstand the specified apparatus service environment and will be backed by a warranty equal to that of the exterior paint and finish. The verbiage tag bezel assemblies will include a chrome-plated panel-mount bezel with durable easy-to-read UV resistant polycarbonate inserts featuring the specified verbiage and color coding. These UV resistant polycarbonate verbiage and color inserts will be subsurface screen

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printed to eliminate the possibility of wear and protect the inks from fading. Both the insert labels and bezel will be backed with 3M permanent adhesive, which meets UL969 and NFPA standards.

### **PRESSURE GOVERNOR AND MONITORING DISPLAY**

The pump shall be controlled by a Class 1, "TPG" Total Pressure Governor installed on the pump operator's panel. It shall be interfaced with a SAE J1939 Controller Area Network (CAN) device that controls engine speed using data communications directly to the engine ECU or with an analog control signal. Operating on the J1939 network, the governor is able to monitor engine RPM and other pertinent data directly from the engine ECU. Control algorithms shall be optimized to take advantage of the J1939 CAN data to yield crisp and accurate control of engine and subsequently pump speed and pressure output. Graphic diagnostics shall be integrated that provides wiring and troubleshooting information.

It shall control the engine fuel to maintain a desired pump pressure, or engine speed setting. Additionally, the TPG will display important engine information specifically battery voltage, engine coolant temperature, oil pressure and RPM.

Features:

- A panel control module (display), a pressure transducer and appropriate cables and connectors.
- Large easy to read Alpha/numeric display.
- Sealed electronics which provide maximum resistance to water, condensation, and humidity.
- A panel display which consolidates throttle with preselect and high idle features in a single 4-1/2" weather resistant housing.
- Communicates with the engine ECU over the J1939 CAN bus for improved accuracy resolution and response. When in the "pressure" mode the TPG will operate as a pressure sensor (regulating) governor (PSG) eliminating any need for a relief valve on the discharge side of the pump. This feature will be set to operate at 100 psi unless specifically requested by the customer to use another pressure. This setting can be changed by the department.

The following parameters shall be visible at all times:

- Pump Intake Pressure
- Pump Discharge Pressure
- Engine RPM
- Engine Oil Pressure
- Engine Coolant Temperature
- Transmission Temperature
- System Voltage
- Throttle Ready Interlock Status
- Pump Engaged Interlock Status

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- OKAY to Pump Interlock Status
- Operating Mode Status (RPM or Pressure)
- Target Pressure Indication (when in pressure mode)

### **TESTING PORTS**

Test port connections for pressure and vacuum will be provided at the pump operator's panel. One (1) will be connected to the intake side of the pump, and the other to the discharge manifold side of the pump.

Each port will have 0.25 inch (6.35 mm) standard pipe thread connection and be manufactured of non-corrosive polished stainless steel or brass plugs.

### **PRESSURE RELIEF VALVE**

A pressure relief valve will be provided. The valve will have an easy-to-read adjustment range from 90 to 300 PSI with 90, 125, 150, 200, 250 and 300 PSI adjustment settings and an "OFF" position. Pressure adjustments will be made utilizing a 1/4" hex key, 9/16" socket or 14mm socket.

For corrosion resistance the cast aluminum valve will be a hard coat anodized with a powder coat interior and exterior finish. The valve will meet (NFPA) 1901, Standard for Automotive Fire Apparatus, requirements for pump inlet relief valves. The unit will be covered by a five-year warranty. The valve will be preset at 125 PSI (860 kPa) suction inlet pressure, unless otherwise shop noted. The valve will be installed inside the pump compartment where it will be easily accessible for future adjustment. The excess water will be plumbed to the atmosphere and will dump on the opposite side of the pump operator.

For normal pumping operations, the relief valve will not be capped and there will be a placard stating "DO NOT CAP" installed.

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### **TANK LEVEL GAUGE**

There will be a Class 1 model #ITL-40M blue tank level gauge provided and installed at the pump operator's panel location.

The tank level gauge will indicate the liquid level for water in increments of 1/20th of a tank with a visual warning at 1/4 of a tank.

The tank level gauge will include a pressure transducer mounted on the outside of the tank, a super bright LED display with visual indication and weather resistant connectors.

### **PUMP COMPARTMENT WORK LIGHT**

A LED work light will be installed in the pump compartment module to illuminate the piping and plumbing components.

The light will be activated by a weather resistant toggle switch installed inside the pump compartment.

### **MASTER DRAIN VALVE**

A Trident manifold type drain valve will be installed in the pump compartment. All pump drains will be connected to the master drain valve. The drain valve will be controlled from the left side lower pump house sill. The control will be a hand wheel knob marked "open" and "closed".

The drain will be located such that it will not interfere with pumping operations or function such as soft suction hoses, etc. nor will it protrude past the outer edge of the apparatus, to prevent damage to the valve.

In some cases, it is necessary to locate the master drain in a secondary location to ensure proper draining. If no lower or vertical sill exists, the drain will be located below the bottom outside edge of the hose body near the forward most corner on the driver's side hose body. The drain will not protrude past the outer edge of the body, thus preventing damage to the valve.

### **PUMP SEAL**

A mechanical or packing style seal will be supplied on the inboard side.

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### **PUMP SHIFT**

The drive unit will be provided with an air pump shift system. The control valve will be a spring-loaded guard lever that locks in "Road" or "Pump" mode.

To the left of the pump shift control, there will be two indicator lights to show the position of the pump when the control is moved to "Pump" position. A green light will be energized when the pump shift has been completed and will be labeled "PUMP ENGAGED"; a second green light will be labeled "OK TO PUMP" energized when both the pump shift has been completed and the chassis automatic transmission is engaged.

A third green indicator light will be installed adjacent to the throttle on the pump operator's panel. This light will be labeled "Throttle Ready".

In addition to this indicator light, an additional indication will be provided to the pump operator at the panel when the pump is ready to pump. This additional indication will be that one (1) of the operator's panel illumination lights will only activate when the "OK TO PUMP" indicator is lit.

### **AIR PUMP SHIFT LOCATION**

The pump shift will be mounted in the "best fit" location as determined by the apparatus manufacture.

### **PRIMING SYSTEM**

The priming system will be a positive displacement, oil-less electrically driven rotary vane priming pump rigidly attached to the pump transmission.

The priming pump will be self-lubricating and will not require lubrication. The pump, when dry, will be capable of taking suction and discharging water with a lift of 10 feet in not more than 30 seconds through 20 feet of suction hose through the steamers.

### **PRIMER CONTROL**

The primer will be activated by a pull/push "T" handle control at the operator's panel.

### **PUMP COOLING LINE**

There will be a .38-inch line running from the pump to the water tank to assist in keeping the pump water from overheating. A valve will be installed on the operator's panel.



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### **PUMP ANODES**

Two (2) pump anodes will be installed in the pumping system, one (1) on the discharge side and one (1) on the suction side, to prevent damage from galvanic corrosion within the pump system.

### **DISCHARGE AND INLET MANIFOLDS**

A 6.00-inch pump manifold inlet will be provided on each side of the pump. The inlets will protrude up to 2 inches (50mm) away from the side panels and maintain a low connection height. A discharge manifold will also be added to the pressure side of the pump to feed the specified discharge waterways.

The main pump inlets will have National Standard Threads and include removable screens designed to provide cathodic protection for reducing deterioration in the pump.

#### **MAIN PUMP INLET - LEFT SIDE**

A 6.00-inch pump manifold inlet will be provided on the left side of the pump. The inlet will protrude up to 2.00 inches away from the side panel and maintain a low connection height.

The main pump inlet will have National Standard Threads and includes a removable screen designed to provide cathodic protection for reducing deterioration in the pump.

#### **MAIN PUMP INLET - RIGHT SIDE**

A 6.00-inch pump manifold inlet will be provided on the right side of the pump. The inlet will protrude up to 2.00 inches away from the side panel and maintain a low connection height.

The main pump inlet will have National Standard Threads and includes a removable screen designed to provide cathodic protection for reducing deterioration in the pump.

### **6" CHROME PLATED BRONZE CAP**

There will be one (1) 6.00-inch-long handled chrome plated cap installed on each Steamer Inlet.

### **STAINLESS STEEL PLUMBING**

All auxiliary suction and discharge plumbing related fittings, and manifolds will be fabricated with 3.00-inch (77 mm) schedule 10 stainless steel pipe: brass or high-pressure flexible piping with stainless steel couplings. Galvanized components and/or iron pipe will NOT be accepted to ensure long life of the plumbing system without corrosion or deterioration of the waterway system. Where waterway transitions are critical (elbows, tees, etc.), no threaded fittings will be allowed to promote the smooth transition of water flow to minimize friction loss and turbulence.

All piping components and valves will be non-painted, unless otherwise specified. All piping welds will be wire brushed and cleaned for inspection and appearance.

The high-pressure flexible piping will be black SBR synthetic rubber hose with 300 PSI working pressure and 1200 PSI burst pressure for flexible piping sizes 1.50 inches (38 mm) through 4.00 inches (100 mm). Sizes .75 inch (19 mm), 1.00 inch (25 mm) and 5.00 inches (125 mm) are rated at 250 PSI working pressure and 1000 PSI burst pressure. All sizes are rated at 30 in HG vacuum. Reinforcement consists of two plies

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of high tensile strength tire cord for all sizes and helix wire installed in sizes 1.00 inch (25 mm) through 5.00 inches (125 mm) for maximum performance in tight bend applications. The material has a temperature rating of -40 degrees Fahrenheit to +210 degrees Fahrenheit.

The stainless-steel full flow couplings are precision machined from high tensile strength stainless steel. All female couplings are brass. Mechanical grooved and male .75-inch (19 mm) and 1.00-inch (25 mm) couplings are brass. A high tensile strength stainless steel ferrule with serrations on the I.D. is utilized to assure maximum holding power when fastening couplings to hose.

### **PUMP HOUSE LINE PROTECTION**

All drain lines for the discharges, suctions, ABS discharge gauge lines and any other appropriate connections in the pump house area will have a protective cover provided on the lines in the required areas of the lines to prevent the lines from rubbing on any other components in the pump house area.

All drain lines, ABS lines, high pressure discharge lines and electrical wiring in the pump house area will be properly and neatly routed, wire tied, and rubber coated "P" clamped, to keep the items secured.

### **DRAIN VALVES**

An Innovative Controls 3/4" quarter turn drain valve will be included on each discharge, gated intake, and steamer valve (if applicable). A side stem, long stroke chrome plated lift handle will be provided on the drain valve to facilitate use with a gloved hand. The drain valve will have an ergonomically designed handle with a recessed verbiage tag area easily read by the operator before opening.

The drain valve will be connected to the valve with a flexible hose that is routed in such a manner as to assure complete drainage to below the apparatus.

### **VALVE CONTROL - T-HANDLE PULL ASSEMBLY**

Unless specified otherwise, the discharge valves will be controlled from an Innovative Controls side mount valve control assembly. The ergonomically designed handle will be chrome-plated with recessed areas for name plate and color code. A .75-inch (19.5 mm) diameter hard coat anodized aluminum control rod and housing will, together with a stainless spring steel locking mechanism, eliminate valve drift.

Teflon impregnated bronze bushings in both ends of the rod housing will minimize rod deflection, never need lubrication, and ensure consistent long-term operation. The control assembly will include a decorative chrome-plated panel-mounting bezel. The valve operating mechanism will indicate the position of the valve at all times.

### **AUXILIARY LEFT SIDE INLET**

There will be one (1) auxiliary gated suction inlet with .75-inch bleeder installed on the left side pump panel.

### **INTAKE VALVE**

A 2.50-inch Akron Brass 8000 series swing-out valve with stainless steel ball.

The intake control valve will be a 'swing out type' direct operation manual lever actuator at the valve.

## **Specification for: CITY OF GRANGER**

### **INTAKE PLUMBING**

The plumbing will consist of 2.50-inch piping and will incorporate a manual drain control installed below the pump area for ease of access.

### **SUCTION/INTAKE TERMINATION**

The termination will include the following components:

One (1) 2.50-inch NST swivel female straight adapter with screen.

One (1) 2.50-inch self-venting plug secured by a chain.

The inlet will be located on the pump panel.

### **DECK GUN MONITOR WATERWAY**

There shall be one (1) deck gun monitor waterway installed on the apparatus.

The deluge waterway shall consist of 3.00-inch piping and shall be drained with an auto-drain located at the lowest point of the waterway plumbing if required.

There shall be an air "blowout" system provided and installed for the front bumper discharge drainage.

The air blow out system shall be connected to the chassis air brake system. A check valve shall be provided between the chassis system and the front bumper discharge blow out system. There shall be a manual control valve provided on the pump operator's panel for the air blow out system.

## **Specification for: CITY OF GRANGER**

### **LEFT SIDE DISCHARGE**

There will be two (2) 2.50-inch gated discharges installed on the left side of the apparatus.

### **RIGHT SIDE DISCHARGE**

There will be one (1) 2.50 and one (1) 3.00-inch gated discharges installed on the right side of the apparatus.

### **2.50" PRE-CONNECT**

A 2.50-inch discharge will terminate on the upper rear body below the hose bed.

### **DISCHARGE GAUGES**

A 2.50-inch gauge will be supplied for reading the pressure of each discharge greater than 1.50 inches in diameter, unless otherwise specified.

### **MASTER GAUGES**

A 4.50-inch Master Vacuum and Master Pressure gauge will be provided and installed on a panel to the right of the crosslays (side mount) OR centered on the pump panel (top mount).

### **GAUGE SCALE**

Each gauge will be marked for reading a pressure range of 0-400 PSI.

### **GAUGE FACE COLOR**

Each gauge will have black markings on a white face.

### **BEZELS FOR 2.5" DISCHARGE GAUGES**

There will be a Deluxe metal bezel supplied around each of the 2.50-inch discharge pressure gauges. The bezels will be constructed from chrome-plated zinc with large, easily identifiable recessed labels for color-coding and verbiage.

### **TANK TO PUMP LINE**

The connection between the tank and the pump will be capable of the flow recommendations as set forth in (NFPA) 1901, Standard for Automotive Fire Apparatus, latest revision and will be tested to those standards when the pump is being certified.

## **Specification for: CITY OF GRANGER**

One (1) non-collapsible flexible hose and valve will be incorporated into the tank to pump plumbing to allow movement in the line as the chassis flexes to avoid damage during normal road operation. Four (4) inch stainless steel schedule 10 piping will be used to complete the connection from the tank to pump valve to the water tank.

### **TANK TO PUMP CHECK VALVE**

There will be a tank to pump check valve, conforming to NFPA standard requirements to prevent water from back flowing at an excessive rate if the pump is being supplied from a pressurized source. The check valve will be mounted as an integral part of the pump suction extension. A hole up to .25 inch is allowable in the check valve to release steam or other pressure buildup so that the void between the valve and check valve may drain of water that could be subject to freezing.

### **TANK FILL LINE**

One (1) 2.00-inch tank fill/recirculating line will be installed from the pump directly to the booster tank.

A 3.00-inch Akron Brass 8000 series swing-out valve with a stainless-steel ball.

The valve will be controlled from the pump operator's panel location.

### **PUMP PANEL LIGHTS**

There will be adequate illumination provided at the side pump panels with the installation of shielded LED light assemblies, one (1) on the left and one (1) on the right-side pump compartment.

One (1) pump panel light at the operator's panel will be illuminated at the time the pump is ready to pump and it is "OK TO PUMP". The Pump shift has been completed and the chassis automatic transmission is engaged.

The remaining lights will be controlled by a switch located on the side operator's panel.

## **VM8 BODY OPTIONS**

### **HOSEBED AND CROSSLAY COVERS**

#### **HOSEBED**

The hose bed area will have a vinyl cover installed on the top and sides of the entire hose bed area.

The top cover will be held in place by an extrusion installed across the front edge of the hose bed and with Velcro along the left and right edges. The rear of the hose bed cover will be secured by means of elastic shock cord passing thru brass grommets. Hooks will be installed at the lower corners to secure the cover to the apparatus.

The full cover will have a flap with Velcro closure providing access to each fill tower without necessitating removal of entire hose bed cover.

#### **CROSSLAY**

The Crosslay hose bed area will have a vinyl cover installed on the top and sides of the Crosslay area.

## **Specification for: CITY OF GRANGER**

The top cover will be held in place with Velcro. The sides of the Crosslay cover will be secured by means of elastic shock cord passing thru brass grommets. Hooks will be installed at the lower corners to secure the cover to the apparatus.

The hose bed and Crosslay covers will be red OR black in color as specified by the customer.

### **HOSEBED ALLOWANCE**

Hose bed hose allowance: 1200 lbs.

### **EQUIPMENT ALLOWANCE**

Equipment allowance: 3000 lbs.

### **ROLL UP DOORS (6) SATIN FINISH**

There will be a total of six (6) roll-up doors for compartments L-1, L-2, L3, R-1, R-2, R-3. Each compartment will have a non-locking ROM Series IV roll-up shutter door.

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

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

Shutter bottom rail will be a one-piece double wall extrusion with integrated finger pull. Finger pull will be curved upward with a linear striated surface to improve operator grip while operating the shutter door. Bottom rail will have a smooth contoured interior surface to prevent loose equipment from jamming the shutter door. Bottom rail seal will be a double "V" seal to prevent water and debris from entering compartment.

Bottom rail lift bar will be a one piece "D" shaped aluminum extrusion with linear striations to improve operator grip during operation. Lift bar will have a wall thickness of 0.125 inches. Lift bar will be supported by no less than two pivot blocks; pivot blocks will be constructed from Type 66 Glass filled reinforced nylon for superior strength. Bottom rail end blocks will have incorporated drain holes which will allow any moisture that collects inside the extrusion to drain out.

Shutter door will have an enclosed counterbalance system. Counterbalance system will be 4.00 inches in diameter and held in place by 2 heavy duty 18-gauge zinc plated plates. Counterbalance system will have 2 over-molded rubber guide wheels to provide a smooth transition from vertical track to counterbalance system.

The compartment doors will have a satin aluminum finish.

Each roll up door will have an integral door open indicator magnet in the lift bar.

## **Specification for: CITY OF GRANGER**

If the door is not properly closed and the transmission is placed into drive or reverse mode with the parking brake released, it will activate the “hazard light” in the cab to alert the crew.

### **SCBA STORAGE TUBES (4)**

SCBA storage compartments shall be installed in the wheel skirt panels, (2) each side, that will accommodate 8.00-inch diameter x 24.00 inch long spare SCBA bottles, one (1) each fore and aft on the left and right side.

The compartments will be vacuum formed PVC material with a drain hole at the bottom rear. A hinged stainless-steel door will be provided over the opening with a thumb-release latch.

Each compartment will hold one (1) SCBA bottle for a total of four (4) spare bottles.

### **APPARATUS BODY**

#### **BODY MATERIAL TYPE**

At a minimum, all formed substructure crossmembers and associated assemblies, exterior panels and compartments will be emergency vehicle industry standard 5052-H32 aluminum alloy. Softer alloys will not be acceptable in the construction processes, except where non-structural bright aluminum treadplate is utilized.

#### **FASTENERS**

All fasteners utilized on the substructure crossmembers and associated assemblies will be precision engineered two-piece Huck® C6L bobtail fasteners. The bolted body compartment structures will utilize Huck Magna-Grip® blind fasteners.

Once installed, no matter how vibration-intensive the environment, these fasteners are engineered to never come loose. Huck bolts are to provide direct metal-to-metal contact when installed, to eliminate the transverse vibration often found in conventional nuts and bolts that have a tendency to loosen over time.

#### **ANTI-CORROSION PROCESS**

Absolutely no dissimilar metals will be used in the body and its supporting substructure without being separated by ECK®. This process is not required where the fastener is an aluminum Huck-bolt to aluminum components.

#### **BODY FINITE ELEMENT ANALYSIS**

The proposed body design must have completed a review and analysis. The analysis is to include real world working load scenarios. Analysis to cover both static and dynamic situations must be completed. The purpose of the finite element analysis is to ensure proper design of the apparatus body, and that it is capable of carrying the typical fire apparatus loads and those specified by NFPA for equipment. The analysis process must conclude that the body structure is properly designed and manufactured to provide longevity under normal conditions. Proof of having completed this testing must be immediately submitted, upon request, during the bid review process.

#### **BODY MOUNTING SYSTEM**

### **Specification for: CITY OF GRANGER**

The entire body module assembly will be mounted above the chassis frame rails exclusively with not less than twelve (12) torsion isolator assemblies to reduce the vibration and stress providing an extremely durable body mounting system.

The body substructure will be mounted above the frame to allow independent flexing to occur between the body and the chassis. Each assembly will be mounted to the chassis frame rails with steel, gusseted mounting brackets. Each body mount bracket will be mounted to the side chassis frame flange with 5/8" Grade 8 Geomet coated (anti-corrosion) bolts. Each mounting bracket will be bolted to the frame using not less than four (4) bolts.

There will be no welding to the chassis frame rail sides, web or flanges, or drilling of holes in the top or bottom frame flanges between axles. All body to chassis connections will be bolted so that in the event of an accident, the body will be easily removable from the truck chassis for repair or replacement.

Because of the constant vibration and twisting action that occurs in chassis frame rails and suspension, the torsion mounting system is required to minimize the possibility of premature body structural failures.



## **Specification for: CITY OF GRANGER**

### **COMPARTMENT INTERIOR WALLS**

All compartment interiors will be smooth aluminum plate.

### **COMPARTMENT FLOORS**

All body compartment floors will be smooth aluminum plate and have a .75-inch lip downward at the door opening side of the compartment. This lip will form a "sweep-out" compartment. The design will also allow for a complete door / weather seal across the bottom.

Each compartment will have the ability to drain and louvers ventilation adequate to provide air circulation.

### **EXTERIOR COMPARTMENT LOCATIONS AND CONFIGURATION**

#### **L-1 - Left Side Forward**

There will be one (1) a compartment ahead of the rear wheels on the left side of the apparatus.

The approximate interior dimensions of this compartment will be not less than 51.50 inches wide by 70.50 inches high with a full height depth of 26.00 inches.

The approximate pass-thru opening will measure not less than 49.00 inches wide by 60.50 inches high.

#### **L-2 - Left Side Over Wheels**

There will be a compartment above the rear wheels on the left side of the apparatus.

The approximate interior dimensions of this compartment will be not less than 63.75 inches wide by 37.50 inches high with a full height depth of 26.00 inches.

The approximate pass-thru opening will measure not less than 54.50 inches wide by 27.50 inches high.

#### **L-3 - Left Side Aft of Rear Wheels**

There will be a compartment aft of the rear wheels on the left side of the apparatus.

The approximate interior dimensions of this compartment will be not less than 51.50 inches wide by 70.50 inches high with a full height depth of 26.00 inches.

The approximate pass-thru opening will measure not less than 39.50 inches wide by 60.50 inches high.

## **Specification for: CITY OF GRANGER**

### **R-1 - Left Side Forward**

There will be a compartment ahead of the rear wheels on the left side of the apparatus.

The approximate interior dimensions of this compartment will be not less than 51.50 inches wide by 37.50 inches high from floor to the bottom of the interior ladder compartment and 33.00 inches high from bottom of ladder compartment to top of compartment. Depths will be 26.00 inches at floor level to bottom of ladder compartment and 13.50 inches from bottom of ladder compartment to top.

The approximate pass-thru opening will measure not less than 49.00 inches wide by 60.50 inches high.

### **R-2 - Left Side Over Wheels**

There will be a compartment above the rear wheels on the left side of the apparatus.

The approximate interior dimensions of this compartment will be not less than 63.75 inches wide by 37.50 inches high with a full height depth of 13.50 inches.

The approximate pass-thru opening will measure not less than 54.50 inches wide by 27.50 inches high.

### **R-3 - Left Side Aft of Rear Wheels**

There will be a compartment aft of the rear wheels on the right side of the apparatus.

The approximate interior dimensions of this compartment will be not less than 42.00 inches wide by 37.50 inches high from floor to the bottom of the interior ladder compartment and 33.00 inches high from bottom of ladder compartment to top of compartment. Depths will be 26.00 inches at floor level to bottom of ladder compartment and 13.50 inches from bottom of ladder compartment to top.

The approximate pass-thru opening will measure not less than 39.50 inches wide by 60.50 inches high.

### **B-1 – Rear of Body below Hose bed**

There will be a compartment on the rear of the apparatus.

The approximate interior dimensions of this compartment will be not less than 43.00 inches wide by 61.00 inches high with a full height depth of 26.00 inches.

The approximate pass-thru opening will measure not less than 40.50 inches wide by 51.00 inches high.

**NOTE:** *All compartment depths must be measured from back of wall to inside closed door.*

### **LADDER COMPARTMENT**

Located on the right rear of the body will be a ground ladder compartment that measures approximately 29.00 inches high x 10.50 inches wide (pass-thru). The bottom of the opening will not more than approximately 60.00 inches (+/- 2) from ground level.

The compartment will accommodate, at a minimum, the following:

- one (1) 14-ft roof ladder

## **Specification for: CITY OF GRANGER**

- one (1) 24-ft two-section ladder
- one (1) 10-ft attic ladder
- two (2) 10-ft pike poles

### **HOSEBED**

The hose bed will be full width of the body to provide storage for not less than 800-feet of 3.00 inch double jacketed and 1500-feet of 5.00-inch hose LDH.

The hose bed will be constructed of extruded aluminum slats with adequate spacing between slats to allow airflow and drainage. It will be capable of removal as a two-piece unit for tank service access.

### **CORNER TRIM – STAINLESS STEEL**

The front and rear of the apparatus body vertical wall overlay will be integrated with a minimum .625-inch satin finish stainless steel corner trim for edge protection. The vertical edge trim will extend from the top to bottom and will be attached with stainless steel fasteners.

### **REAR TAILBOARD**

The tailboard will be an independent assembly bolted to the rear body structural framing to provide body protection and a solid rear stepping platform.

The rear tailboard and body will be constructed such that the angle of departure will be not less than 8 degrees at the rear of the apparatus when fully loaded (NFPA) 1901, Standard for Automotive Fire Apparatus.

The rear tailboard will be approximately not less than 9.50 inches deep and full width of the body. The step surface will be formed bright treadplate aluminum with an embossed aggressive anti-slip pattern.

Three (3) LED rear body marker lights will be centered on the face of the step.

On the rear body surface, a sign will be attached that states: "DO NOT RIDE ON REAR STEP, DEATH OR SERIOUS INJURY MAY RESULT."

### **WHEEL WELLS**

Wheel wells will have semicircular black polymer composite inner liners that are bolted to the wheel well panel. Each wheel well will be a continuous piece with no breaks or ledges where road grime or debris may accumulate. This liner will be removable for access to suspension assembly for repairs. There will be no exception to the bolted wheel well inner liner requirement.

### **FENDERETTES**

Two (2) polished stainless steel fenderettes will be provided and installed on body rear wheel well openings, one (1) each side. Rubber welting will be provided between the body and the crown to seal the seam and restrict moisture from entering.

### **COMPARTMENT UNISTRUT**

Vertically mounted Unistrut will be installed in all apparatus body compartments to accommodate the installation of shelves, trays, and or other miscellaneous equipment.

### **SIDE RUB RAILS**

## **Specification for: CITY OF GRANGER**

The lowest edge of the apparatus body side compartments will be trimmed with an extruded C-Channel aluminum extrusion rub rail not less than 3" high x 1.50" deep. Each end of each rail will be capped with a contoured black formed PVC end cap for safety matching the shape of the rub rail. The rub rails will not be constructed as an integral part of the apparatus body structure, allowing each rub rail to be easily removed in the event of damage.

The inside flat surface will be designed to apply retro-reflective striping for added visibility, clearance lights, auxiliary turn signal and NFPA 1901 Lower Zone warning lights.

The rub rails will be secured with stainless steel fasteners and spaced away from the apparatus body with .50-inch nylon spacers to help absorb moderate side impacts and prevent the collection of water and debris for easier cleaning.

### **FOLDING STEPS**

LED illuminated folding steps conforming to current NFPA requirements, will be provided and installed on the apparatus as specified below.

The steps will have a minimum of 46 sq. inches of surface area capable of sustaining a 1200 lb. static load. They will have a maximum 18" inch spread between each step.

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### **HANDRAILS**

Three (3) handrails will be installed on the rear of the apparatus. Each handrail will be of an adequate length, as available usable space allows, to provide a suitable gripping area for personnel.

Two (2) vertical handrails will be installed, one on each side, just below the hose bed sides. The remaining handrail will be installed horizontally, just below the hose bed area.

### **TOW EYES**

There will be two rear tow eyes installed to the frame rails, one each side, accessible below the rear of the apparatus. They will be manufactured of 1.00-inch plate steel 5.00 inch wide with 2.50-inch round hole.

Each plate will be bolted to the chassis frame rail with minimum 5/8" Grade 8 Geomet coated (anti-corrosion) bolts. All steel components will be painted black.

### **MUD FLAPS**

Heavy-duty black rubber mud flaps will be provided behind the rear wheels. The mud flaps will be bolted in place.

### **MINIMUM REQUIRED LABELING**

Where not required in other paragraphs contained in this document, the minimum required labeling otherwise will include the following:

#### **CHASSIS REQUIRED LABELING**

Signs that state "Occupants must be seated and belted when apparatus is in motion" will be provided.

They will be visible from each seating position.

There will be a lubrication plate mounted inside the cab listing the type and grade of lubrication used in the following areas on the apparatus and chassis:

- Engine oil
- Engine Coolant
- Transmission Fluid
- Pump Transmission Lubrication Fluid
- Drive Axle Lubrication Fluid
- Generator Lubrication Fluid (where applicable)
- Tire Pressures

#### **APPARATUS INFORMATION LABEL**

There will be a high-visibility label installed in a location clearly detectable to the driver while in the seated position.

The label will indicate the following specified information.

Overall Height (feet and inches)

Overall Length (feet and inches)

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Overall GVWR (tons or metric tons)

### **WATER TANK**

#### **TANK CAPACITY**

A water tank will be installed with a minimum capacity of 1000 US gallons.

#### **TANK CONSTRUCTION**

The booster tank will be constructed of .50-inch thick Polypropylene sheet stock which is a non-corrosive stress relieved thermoplastic. It will be designed to be completely independent of the body and compartments. All joints and seams are extrusion welded and/or contain the "Bent Edge" and tested for maximum strength and integrity. The top of the booster tank is fitted with lifting eyes designed with a 3 to 1 safety factor to facilitate tank removal.

The tank will feature a 0.5" recess for a drain / cleanout.

#### **COVER**

The tank cover will be constructed of .50-inch thick Polypropylene and will be recessed. A minimum of two lifting dowels will be drilled and tapped .50-inch x 2.00 inch to accommodate the lifting eyes.

#### **BAFFLES**

The swash partitions will be manufactured from .50-inch Polypropylene. All partitions will be equipped with vent and air holes to permit movement of air and water between compartments to provide maximum water flow. All swash partitions interlock and are welded to one another as well as to the walls of the tank.

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### **MOUNTING**

The tank will be isolated from the body substructure cross members with .50-inch x 2.50-inch rubber strips that are 60 durometers in hardness. The tank will sit nested inside the center body substructure and will be completely removable without disturbing the body side panels. Tank stops on all four sides will keep the tank from shifting front to back or side to side.

### **FILL TOWER**

The fill tower opening will be approximately 13.00 inches x 12.00 inches.

The tower will have a .25-inch thick removable Polyprene screen and a Polyprene hinged type cover that will open if the tank is filled at an excess rate. There will be a removable .25 inch (6.40 mm) thick Polyprene screen to prevent debris from falling into the tank.

The fill tower will have a 4.00-inch overflow that will discharge underneath the tank, behind the rear axle(s), avoiding the chassis fuel tank and suspension components where applicable. The overflow will terminate above the tank water level when filled to the rated capacity.

The fill tower will be located to the left side at the front of the hose bed.

### **OUTLETS**

An outlet shall be provided for the tank fill valve. If there are any additional options selected (such as an extra tank suction or direct tank inlets), there will be additional outlets provided to accommodate these items.

### **SATIN ROLL UP DOOR - B1**

There will be a roll-up door for compartment B-1. The compartment will have a non-locking ROM Series IV roll-up shutter door.

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

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

Shutter bottom rail will be a one-piece double wall extrusion with integrated finger pull. Finger pull will be curved upward with a linear striated surface to improve operator grip while operating the shutter door. Bottom rail will have a smooth contoured interior surface to prevent loose equipment from jamming the shutter door. Bottom rail seal will be a double "V" seal to prevent water and debris from entering compartment. Bottom rail lift bar will be a one piece "D" shaped aluminum extrusion with linear striations to

## **Specification for: CITY OF GRANGER**

improve operator grip during operation. Lift bar will have a wall thickness of 0.125 inches. Lift bar will be supported by no less than two pivot blocks; pivot blocks will be constructed from Type 66 Glass filled reinforced nylon for superior strength. Bottom rail end blocks will have incorporated drain holes which will allow any moisture that collects inside the extrusion to drain out.

Shutter door will have an enclosed counterbalance system. Counterbalance system will be 4.00 inches in diameter and held in place by 2 heavy duty 18-gauge zinc plated plates. Counterbalance system will have 2 over-molded rubber guide wheels to provide a smooth transition from vertical track to counterbalance system.

The compartment door will have a satin aluminum finish.

The roll up door will have an integral door open indicator magnet in the lift bar.

If the door is not properly closed and the transmission is placed into drive or reverse mode with the parking brake released, it will activate the "hazard light" in the cab to alert the crew.

Brushed stainless steel sill plates will be installed at the bottom of each body compartment door opening.

### **HOSEBED DIVIDER**

There will be a full height adjustable divider provided and installed in the hose bed area of the apparatus body.

The divider will be fabricated of .25-inch-thick aluminum plate and attached to the adjustable slide rails. The rear of the divider will have a radius to provide a smooth corner.

Hose payout will be unobstructed by the divider.

## **VM8 WARNING LIGHTS**

### **WHELEN LIGHT BAR**

A Whelen Justice JE2NFPA 56" LT BAR shall be provided. The light bar will be mounted on brackets forward facing above the cab roof.

The light bar shall meet the requirements for Upper Zone A.

### **WHELEN WARNING LIGHTS**

Whelen model C9LRC SurfaceMax™ Super-LED lights with chrome bezels shall be installed on the upper left and right body; one each fore and aft for a total of four (4).

## **EMERGENCY WARNING SYSTEM**

### **UPPER ZONE B&D**

There will be a Whelen model C9LRC SurfaceMax™ Super-LED lights with chrome bezels installed on the upper left and right rear body for a total of two (2).

### **UPPER ZONE C:**

There will be two (2) Whelen C9LRC SurfaceMax™ Super-LED lights with chrome bezels installed on the upper left and right rear body.

### **LOWER ZONE A:**



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There will be two (2) Whelen C6LRC SurfaceMax™ Super LED lights with chrome bezels installed and installed on the grille of the apparatus chassis.

### **LOWER ZONE B&D:**

There will be four (4) Whelen ION-TLIR Super-LED lights with chrome bezels installed in the lower rub rails: two (2) each side forward and two (2) each side aft.

### **LOWER ZONE C:**

There will be two (2) Whelen C6LRC SurfaceMax™ Super-LED lights installed in the lower section of the taillight assembly.

### **SIREN CONTROL HEAD**

One (1) Whelen electronic siren, model #295SLSA1 will be provided and mounted in the top of the cab console.

The siren will be 100-200 watts and feature wail, yelp, phaser, air horn and manual wail. The microphone will have noise canceling circuitry and Public Address override.

The siren and hard-wired microphone will be installed within reach of the driver and officer.

### **SIREN SPEAKER**

A Whelen model #SA315P 100-watt siren speaker will be provided, located on the front bumper face on the left side outboard of the frame rail in the far outboard position.

### **BACKUP ALARM**

An electronic back-up alarm will be supplied. The 97 dB alarm will be wired into the chassis back-up lights to signal when the vehicle is in reverse gear.

### **REARVIEW CAMERA**

There will be a shielded camera mounted up high at the rear of the vehicle to provide a wide-angle rear view with audio.

A minimum 5.6" color monitor will be mounted on cab console with swivel capability.

The camera will be interlocked with the chassis transmission. When the apparatus is placed in reverse the camera will automatically be activated and when the transmission is placed in any other gear the screen will return to the previously displayed screen.

## **VM8 ELECTRICAL**

### **WHELEN SCENE LIGHTS**

There will be four (4) Whelen C6SL SurfaceMax™ Super-LED scene lights installed on the body sides of the apparatus, two (2) on each side; one (1) located at the front and one (1) located at the rear corner of the body side walls for a total of four (4).

They will be activated by a switch marked "Work Light" located on the cab console.

### **ELECTRICAL SYSTEM - VMUX**

#### **ELECTRICAL SYSTEM**

The apparatus shall incorporate a Weldon V-MUX multiplex 12-volt electrical system. The system shall have the capability of delivering multiple signals via a CAN bus. The

## **Specification for: CITY OF GRANGER**

electrical system installed by the apparatus manufacturer shall conform to current SAE standards, the latest FMVSS standards, and the requirements of the applicable NFPA 1901 standards.

The electrical system shall be pre-wired for optional computer modem accessibility to allow service personnel to easily plug in a modem to allow remote diagnostics.

The electrical circuits shall be provided with low voltage over-current protective devices. Such devices shall be accessible and located in required terminal connection locations or weather-resistant enclosures. The over-current protection shall be suitable for electrical equipment and shall be automatic reset type and meet SAE standards. All electrical equipment, switches, relays, terminals, and connectors shall have a direct current rating of 125 percent of maximum current for which the circuit is protected. The system shall have electro-magnetic interference suppression provided as required in applicable SAE standards.

Any electrical junction or terminal boxes shall be weather-resistant and located away from water spray conditions.

### **MULTIPLEX SYSTEM**

For superior system integrity, the networked multiplex system shall meet the following minimum component requirements:

- The network system must be Peer to Peer technology based on RS485 protocol. No one module shall hold the programming for other modules. One or two modules on a network referred to as Peer to Peer, while the rest of the network consists of a one master and several slaves is not considered Peer to Peer for this application.
- Modules shall be IP67 rated to handle the extreme operating environment found in the fire service industry.
- All modules shall be solid state circuitry utilizing MOS-FET technology and utilize Deutsch series input/output connectors.
- Each module that controls a device shall hold its own configuration program.
- Each module should be able to function as a standalone module. No "add-on" module will be acceptable to achieve this form of operation.
- Load shedding power management (8 levels).
- Switch input capability for chassis functions.
- Responsible for lighting device activation.
- Self-contained diagnostic indicators.
- Wire harness needed to interface electrical devices with multiplex modules.
- The grounds from each device should return to main ground trunk in each sub harness by the use of ultrasonic splices.

### **WIRING**

All harnessing, wiring and connectors shall be manufactured to the following standards/guidelines. No exceptions.

## **Specification for: CITY OF GRANGER**

- NFPA 1901-Standard for Automotive Fire Apparatus
- SAE J1127 and J1127
- IPC/WHMA-A-620 – Requirements and Acceptance for Cable and Wire Harness Assemblies. (Class 3 – High Performance Electronic Products)

All wiring shall be copper or copper alloys of a gauge rated to carry 125 of the maximum current for which the circuit is protected. Insulated wire and cable 8 gauge and smaller shall be SXL, GXL, or TXL per SAE J1128. Conductors 6 gauge and larger shall be SXL or SGT per SAE J1127.

All wiring shall be colored coded and imprinted with the circuits function. Minimum height of imprinted characters shall not be less than .082" plus or minus .01". The imprinted characters shall repeat at a distance not greater than 3".

A coil of wire shall be provided behind electrical appliances to allow them to be pulled away from mounting area for inspection and service work.

### **WIRING PROTECTION**

The overall covering of the conductors shall be loom or braid.

Braid style wiring covers shall be constructed using a woven PVC-coated nylon multifilament braiding yarn. The yarn shall have a diameter of no less than .04" and a tensile strength of 22 lbs. The yarn shall have a service temperature rating of -65 F to 194 F. The braid shall consist of 24 strands of yarn with 21 black and 3 yellow. The yellow shall be oriented the same and be next to each other.

Wiring loom shall be flame retardant black nylon. The loom shall have a service temperature of -40 F to 300 F and be secured to the wire bundle with adhesive-backed vinyl tape.

### **WIRING CONNECTORS**

All connectors shall be Deutsch series unless a different series of connector is needed to mate to a supplier's component. The connectors and terminals shall be assembled per the connector/terminal manufacturer's specification. Crimp able/Solderless terminals shall be acceptable. Heat shrink style shall be utilized unless used within the confines of the cab.

### **NFPA REQUIRED TESTING OF ELECTRICAL SYSTEM**

The apparatus shall be electrical tested upon completion of the vehicle and prior to delivery. The electrical testing, certifications, and test results shall be submitted with delivery documentation per requirements of NFPA 1901. The following minimum testing shall be completed by the apparatus manufacturer:

#### **1. Reserve capacity test:**

The engine shall be started and kept running until the engine and engine compartment temperatures are stabilized at normal operating temperatures and the battery system is fully charged. The engine shall be shut off and the minimum continuous electrical load shall be activated for ten (10) minutes. All electrical loads shall be turned off prior to attempting to restart the engine. The battery system shall then be capable of restarting the engine. Failure to restart the engine shall be considered a test fail.

## **Specification for: CITY OF GRANGER**

### **2. Alternator performance test at idle:**

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

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### **3. Alternator performance test at full load:**

The total continuous electrical load shall be activated with the engine running up to the engine manufacturer's governed speed. The test duration shall be a minimum of two (2) hours. Activation of the load management system shall be permitted during this test. However, an alarm sounded by excessive battery discharge, as detected by the system required in NFPA 1901 Standard, or a system voltage of less than 11.7 volts DC for a 12-volt nominal system, for more than 120 seconds, shall be considered a test failure.

### **4. Low voltage alarm test:**

Following the completion of the above tests, the engine shall be shut off. The total continuous electrical load shall be activated and shall continue to be applied until the excessive battery discharge alarm activates. The battery voltage shall be measured at the battery terminals. With the load still applied, a reading of less than 11.7 volts DC for a 12-volt nominal system shall be considered a test failure. The battery system shall then be able to restart the engine. Failure to restart the engine shall be considered a test failure.

### **NFPA REQUIRED DOCUMENTATION**

The following documentation shall be provided on delivery of the apparatus:

- A. Documentation of the electrical system performance tests required above.
- B. A written load analysis, including:
  - a. The nameplate rating of the alternator.
  - b. The alternator rating under the conditions.
  - c. Each specified component load.
  - d. Individual intermittent loads.

### **VEHICLE DATA RECORDER**

A vehicle data recorder system will be provided to comply with NFPA 1901, 2009 edition. The following data will be monitored:

- Vehicle speed MPH
- Acceleration (from speedometer) MPH/Sec.
- Deceleration (from speedometer) MPH/Sec.
- Engine speed RPM
- Engine throttle position % of full throttle
- ABS Event On/Off
- Seat occupied status Occupied Yes/No by position
- Seat belt status Buckled Yes/No by position
- Master Optical Warning Device Switch On/Off
- Time: 24-hour time
- Date: Year/Month/Day

### **OCCUPANT DETECTION SYSTEM**

## **Specification for: CITY OF GRANGER**

There will be a visual and audible warning system installed in the cab that indicates the occupant buckle status of all cab seating positions that are designed to be occupied during vehicle movement.

The audible warning will activate when the vehicle's park brake is released, and a seat position is not in a valid state. A valid state is defined as a seat that is unoccupied and the seat belt is unbuckled, or one that has the seat belt buckled after the seat has been occupied.

The visual warning will consist of a graphical representation of each cab seat in the multiplex display screen that will continuously indicate the validity of each seat position.

The system will include a seat sensor and safety belt latch switch for each cab seating position, audible alarm and wiring harness.

### **ELECTRICAL CONNECTION PROTECTION**

The vehicle electrical system will be made more robust by the application of a corrosion inhibiting spray coating on all exposed electrical connections on the chassis and body. If equipped with an aerial device, the exposed connections on the aerial components will also be protected.

The coating will use nanotechnology to penetrate at the molecular level into uneven surfaces to create a protective water repellant film. The coating will protect electrical connections against the environmental conditions' apparatus are commonly exposed to.

### **CAB CONTROL CONSOLE**

The control center console will be fabricated of minimum .125-inch smooth aluminum and will be installed between the driver and officer seat. The base of the console will be custom trim-fit to the chassis floor line and be securely fastened.

This area will serve as the main electrical distribution point for all chassis related functions and contain the majority of the hardware related to these functions.

### **ROCKER SWITCH PANEL**

All specified lighting fixtures and electrical components will be activated by rocker style switches. The switches will be located on a separate embossed electrical panel, fabricated with aluminum complete with backlit name tags describing the function of each individual switch and installed on the console specified.

An internally lighted red rocker switch will be furnished on the left and identified as the "MASTER WARNING".

## **Specification for: CITY OF GRANGER**

### **12-VOLT CHARGER PORT**

A USB charger port will be installed in the top of the console. It will be provided with a tethered rubber cover. It will be wired directly to battery hot.

### **BATTERY SWITCH**

There will be a rotary style battery disconnect switch installed on the floor left of the driver's seat to activate the battery system.

### **AUTO THROTTLE**

Engine will increase in RPM to a preset amount if the battery voltage drops below 11.7V and the pump is not engaged, or transmission placed in drive gear.

### **HAZARD LIGHT IN CAB**

There will be a LED "Door Open" indicator light provided and installed in the chassis cab. The light will be installed on the console and will activate when the parking brake is released and a compartment door or any additional specified accessible devices are not in the completely closed positions.

A warning placard will be installed in the apparatus cab near the light, stating "Do Not Move Apparatus When Light Is On."

### **BATTERY CHARGER**

A minimum 45-amp (12 volt) battery charger/conditioner will be provided and installed in the "best fit" location as determined by the apparatus manufacture.

The battery charger will automatically regulate operation output to a single battery bank. A built-in sensing circuit will check the battery voltage 120 times per second, to compensate for voltage drop in charging wires and provide quick recharge, with no overcharge.

### **SHORELINE RECEPTACLE W/AUTO EJECT**

A Kussmaul "Super Auto-Eject" 120-volt 20-amp shoreline receptacle will be installed on the apparatus. It will automatically eject the plug when the starter button is depressed.

The electrical current will be interrupted before the plug is automatically ejected to prevent arcing. The plug for the receptacle will be shipped loose for installation on the shoreline cord.

The shoreline connection will be installed under the driver's doorstep area at the lower step level and placed forward of the immediate stepping area where space allows.

The electrical inlet will be connected to the battery charger.

The shoreline inlet connection will include a yellow cover.

### **DOT LIGHTING**

There will be seven (7) lights located on the rear of the apparatus. Three (3) of the lights will be mounted on the rear of the apparatus center location, for use as identification lamps. Two (2) additional lights will be located on the rear outboard locations, one (1) each side as high as possible. Two (2) lights will be mounted in the rub rails on the sides facing the side at the rear corners, for use as clearance lamps.

## **Specification for: CITY OF GRANGER**

### **REAR TAIL LIGHT ASSEMBLY**

There will be Whelen C6 series SurfaceMax™ Super LED rear taillight assemblies provided and installed with the apparatus, one (1) each side at the rear.

The following will be installed in each taillight stack:

One (1) C6BTT red brake/taillight

One (1) C6TC amber arrow turn signal light.

One (1) C6BUL clear backup light

One (1) C6LRC warning light on the bottom of the stack

They will be mounted in PLASC4V chrome flanges provided for each taillight assembly.

### **ENGINE COMPARTMENT LIGHT**

There will be one (1) 12-volt LED work light installed in the engine compartment on the firewall. The light will have an integrated on/off switch.

### **CAB STEP LIGHTS**

There will be a LED light installed underneath each of the apparatus cab steps meeting NFPA1901 lumen requirements. The lights will be positioned to provide illumination to the ground area or the lower step under the cab entry doors.

The lights will be activated by the opening of any cab door and work light switch in the cab console.



## **Specification for: CITY OF GRANGER**

### **UNDER BODY LIGHTS**

There will be one (1) perimeter light mounted centered under the front bumper to illuminate the ground area under the bumper.

The under bumper perimeter lights will illuminate the area with the activation of the work light switch in the cab dash and with the parking brake applied.

One (1) under each side of the pump house running boards and two (2) under the rear tailboard.

### **LED INTERMEDIATE TURN SIGNAL LIGHTING**

There will be two (2) amber intermediate turn signals and two (2) amber intermediate marker lights on the sides of the apparatus (one (1) each per side) between the front and rear axles.

The lights will be Weldon brand 9186-1500 series LED amber markers.

### **INTERMEDIATE TURN SIGNALS**

The intermediate turn signals will flash with the turn indicators.

### **COMPARTMENT LIGHTING**

One (1) LED Tube light model #RX-15T16-5050, will be installed in each body compartment. The tube light will be centered vertically along the forward side of the door framing and at maximum length available to fit the opening.

The light in each compartment will be on a separate circuit, turning on only those lights that have open compartment doors.

### **LED CROSSLAY HOSEBED FLOOD LIGHT**

There will be one (1) LED light with clear LED wide flood lamp rated at not less than 750 lumens installed on the top center of the cross compartment. It will be capable of illuminating the entire Crosslay hose bed area.

It will be manually activated by the Work Light switch located on the cab console.

### **LED HOSEBED FLOOD LIGHTS**

There will be an LED minimum 6:00 x 3:00-inch LED flood light with clear lens located at the front of the hose bed rated at not less than 1900 lumens capable of illuminating the entire hose bed area.

It will be manually activated by the Work Light switch located on the cab console.

### **REAR BODY SCENE / WORK LIGHTS**

There will be two (2) Whelen C9SL SurfaceMax™ Super-LED scene lights installed on the rear facing vertical surface of the body, one (1) on each side.

They will be activated by a switch marked "Work Light" located on the cab console or whenever the apparatus is placed in the reverse mode of operation to access with backing.

## **VM8 PAINT / GRAPHICS**

### **BODY COLOR**

## **Specification for: CITY OF GRANGER**

The body side panels will be painted to match the primary cab color.

### **STRIPING**

#### **STRIPING**

Reflective striping shall be provided and installed by the dealer/customer.

#### **REAR CHEVRON STRIPE**

Printed chevron style Scotch lite striping shall be provided on the rear of the apparatus. The stripes shall consist of 6" red/lemon yellow alternating stripes in an "A" pattern. The striping shall be located full width on rear of body each side of B1. Colors shall be Red/ Lemon yellow. Does not include B1 Door.

### **WARRANTY / STANDARD & EXTENDED**

#### **STANDARD 1 YEAR WARRANTY**

The apparatus manufacturer shall provide a full 1-year standard warranty. All components manufactured by the apparatus manufacturer shall be covered against defects in materials or workmanship for a 1-year period. All components covered by separate suppliers such as engines, transmissions, tires, and batteries shall maintain the warranty as provided by the component supplier. A copy of the warranty document shall be provided with the proposal.

#### **15 YEAR/100,000ML STRUCTURAL WARRANTY**

The apparatus manufacturer shall provide a comprehensive 15 year/100,000-mile structural warranty for the apparatus body. This warranty shall cover all structural components of the body manufactured by the apparatus manufacturer against defects in materials or workmanship for 15 years or 100,000 miles, whichever occurs first. Excluded from this warranty are all hardware, mechanical items, electrical items, or paint finishes. A copy of the warranty document shall be provided with the proposal.

#### **WARRANTY - 12 YEAR NON-PRORATED PAINT**

The apparatus manufacturer shall provide a 12-year non prorated paint and corrosion perforation warranty for the body. This warranty shall cover paint peeling, cracking, blistering, and corrosion provided the vehicle is used in a normal and reasonable manner.

The warranty period shall begin upon delivery of the apparatus to the original user-purchaser. A copy of the warranty document shall be provided with the proposal.