

LOVELAND FIRE RESCUE AUTHORITY  
LOVELAND, COLORADO  
ENGINE TYPE 4, SVI #1098

## PRODUCTION SPECIFICATION

Contract Administrator: Jackie Sipes  
Sales Administrator: Jason KLine



**ROCK SOLID QUALITY**

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **LIABILITY INSURANCE**

The manufacturer shall furnish with the bid a certificate of insurance for;

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

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

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

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

All insurance policies must be;

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

## **INTERNET IN-PROCESS SITE**

The manufacturer shall post and maintain a website where the Loveland Fire Rescue Authority will be able to view digital images of their apparatus as its being built. The digital images shall be posted once a week starting when the body begins production or when the cab/chassis arrives and shall continue until the final completion of unit.

## **VEHICLE STABILITY SUPPLIED WITH CAB/CHASSIS**

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

## **FIRE APPARATUS PERFORMANCE**

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

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

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

## **HIGHWAY PERFORMANCE**

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

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

# Loveland Fire Rescue Authority

## Engine Type 4, SVI #1098

The maximum top speed of fire apparatus with a GVWR over 33,000 lb (11,800 kg) shall not exceed 68 mph (105 km/hr) or the manufacturer's maximum fire service speed rating for the tires installed on the apparatus, whichever is lower.

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

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

### **SERVICEABILITY**

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

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

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

### **WILDLAND DOCUMENTATION**

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

1. The manufacturer's record of apparatus construction details, including the following information:
  - (a) Owner's name and address
  - (b) Apparatus manufacturer, model, and serial number
  - (c) Chassis make, model, and serial number
  - (d) GAWR of front and rear axles and GVWR
  - (e) Front tire size and total rated capacity in pounds (kilograms)
  - (f) Rear tire size and total rated capacity in pounds (kilograms)
  - (g) Chassis weight distribution in pounds (kilograms) with water and manufacturer-mounted equipment (front and rear)
  - (h) For each engine: make, model, serial number, rated horsepower and related speed, and governed speed; and if so equipped, engine transmission PTO(s) make, model, and gear ratio
  - (i) Type of fuel and fuel tank capacity
  - (j) Electrical system voltage and alternator output in amps
  - (k) Battery make, model, and capacity in cold cranking amps (CCA)
  - (l) Chassis transmission make, model, and serial number; and if so equipped, chassis transmission PTO(s) make, model, and gear ratio
  - (m) Ratios of all driving axles
  - (n) Maximum governed road speed
  - (o) For each pump: make, model, rated capacity in gallons per minute (liters per minute where applicable), and serial number
  - (p) For each pump transmission: make, model, serial number, and gear ratio
  - (q) Reserved
  - (r) Water tank certified capacity in gallons or liters
  - (s) Reserved
  - (t) Paint manufacturer and paint number(s)
  - (u) Company name and signature of responsible company representative

# Loveland Fire Rescue Authority

## Engine Type 4, SVI #1098

- (v) Weight documents from a certified scale showing actual loading on the front axle, rear axle(s), and overall fire apparatus (with water tank full but without personnel, equipment, and hose)
- 2. Certification of compliance of the optical warning system
- 3. Siren manufacturer's certification of siren
- 4. Written load analysis and results of the electrical system performance tests
- 5. Certification of slip resistance of all stepping, standing, and walking surfaces
- 6. The wildland fire pump manufacturer's certification of suction capability
- 7. If special conditions are specified by the purchaser of the wildland fire pump, the pump manufacturer's certification of suction capacity under the special conditions
- 8. A copy of the apparatus manufacturer's approval for stationary pumping applications of the wildland fire pump
- 9. For each pump, the pump manufacturer's certification of the hydrostatic test
- 10. For each pump, the certification of inspection and test for the pump
- 11. The certification of water tank capacity
- 12. If the apparatus has a foam proportioning system, the foam proportioning system manufacturer's certification of accuracy and the final installer's certification that the foam proportioning system meets this standard
- 13. If the system has a CAFS, the documentation of the manufacturer's pre delivery tests
- 14. If the apparatus has a line voltage power source, the certification of the test for the power source (*see NFPA 1901, Standard for Automotive Fire Apparatus, 22.15.7.2*)
- 15. If the apparatus is equipped with an air system, air tank certificates (*see NFPA 1901, 24.5.1.2*), the SCBA fill station certification (*see NFPA 1901, 24.9.7*), and the results of the testing of the air system installation (*see NFPA 1901, 24.14.5 and NFPA 1901, 24.15.4*)
- 16. Certification of vehicle side slope stability, including the weight distribution assumed for the calculations or as loaded on the vehicle for the tilt table test
- 17. Any other required manufacturer test data or reports

### **OPERATIONS AND SERVICE DOCUMENTATION**

The contractor shall deliver with the fire apparatus complete operation and service documentation covering the completed apparatus as delivered and accepted.

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

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

- 1) Manufacturer's name and address
- 2) Country of manufacture
- 3) Source for service and technical information
- 4) Parts replacement information
- 5) Descriptions, specifications, and ratings of the chassis, pump (if applicable), and aerial device (if applicable)
- 6) Wiring diagrams for low voltage and line voltage systems to include the following information:
  - a) Pictorial representations of circuit logic for all electrical components and wiring
  - b) Circuit identification
  - c) Connector pin identification
  - d) Zone location of electrical components
  - e) Safety interlocks
  - f) Alternator–battery power distribution circuits
  - g) Input/output assignment sheets or equivalent circuit logic implemented in multiplexing systems
- 7) Lubrication charts
- 8) Operating instructions for the chassis, any major components such as a pump or aerial device, and any auxiliary systems
- 9) Precautions related to multiple configurations of aerial devices, if applicable

# Loveland Fire Rescue Authority

## Engine Type 4, SVI #1098

- 10) Instructions regarding the frequency and procedure for recommended maintenance
- 11) Overall apparatus operating instructions
- 12) Safety considerations
- 13) Limitations of use
- 14) Inspection procedures
- 15) Recommended service procedures
- 16) Troubleshooting guide
- 17) Apparatus body, chassis and other component manufacturer's warranties
- 18) Special data required by this standard
- 19) A material safety data sheet (MSDS) for any fluid that is specified for use on the apparatus

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

### **NFPA REQUIRED DOCUMENTATION FORMAT - USB FLASH DRIVE**

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

### **FIRE APPARATUS SAFETY GUIDE**

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

### **STATEMENT OF EXCEPTIONS**

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

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

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

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## CARRYING CAPACITY

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

The estimated in-service weight shall include the following:

1. The chassis, body and tank(s)
2. Full fuel, lubricant, and other chassis or component fluid tanks or reservoirs
3. Full water and other agent tanks
4. \*250 lb (114 kg) in each seating position
5. Fixed equipment such as pumps, aerial devices, generators, reels and air systems as installed
6. Ground ladders, suction hose, designed hose load in their hose beds and on their reels
7. An allowance for miscellaneous equipment that is at least as great as the values shown in table below.
8. If the apparatus is designed to accommodate SCBA, an additional 25 lb. (11.4 kg) per seating position shall be added to the miscellaneous equipment allowance.

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

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

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

The label shall show the height of the completed unequipped fire apparatus in feet and inches (meters), the length of the completed fire apparatus in feet and inches (meters), and the GVWR in tons (metric tons).

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

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **TESTING**

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

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

### **TEST SEQUENCE**

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

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

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

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

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

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

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

##### **TEST AT FULL LOAD**

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

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

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

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

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

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

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

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

### **DOCUMENTATION**

The manufacturer shall deliver the following with the fire apparatus:

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

### **MANUFACTURER PUMP CERTIFICATION**

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

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

A fifty (50) minute pumping test from draft shall be completed and results recorded to perform as listed below;

- 100% of rated capacity at 150 psi (1,000 kPa) net pressure, 30 min.
- 70% of rated capacity at 200 psi (1,400 kPa) net pressure, 10 min.
- 50% of rated capacity at 250 psi (1,700 kPa) net pressure, 10 min.

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

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

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

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

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

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

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



# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **WARRANTY**

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

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

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

## **GENERAL LIMITED WARRANTY - TWO (2) YEARS**

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

The Contractor must be the "single source" coordinator of all warranties on the vehicle.

## **LOW VOLTAGE ELECTRICAL WARRANTY - FIVE (5) YEARS**

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

## **STRUCTURAL WARRANTY - TEN (10) YEARS**

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

## **UNDERCOAT WARRANTY**

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

## **PAINT LIMITED WARRANTY - TEN (10) YEARS**

The body shall be free of bubbling or peeling as a result of a defect in the method of manufacture for a period of ten (10) years or 100,000 miles (or 160,934 kilometers), whichever occurs first, starting thirty (30) days after the original invoice date. **Pro-rated warranties will not be acceptable.**

## **GRAPHICS LIMITED WARRANTY**

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

## **DARLEY THREE YEAR PUMP WARRANTY**

The fire pump shall be warranted by Darley for a period of three (3) years from the date of delivery to the Loveland Fire Rescue Authority.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **STAINLESS STEEL PLUMBING WARRANTY**

The stainless steel plumbing shall be free of defects in material and workmanship for a period of ten (10) years, or 100,000 miles (or 160,934 kilometers), whichever occurs first, starting thirty (30) days after the original invoice date.

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

## **AKRON BRASS FIVE YEAR VALVE WARRANTY**

The Akron Brass valves shall be warranted by Akron Brass for a period of ten (10) years from the date of delivery to the Loveland Fire Rescue Authority. The warranty for electronics shall be warranted by Akron Brass for a period of five (5) years from date of delivery to the Loveland Fire Rescue Authority.

## **UPF POLY WATER TANK WARRANTY**

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

## **CONSTRUCTION PERIOD**

The completed vehicle shall be delivered within three hundred sixty five (365) days after receipt of a purchase order or contract.

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

## **OVERALL HEIGHT REQUIREMENT**

There is no overall height (OAH) restriction for this vehicle.

## **OVERALL LENGTH REQUIREMENT**

There is no overall length (OAL) restriction for this vehicle.

## **OVERALL WIDTH**

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

## **ANGLE OF APPROACH**

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

## **ANGLE OF DEPARTURE**

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **DELIVERY AND DEMONSTRATION**

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

The Delivery Engineer shall set delivery and instruction schedule with the person appointed by Loveland Fire Rescue Authority.

After delivery of the apparatus, the Loveland Fire Rescue Authority shall be responsible for ongoing training of its personnel to proficiency regarding the proper and safe use of the apparatus and associated equipment.

## **CAB CHASSIS SPECIFICATION**

### **Vehicle Configuration**

M2 106 CONVENTIONAL CHASSIS  
2020 MODEL YEAR SPECIFIED  
SET BACK AXLE - TRUCK **4 X 4**

### **General Service**

RESCUE AND EMERGENCY SERVICE  
EMERGENCY VEHICLES BUSINESS SEGMENT  
MEDIUM TRUCK 2 YEAR WARRANTY  
EXPECTED FRONT AXLE LOAD: 13220 lbs  
EXPECTED REAR DRIVE AXLE LOAD: 23000 lbs  
EXPECTED GROSS VEHICLE CAPACITY: 37220 lbs

### **Engine**

CUM L9 350EV HP @ 2000 RPM, 2200 GOV RPM , 1000 LB/FT @ 1400 RPM

### **Engine Equipment**

2016 ONBOARD DIAGNOSTICS/2010 EPA/CARB/GHG17  
2008 CARB EMISSION CERTIFICATION - EXEMPTED VEHICLE; NO CLEAN IDLE LABEL REQUIRED  
ENGINE MOUNTED OIL CHECK AND FILL  
SIDE OF HOOD AIR INTAKE WITH NFPA COMPLIANT EMBER SCREEN AND FIRE RETARDANT DONALDSON AIR CLEANER  
DR 12V 275 AMP 40-SI BRUSHLESS PAD ALTERNATOR WITH REMOTE BATTERY VOLTAGE SENSE  
(3) DTNA GENUINE, FLOODED STARTING, MIN 2250CCA, 510RC, THREADED STUD BATTERIES  
BATTERY BOX FRAME MOUNTED BACK OF CAB  
POSITIVE LOAD DISCONNECT WITH CAB MOUNTED CONTROL SWITCH MOUNTED OUTBOARD DRIVER SEAT  
POSITIVE AND NEGATIVE POSTS FOR JUMPSTART LOCATED ON FRAME NEXT TO STARTER  
CUMMINS TURBOCHARGED 18.7 CFM AIR COMPRESSOR WITH INTERNAL SAFETY VALVE  
FIRE AND EMERGENCY SERVICE VEHICLES ENGINE WARNING  
C-BRAKE BY JACOBS WITH LOW/OFF/HIGH BRAKING DASH SWITCH

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

RH MTD HORIZONTAL AFTERTREATMENT WITH RH MOUNTED  
BRIGHT VERTICAL CURVED TAILPIPE  
HORTON DRIVEMASTER ADVANTAGE ON/OFF FAN DRIVE  
AUTOMATIC FAN CONTROL NON ENGINE MOUNTED  
CUMMINS SPIN ON FUEL FILTER  
COMBINATION FULL FLOW/BYPASS OIL FILTER  
1100 SQUARE INCH ALUMINUM RADIATOR  
ANTIFREEZE TO -34F, OAT (NITRITE AND SILICATE FREE) EXTENDED  
LIFE COOLANT  
GATES BLUE STRIPE COOLANT HOSES OR EQUIVALENT  
CONSTANT TENSION HOSE CLAMPS FOR COOLANT HOSES  
ELECTRIC GRID AIR INTAKE WARMER  
DELCO 12V 38MT HD STARTER WITH INTEGRATED MAGNETIC  
SWITCH

## Transmission

ALLISON 3000 EVS 5 SPD AUTOMATIC TRANSMISSION WITH PTO  
PROVISION

## Transmission Equipment

MAGNETIC PLUGS, ENGINE DRAIN, TRANSMISSION DRAIN, AXLE(S)  
FILL AND DRAIN  
PUSH BUTTON ELECTRONIC SHIFT CONTROL, DASH MOUNTED  
TRANSMISSION PROGNOSTICS - ENABLED 2013  
WATER TO OIL TRANSMISSION COOLER, IN RADIATOR END TANK  
MERITOR MTC-4210 TRANSFER CASE WITH OIL COOLER  
TRANSMISSION OIL CHECK AND FILL WITH ELECTRONIC OIL LEVEL  
CHECK  
SYNTHETIC TRANSMISSION FLUID (TES-295 COMPLIANT)

## Front Axle and Equipment

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

## Front Suspension

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## Rear Axle and Equipment

24,000 # R-SERIES FIRE/EMERGENCY SERVICE SINGLE REAR AXLE  
4.89 REAR AXLE RATIO / 68 MPH ELECTRONIC LIMIT  
IRON REAR AXLE CARRIER WITH STANDARD AXLE HOUSING  
MXL 17T MERITOR EXTENDED LUBE MAIN DRIVELINE WITH HALF  
ROUND YOKES  
DRIVER CONTROLLED TRACTION DIFFERENTIAL  
MERITOR 16.5X7 Q+ CAST SPIDER HEAVY DUTY CAM REAR BRAKES,  
DOUBLE ANCHOR, FABRICATED SHOES  
FIRE AND EMERGENCY SEVERE SERVICE NON-ASBESTOS REAR  
BRAKE LINING  
REAR BRAKE DUST SHIELDS  
REAR OIL SEALS  
MERITOR AUTOMATIC REAR SLACK ADJUSTERS  
SYNTHETIC 75W-90 REAR AXLE LUBE

## Rear Suspension

24,000# FLAT LEAF SPRING REAR SUSPENSION WITH HELPER, WITH  
RADIUS ROD, FOR FIRE/EMERGENCY  
SPRING SUSPENSION - 1.00" AXLE SPACER  
STANDARD AXLE SEATS IN AXLE CLAMP GROUP  
FORE/AFT CONTROL RODS

## Brake System

AIR BRAKE PACKAGE  
WABCO 4S/4M ABS WITH TRACTION CONTROL & ESC  
STANDARD AIR SYSTEM PRESSURE PROTECTION  
WABCO SYSTEM SAVER HP WITH INTEGRAL AIR GOVERNOR AND  
HEATER  
CUSTOM STEEL AIR BRAKE RESERVOIRS  
BW DV-2 AUTO DRAIN VALVE WITH HEATER - WET TANK

## Electrical Connections

UPGRADED CHASSIS MULTIPLEXING UNIT  
UPGRADED BULKHEAD MULTIPLEXING UNIT

## Wheelbase & Frame

(195 INCH) WHEELBASE / (82 INCH) CA  
11/32X3-1/2X10-15/16 INCH STEEL FRAME 120KSI  
(58 INCH) REAR FRAME OVERHANG

## Chassis Equipment

CUSTOMER INSTALLED SPECIAL BUMPER  
FRONT TOW HOOKS - FRAME MOUNTED  
FENDER & FRONT OF HOOD MTD FRONT MUDFLAPS  
GRADE 8 THREADED HEX HEADED FRAME FASTENERS

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## Fuel Tanks

50 GALLON RECTANGULAR ALUMINUM FUEL TANK - LH  
6 GALLON DIESEL EXHAUST FLUID TANK  
CHROME FUEL TANK CAP  
FUEL/WATER SEPARATOR WITH WATER IN FUEL SENSOR AND 12  
VOLT PREHEATER

## Tires

MICHELIN XDN2 11R22.5 16 PLY RADIAL FRONT TIRES  
MICHELIN XDN2 11R22.5 16 PLY RADIAL REAR TIRES

## Hubs

MERITOR IRON FRONT HUBS  
CONMET PRESET PLUS PREMIUM IRON REAR HUBS

## Wheels

22.5X8.25 10-HUB PILOT ALUMINUM DISC FRONT WHEELS  
22.5X8.25 10-HUB PILOT POLISHED ALUMINUM DISC REAR WHEELS

## Cab Exterior

154 INCH BBC HIGH-ROOF ALUMINUM CONVENTIONAL AIR RIDE  
CREW CAB WITH EXTERIOR SUN VISOR  
NONREMOVABLE BUGSCREEN MTD BEHIND GRILLE  
2-1/2 INCH FENDER EXTENSIONS  
NFPA COMPLIANT EXTERIOR GRAB HANDLES  
HOOD MOUNTED CHROMED PLASTIC GRILLES  
FIBERGLASS HOOD & FIRE WALL INSULATION  
DUAL 25 INCH ROUND STUTTER TONE HOOD MOUNTED AIR HORNS  
WITH SHIELDS  
DUAL ELECTRIC HORNS  
LED HEADLIGHT ASSEMBLY AND INCANDESCENT MARKER/TURN  
LAMP WITH CHROME BEZELS & DAYTIME RUNNING LIGHTS  
ALTERNATING FLASHING HEADLAMP SYSTEM WITH BODY BUILDER  
CONTROLLED ENGAGEMENT  
LED AERODYNAMIC MARKER LIGHTS  
DUAL 102" WEST COAST BRIGHT FINISH HEATED MIRRORS WITH LH  
AND RH REMOTE  
LH AND RH 8 INCH BRIGHT FINISH CONVEX MIRRORS MOUNTED  
UNDER PRIMARY MIRRORS  
NO REAR WINDOW  
TINTED DOOR GLASS LH AND RH WITH TINTED NON-OPERATING  
WING WINDOWS  
RH /LH ELECTRIC PWR WINDOWS & DOOR LOCKS  
TINTED WINDSHIELD  
2 GALLON WINDSHIELD WASHER RESERVOIR WITHOUT FLUID LEVEL  
INDICATOR, FRAME MOUNTED

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## Cab Interior

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## Instruments & Controls

BLACK GAUGE BEZELS  
LOW AIR PRESSURE INDICATOR LIGHT AND AUDIBLE ALARM  
2" PRIMARY AND SECONDARY AIR PRESSURE GAUGES  
2 INCH ELECTRIC FUEL GAUGE  
2 INCH TRANSMISSION OIL TEMPERATURE GAUGE  
ENGINE COMPARTMENT MOUNTED AIR RESTRICTION INDICATOR  
WITH GRADUATIONS  
ELECTRONIC CRUISE CONTROL WITH SWITCHES IN LH SWITCH  
PANEL  
IGNITION SWITCH WITH NON REMOVABLE KEY  
ICU3S, 132X48 DISPLAY WITH DIAGNOSTICS, 28 LED WARNING  
LAMPS AND DATA LINKED  
ELECTRICAL ENGINE COOLANT TEMPERATURE GAUGE  
ENGINE AND TRIP HOUR METERS INTEGRAL WITHIN DRIVER  
DISPLAY  
ELECTRIC ENGINE OIL PRESSURE GAUGE  
ELECTRONIC MPH SPEEDOMETER WITH SECONDARY KPH SCALE  
ELECTRONIC 3000 RPM TACHOMETER  
IGNITION SWITCH CONTROLLED ENGINE STOP  
DIGITAL VOLTAGE DISPLAY INTEGRAL WITH DRIVER DISPLAY  
SINGLE ELECTRIC WINDSHIELD WIPER MOTOR WITH DELAY  
MARKER LIGHT SWITCH INTEGRAL WITH HEADLIGHT SWITCH  
ONE VALVE PARKING BRAKE SYSTEM WITH DASH VALVE CONTROL  
SELF CANCELING TURN SIGNAL SWITCH WITH DIMMER,  
WASHER/WIPER AND HAZARD IN HANDLE  
INTEGRAL ELECTRONIC TURN SIGNAL FLASHER WITH HAZARD  
LAMPS OVERRIDING STOP LAMPS

## Paint Design

CAB COLOR A: L4664EB RED PIERCE #90 ELITE BC  
BLACK, HIGH SOLIDS POLYURETHANE CHASSIS PAINT

## Weight Summary

	Weight Front	Weight Rear	Total Weight
Factory Weight <sup>+</sup>	8876 lbs	4602 lbs	13478 lbs
(+) Weights shown are estimates only			

## CAB TO AXLE DIMENSION

Cab to axle will be 82".

## CAB/CHASSIS PREPAYMENT

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



# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **CHASSIS MODIFICATIONS**

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

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

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

### **VEHICLE DATA PLATE**

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

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

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

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

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

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **PERSONNEL CAPACITY**

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

## **SEAT BELT WARNING - FAMA06/07**

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

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

## **EQUIPMENT MOUNTING FAMA10**

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

## **FIRE SERVICE TIRES - FAMA12**

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

## **HELMET WARNING - FAMA15**

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

## **CLIMBING METHOD - FAMA23**

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

## **REAR STEP CROSSWALK WARNING - FAMA24**

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

## **FINAL STAGE MANUFACTURER VEHICLE CERTIFICATION**

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

## **FRONT BUMPER**

The cab/chassis supplied bumper shall be removed and replaced with a 12" high formed 10 gauge stainless steel swept-back style bumper. The bumper shall come with openings for front bumper discharge(s), if specified and painted lower cab color choice.

## **FRONT BUMPER EXTENSION**

The front bumper of the chassis shall be extended approximately 20" ahead of the cab using structural steel channel.

The bumper mounting plate shall be welded to the structural steel channel for mounting of the chassis bumper. After fabrication of the bumper extension, the panels shall be removed and the unit shall be primed and painted black.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **BUMPER GRAVEL SHIELD**

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

## **BUMPER PRE-CONNECT COMPARTMENT**

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

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

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

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

Bumper compartment must hold 150' of 1-3/4" hose.

## **AIR HORN(S)**

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

## **GROUND LIGHTS**

There shall be two (2) OnScene 8" Access LED lights installed below bumper capable of providing illumination at a minimum level of 2 fc (20 lx) on ground areas within 30 in. (800 mm) of the edge of the vehicle in areas designed for personnel to climb onto or descend from the vehicle to the ground level.

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

## **FRONT TOW PROVISIONS**

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

## **AIR INTAKE SYSTEM**

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

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

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

1. Provision of a device such that burning particulate matter larger than 0.039 in. (1.0 mm) in diameter cannot reach the air filter element.

# Loveland Fire Rescue Authority

## Engine Type 4, SVI #1098

2. Provision of a multi screen ember separator capable of meeting the test requirements defined in the Parker Hannafin, Racor Division, publication LF 1093-90, *Ember Separation Test Procedure*, or an equivalent test.

### **EXHAUST**

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

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

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

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

### **PLYMOVENT EXHAUST ADAPTER**

A Plymovent 5" exhaust adapter flange for Plymovent pneumatic systems shall be provided and installed on the chassis engine exhaust tailpipe.

### **RELOCATE CHASSIS SUPPLIED BATTERIES**

The cab/chassis supplied batteries shall be relocated to forward streetside compartment. If battery storage boxes are provided with cab/chassis they will be removed and holes in frame filled with appropriate sized bolts and nuts.

The battery compartment shall have additional vents for proper ventilation. Batteries shall be mounted on black DriDek plastic matting material with a heavy duty clamp device. The battery connectors shall be heavy duty type with cables terminating in heat shrink loom. A cover shall be provided over top of batteries

Heavy duty battery cables shall provide maximum power to the electrical system. The cables shall be shielded from exhaust and mufflers. Large rubber grommets shall be used where cable enters battery compartment.

### **SEAT SCBA BRACKETS**

There shall be one (1) Bostrom SecureAll SCBA air pack bracket(s) that meet NFPA 1901 standards mounted in specified SCBA seats. The air pack bracket(s) shall have a mechanical release handle, adjusts to accommodate varying cylinder lengths, with one-touch release handle, and auto-lock system secures SCBA in all directions.

### **SEAT BELT COLOR**

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

### **SEAT BELT WEB LENGTH - COMMERCIAL CAB**

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

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **SEAT BELT MONITORING AND VEHICLE DATA RECORDER (VDR) SYSTEMS**

### **SEAT BELT MONITORING**

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

### **VEHICLE DATA RECORDER (VDR)**

The vehicle data recorder shall have the following features;

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

### **OCCUPANT RESTRAINT INDICATOR**

The occupant restraint indicator shall have the following features;

- Will be displayed on Vista IV panel.
- Supports commercial and custom cab seating layouts; up to 12 seats
- Built-in audible alarm
- Use in conjunction with Vehicle Data Recorder (VDR)

### **IGNITION LEVER**

An ignition lever or button instead of a key shall be provided by the cab chassis manufacturer.

### **SIX (6) – LED TIRE PRESSURE VISUAL INDICATORS**

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

### **HELMET STORAGE**

No helmet storage is required in the cab driving area.

### **HELMET STORAGE**

No helmet storage is required in the cab crew area.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **CAB CRASH TEST CERTIFICATION**

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

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

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

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

## **CAB STEP COVERS AND HOSE REEL COMPARTMENTS**

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

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

There shall be aluminum compartments mounted beneath the crew doors on each side of cab. The compartment shall be large enough to hold specified booster hose reel.

No door is provided over booster hose reel location. 4-way hose rollers are provided to prevent damage to booster hose. Booster hose valve control will be located on front vertical surface step cover.

The following options will be cut into the step cover:

## **BATTERY CHARGING RECEPTACLE LOCATION**

The specified battery charging receptacle and/or display panel shall be located on front face of specified cab step cover.

## **HUB AND NUT COVERS**

Front and rear wheels shall be provided with stainless steel hub caps and wheel nut covers.

## **MUDFLAPS**

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

## **AIR BRAKE SYSTEM QUICK BUILD-UP**

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

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **ROAD EMERGENCY SAFETY KIT**

The completed unit shall be supplied with one (1) set of three (3) dual faced reflective triangles, and three (3) warning flares complete with storage case per DOT requirements.

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

There shall be one (1) storage cabinet provided in rear cab area. The cabinet shall be fabricated from 1/8" smooth aluminum and finished with a dark gray hammer tone powder coat paint for a hard and durable finish. The cabinet shall be approximately 20" wide x 18" high x 20" deep.

A drop-down type door shall be provided on front with a push style latch to access storage below.

## **SCBA BRACKETS**

There shall be two (2) Bostrom SecureAll SCBA air pack bracket(s) that meet NFPA 1901 standards mounted inside a crew compartment area. The air pack bracket(s) shall have a mechanical release handle, adjusts to accommodate varying cylinder lengths, with one-touch release handle, and auto-lock system secures SCBA in all directions.

## **BODY DESIGN**

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

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

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

The fabrication of the body shall be formed sheet metal. Formed components shall allow the Loveland Fire Rescue Authority to have the body repaired locally in the case where any object has struck the body and caused damage. The use of proprietary extrusions will prevent the Loveland Fire Rescue Authority from such repair and shall NOT be used. All fabricated body components to be cut by a laser or water-jet for superior cut edge quality.

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

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **EXTERIOR ALUMINUM BODY**

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

The body compartment floors and exterior panels shall be constructed with not less than 1/8" (.125) aluminum 3003H-14 smooth plate. Interior compartment dividing walls shall be constructed with not less than 1/8" (.125) aluminum 3003H-14 smooth plate. Lighter gauge sheet metal will not be acceptable in these areas.

The front and rear corners of body shall be formed as part of the front or rear body panels. This provides a stronger body corner and finished appearance. The use of extruded corners, or caps will not be acceptable.

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

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

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

Compartment floors shall have a "sweep-out" design with door opening threshold positioned lower than compartment floor, permitting easy cleaning of compartments. Angles, lips, or door moldings are not acceptable in the base of compartment door opening. One-way rubber drain valves shall be provided in compartment floors so that a water hose may be used to flush-out compartment area.

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

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

## **DRIP RAILS**

The body shall have drip rails over the side full height compartments. The drip rails shall be formed into the upper body panels providing a ridged lower panel and a flat upper body panel surface. The use of mechanically fastened, taped or glued on drip rails will not be acceptable.

## **BODY SUBFRAME**

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

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

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



# Loveland Fire Rescue Authority

## Engine Type 4, SVI #1098

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

### **BODY MOUNTING**

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

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

### **8" REAR BUMPER**

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

### **REAR TOW EYES**

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

### **GROUND LIGHTS**

There shall be two (2) OnScene 8" Access LED lights installed below bumper capable of providing illumination at a minimum level of 2 fc (20 lx) on ground areas within 30 in. (800 mm) of the edge of the vehicle in areas designed for personnel to climb onto or descend from the vehicle to the ground level.

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

### **WHEEL WELL EXTERIOR PANEL**

The exterior panel of the body wheel well enclosure shall be constructed from 1/8" smooth aluminum panels.

### **STAINLESS STEEL BODY FENDERS**

The body wheel well openings shall be provided with round radius, polished stainless steel fenderettes. The fenderettes shall be bolted and easily replaceable if damaged. The fenderettes shall be installed using a rubber gasket to reduce buildup of moisture and/or debris.

### **WHEEL WELL LINERS**

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **ANGLED BODY PANEL BELOW SIDE REAR COMPARTMENTS**

The area below the rear side compartments shall be angled upward from rear wheel well panel to rear of body.

## **SCBA CYLINDER COMPARTMENTS**

There shall be four (4) SCBA cylinder storage compartments, two (2) on each side of body in the rear wheel well area. Each compartment shall have a stainless steel hinge with brushed stainless steel door assembly with a positive catch latch. Each compartment shall have a 8" diameter tube behind the wheel well panel attached to the door assembly. Each compartment shall allow the storage of an SCBA cylinder or a fire extinguisher up to 7-3/4" in diameter and 22" deep. The door shall activate the "Hazard Warning Light" in the cab when not in the closed position.

## **BODY PAINT SPECIFICATIONS**

### **BODY PAINT PREPARATION**

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

The exterior (and interior, if painted) body shall undergo a thorough cleaning process starting with a biodegradable phosphoric acid solution to begin the etching process followed by a complete clear water rinse. The next step shall consist of a chemical conversion coating applied to seal the metal substrate and become part of the metal surface for greater film adhesion.

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

### **PAINT PROCESS**

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

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

- 10) After cooling, DA sand heavy orange peel or runs using 1000 grit dry sand paper and final DA sand using 1500-2000 grit dry sand paper. Wipe off all surfaces to remove dust and debris. Buff unit as needed using 3M rubbing compound and a white wool pad and inspect until all sand scratches are removed.
- 11) Polish as needed using 3M Perfect-It-Polish and a black foam pad, repeat as necessary and inspect until all sand scratches are removed.

## **PAINT - ENVIRONMENTAL IMPACT**

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

## **FASTENERS**

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

## **ELECTROLYSIS CORROSION CONTROL**

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

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

## **PAINT FINISH - SINGLE COLOR**

The body shall be painted with a single color of PPG Delfleet® Evolution per Loveland Fire Rescue Authority approved paint spray out provided.

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

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

## **BODY UNDERCOATING**

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

## **UNDERCOAT WARRANTY**

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **PAINT WARRANTY**

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

## **COMPARTMENT INTERIOR FINISH**

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

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

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

## **REFLECTIVE STRIPE REQUIREMENTS**

### **Material**

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

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

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

### **Minimum Requirements**

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

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

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

## **GRAPHICS PROOF**

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **REFLECTIVE STRIPE - CAB SIDE**

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

- This reflective stripe shall be white in color.

There shall be a 1" Scotchcal reflective stripe located approx. 1" above the main stripe.

- This reflective stripe shall be blue in color.

## **REFLECTIVE STRIPE - CAB FRONT**

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

- This reflective stripe shall be white in color.

There shall be a 1" Scotchcal reflective stripe located approx. 1" above the main stripe.

- This reflective stripe shall be blue in color.

## **CHEVRON STRIPE - CAB BUMPER**

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

The approximate 10" wide Chevron retroreflective stripe shall be affixed to at least 25 percent of the width of the front of the apparatus with retroreflective striping in a chevron pattern sloping downward and away from the centerline of the vehicle at an angle of 45 degrees. Each stripe shall be 6" width. Chevron panels shall have a 3M UV over laminate to protect from UV rays, scene damage, and everyday use. Chevron panels shall have a minimum 10 year warranty for material failure, and colorfastness.

- The stripe material shall be 3M Scotchlite Diamond Grade.

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

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

## **REFLECTIVE STRIPE - CAB DOOR INTERIOR**

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

The stripe material shall be 3M Scotchcal 680.

- This reflective stripe shall be white in color.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **REFLECTIVE STRIPE - BODY SIDES**

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

- This reflective stripe shall be white in color.

There shall be a 1" Scotchcal reflective stripe located approx. 1" above the main stripe.

- This reflective stripe shall be blue in color.

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

## **CHEVRON REFLECTIVE STRIPE - REAR SIDES PANELS**

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

The rear side panels of the body on each side of a rear stairway or compartment shall have a chevron style reflective stripe, extending from bumper height up to side compartment drip rail height. Each chevron panel shall be a full sheet and shall have a 3M UV over laminate to protect from UV rays, scene damage, and everyday use. Chevron panel shall have a minimum 10 year warranty for material failure, and colorfastness.

The stripe material shall be 3M Diamond Grade.

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

## **LETTERING**

### **GRAPHICS PROOF**

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

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

### **SIDE CAB DOOR LETTERING**

There shall be fifty two (52) 4" high SuperGold letters furnished and installed on the vehicle. Lettering shall have a clear 3M UV Protective Over Laminate applied before installation.

"LOVELAND"  
"FIRE RESCUE"  
"AUTHORITY"

There shall be six (6) 10" high reflective letters furnished and installed on the vehicle.

"E47" (Unit number, located rear cab doors)

- This reflective lettering shall be white in color.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **UPPER BODY SIDE LETTERING**

There shall be fifty eight (58) 7" high SuperGold letters furnished and installed on the vehicle. Lettering shall have a clear 3M UV Protective Over Laminate applied before installation.

"Commitment, Compassion & Courage"

## **REAR BODY LETTERING**

## **FRONT OF CAB LETTERING**

There shall be four (4) 6" high reflective letters furnished and installed on front bumper.

"LFRA"

- This reflective lettering shall be blue in color.

## **EXTERIOR COMPARTMENT DOORS**

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

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

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

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

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

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **ROM DOOR BOTTOM RAIL**

All exterior compartment doors shall have the standard 3.0" tall bottom rail extrusion for easy one (1) hand opening and closing.

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

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

## **DOOR EDGE PROTECTION**

Provide 3M clear material, or similar on door edges to prevent door seals on sides to wear paint down pre-maturely.

## **BODY WIDTH DIMENSIONS**

The wildland body shall be 98.0" wide, and 100.0" wide at drip rails. Interior compartment depth dimensions shall be approximately:

<u>Area Description</u>	<u>Dimension</u>
Compartment depth above subframe	19.0"
Compartment depth below subframe	21.0"



# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

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

The interior useable compartment width shall be approximately 49.5" wide.

The compartment door opening shall be approximately 42.2" wide.

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

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- A keyed cylinder lock shall be provided on bottom rail of the roll-up door.
- One (1) aluminum drip pan/door guard shall be provided below door roll area. Drip pan/door guard shall have thumb nuts making it easily removable without tools with a maintenance-free, un-painted finish. A plastic drain line shall be provided on each end of the drip pan to lower door threshold.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

## **COMPARTMENT LAYOUT**

- There shall be vertically mounted aluminum Shelf-Trac welded to compartment walls for specified component installation. Shelf-Trac extrusion shall have side extruded channels for use in mounting or securing special ancillary items, without need for drilling into body.
- There shall be one (1) adjustable shelf/shelves approximately 18" deep. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front and rear edges.
  - The above component(s) shall have a smooth un-painted finish.
  - Reflective Scotchcal stripe shall be provided on the front face of the shelf. The stripe shall be blue in color.
- There shall be one (1) 400 lbs. slide-out tray(s) approximately 21" deep and as wide as the compartment layout or door opening permits. The tray top shall be fabricated from 3/16" 3003 aluminum sheet with a 3" vertical lip and welded corners to form a box type tray surface. The sliding tracks shall extend 100% of the slide length. The tray assembly shall utilize a pneumatic cylinder mounted on underside to hold the tray in both the extended and closed positions.
  - The above component(s) shall have a smooth un-painted finish.
  - Reflective Scotchcal stripe shall be provided on the front and side faces of the tray. The stripe shall be 2" wide and blue in color.

# Loveland Fire Rescue Authority

## Engine Type 4, SVI #1098

- There shall be one (1) OnScene Solutions 84 series slide-out, drop-down style aluminum tray base with 90% extension, and rating of 250 lbs. Slide-out tray(s) base shall be approximately 18" deep and as wide as the compartment layout or door opening permits. It shall be located above the level of the chassis frame rails and shall be vertically adjustable in height. Each slide shall have a cable operated, spring loaded latch complimented by a large hand opening and red pull handle (Pull to Release) which will hold the tray in the closed position. Each tray shall be fabricated from 3/16" 3003 aluminum sheet and have welded corners to form a box type tray surface with an internal depth of approximately 3 ½".
  - The above component(s) shall have a smooth un-painted finish.
  - Reflective Scotchlite stripe shall be provided on the front and side faces of the tray. The stripe shall be 2" wide and blue in color.
- Two (2) OnScene Access LED, full height compartment lights, vertically mounted.
- Chassis batteries to be relocated to this lower compartment.
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

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

The interior useable compartment width shall be approximately 58.0" wide.

The compartment door opening shall be approximately 52.2" wide.

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

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- A keyed cylinder lock shall be provided on bottom rail of the roll-up door.
- One (1) aluminum drip pan/door guard shall be provided below door roll area. Drip pan/door guard shall have thumb nuts making it easily removable without tools with a maintenance-free, un-painted finish. A plastic drain line shall be provided on each end of the drip pan to lower door threshold.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

## **COMPARTMENT LAYOUT**

- There shall be vertically mounted aluminum Shelf-Trac welded to compartment walls for specified component installation. Shelf-Trac extrusion shall have side extruded channels for use in mounting or securing special ancillary items, without need for drilling into body.
- There shall be one (1) OnScene Solutions 84 series slide-out, drop-down style aluminum tray base with 90% extension, and rating of 150 lbs. Slide-out tray(s) base shall be approximately 18" deep and as wide as the compartment layout or door opening permits. It shall be located above the level of the chassis frame rails and shall be vertically adjustable in height. Each slide shall have a cable operated, spring loaded latch complimented by a large hand opening and red pull handle (Pull to Release) which will hold the tray in the closed position. Each tray shall be fabricated from 3/16" 3003 aluminum sheet and have welded corners to form a box type tray surface with an internal depth of approximately 3 ½".
  - The above component(s) shall have a smooth un-painted finish.
  - Reflective Scotchlite stripe shall be provided on the front and side faces of the tray. The stripe shall be 2" wide and blue in color.
- Two (2) OnScene Access LED, full height compartment lights, vertically mounted.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

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

The interior useable compartment width shall be approximately 30.0" wide.

The compartment door opening shall be approximately 25.2" wide.

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

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- A keyed cylinder lock shall be provided on bottom rail of the roll-up door.
- One (1) aluminum drip pan/door guard shall be provided below door roll area. Drip pan/door guard shall have thumb nuts making it easily removable without tools with a maintenance-free, un-painted finish. A plastic drain line shall be provided on each end of the drip pan to lower door threshold.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

## **COMPARTMENT LAYOUT**

- There shall be vertically mounted aluminum Shelf-Trac welded to compartment walls for specified component installation. Shelf-Trac extrusion shall have side extruded channels for use in mounting or securing special ancillary items, without need for drilling into body.
- There shall be one (1) OnScene Solutions 84 series slide-out, drop-down style aluminum tray base with 90% extension, and rating of 250 lbs. Slide-out tray(s) base shall be approximately 18" deep and as wide as the compartment layout or door opening permits. It shall be located above the level of the chassis frame rails and shall be vertically adjustable in height. Each slide shall have a cable operated, spring loaded latch complimented by a large hand opening and red pull handle (Pull to Release) which will hold the tray in the closed position. Each tray shall be fabricated from 3/16" 3003 aluminum sheet and have welded corners to form a box type tray surface with an internal depth of approximately 3 ½".
  - The above component(s) shall have a smooth un-painted finish.
  - Reflective Scotchlite stripe shall be provided on the front and side faces of the tray. The stripe shall be 2" wide and blue in color.
- There shall be one (1) Zico 1000 series KD-UH walkaway type SCBA air pack bracket(s) with high cycle coated spring clips and angled foot plate (no CRS strap inc.).
- Two (2) OnScene Access LED, full height compartment lights, vertically mounted.
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

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

The interior useable compartment width shall be approximately 49.5" wide.

The compartment door opening shall be approximately 42.2" wide.

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

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- A keyed cylinder lock shall be provided on bottom rail of the roll-up door.
- One (1) aluminum drip pan/door guard shall be provided below door roll area. Drip pan/door guard shall have thumb nuts making it easily removable without tools with a maintenance-free, un-painted finish. A plastic drain line shall be provided on each end of the drip pan to lower door threshold.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

## **COMPARTMENT LAYOUT**

- There shall be vertically mounted aluminum Shelf-Trac welded to compartment walls for specified component installation. Shelf-Trac extrusion shall have side extruded channels for use in mounting or securing special ancillary items, without need for drilling into body.
- There shall be two (2) slide-out smooth aluminum vertical tool board(s) approximately 18" deep. Each tool board(s) vertical exterior edge shall have a double 90 degree formed edge to provide an easy grip handle. The top and bottom of tool board(s) shall be provided with Accuride 9300 series slide tracks. Each board shall be rated for a maximum 200 lbs. evenly distributed load. Each tool board shall utilize a pneumatic cylinder to hold the tool board in both the opened and closed positions.
  - The vertical tool board material shall be 3/16" (.188) 3003H-14 aluminum alloy sheet.
  - The above component(s) shall have a smooth un-painted finish.
  - Each tool board will be bolted to compartment floor.
  - Reflective Scotchcal stripe shall be provided on both sides of the tool board. The striping shall be 2" wide and blue in color.
- Two (2) OnScene Access LED, full height compartment lights, vertically mounted.
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

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

The interior useable compartment width shall be approximately 58.0" wide.

The compartment door opening shall be approximately 52.2" wide.

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

- The roll-up door slats and the door track components shall be painted to match the single tone exterior color.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- A keyed cylinder lock shall be provided on bottom rail of the roll-up door.
- One (1) aluminum drip pan/door guard shall be provided below door roll area. Drip pan/door guard shall have thumb nuts making it easily removable without tools with a maintenance-free, un-painted finish. A plastic drain line shall be provided on each end of the drip pan to lower door threshold.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

## **COMPARTMENT LAYOUT**

- There shall be vertically mounted aluminum Shelf-Trac welded to compartment walls for specified component installation. Shelf-Trac extrusion shall have side extruded channels for use in mounting or securing special ancillary items, without need for drilling into body.
- There shall be one (1) OnScene Solutions 84 series slide-out, drop-down style aluminum tray base with 90% extension, and rating of 150 lbs. Slide-out tray(s) base shall be approximately 18" deep and as wide as the compartment layout or door opening permits. It shall be located above the level of the chassis frame rails and shall be vertically adjustable in height. Each slide shall have a cable operated, spring loaded latch complimented by a large hand opening and red pull handle (Pull to Release) which will hold the tray in the closed position. Each tray shall be fabricated from 3/16" 3003 aluminum sheet and have welded corners to form a box type tray surface with an internal depth of approximately 3 ½".
  - The above component(s) shall have a smooth un-painted finish.
  - Reflective Scotchlite stripe shall be provided on the front and side faces of the tray. The stripe shall be 2" wide and blue in color.
- Two (2) OnScene Access LED, full height compartment lights, vertically mounted.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

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

Location of specified pump above frame. A compartment shall be provided below fire pump unit.

The interior useable compartment width shall be approximately 30.0" wide.

The compartment door opening shall be approximately 25.2" wide.

- This compartment shall have flush fitting vertically hinged compartment door. The door exterior shall be painted job color.
- The interior door panel shall have a smooth un-painted aluminum panel.
- The door shall be equipped with a CPI harsh environment mechanical type door ajar switch located inside compartment interior lower door track.
- The hinged door(s) shall have a stainless steel 6" offset bent D-ring non-locking handle. A gasket shall be placed between handle and door. Door latches shall be a two-point rotary slam, double-catch latch, recessed inside the double panel door with striker plate.
- The hinged door(s) shall have a pneumatic cylinder to hold door in the open and closed positions. Each door shall be capable of being closed without unlatching. Door checks shall be bolted to the compartment door header and the box pan of the door.
- A compartment threshold protection plate shall be installed on the bottom edge of the compartment door opening. The threshold protection shall be fabricated from an aluminum extrusion with an anodized exterior finish.

## **COMPARTMENT LAYOUT**

- There shall be vertically mounted aluminum Shelf-Trac welded to compartment walls for specified component installation. Shelf-Trac extrusion shall have side extruded channels for use in mounting or securing special ancillary items, without need for drilling into body.
- One (1) OnScene Access LED, full height compartment light, vertically mounted.
- One (1) OnScene 8" Access LED ground light(s) shall be provided below the body.
- Two (2) 3-1/2" x 3-1/2" black plastic louvered vents shall be provided in the lower compartment.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **UPPER BODY COMPARTMENT - FRONT**

Above the front compartments shall be an upper body compartment for storage of long equipment. The compartment shall be a bolted on assembly. The compartment shall be fabricated from 1/8" 3003-H14 alloy aluminum treadplate, approximately 96" long (full body width) x 30" wide x 18" high.

Access to the compartment shall be from open area above tank with a full-length outboard hinged lift-up compartment door. Door shall be fabricated from 1/8" 3003-H14 alloy aluminum treadplate with two (2) 16", 16 gauge stainless steel hinges, with 1/4" stainless steel pin. Two (2) gas strut door holders shall assist in holding doors in open position. A polyester barrier film gasket shall be placed between stainless steel hinge and any dissimilar metals as necessary to prevent corrosion. Door shall overlap compartment vertical sides to prevent entry of moisture and sealed with automotive type rubber molding to provide a weather resistant seal.

The hinged door(s) shall have an automotive tailgate style lift-up locking handle. A gasket shall be placed between the handle and the compartment exterior wall. Door latches shall be a single point, double-catch latch, mounted on the interior wall of the compartment panel.

Compartment shall have two (2) flush mounted OnScene LED lights near door opening that will be automatically activated when door is opened, and wired to compartment door ajar warning light provided in cab.

## **UPPER BODY COMPARTMENT - SIDES**

Above the streetside and curbside compartments shall be upper body compartments for storage of long equipment or when specified a pre-connected discharge. The compartments shall be a bolted on assembly. The compartments shall be fabricated from 1/8" 3003-H14 alloy aluminum treadplate. The streetside compartment shall be approximately 20" wide x 108" long x 18" high, and the curbside compartment shall be approximately 72" long x 20" wide x 18" high, allowing room for air circulation vent for pump.

Access to the compartment shall be from open area above tank with a full-length outboard hinged lift-up compartment door. Door shall be fabricated from 1/8" 3003-H14 alloy aluminum treadplate with two (2) 16", 16 gauge stainless steel hinges, with 1/4" stainless steel pin. Two (2) gas strut door holders shall assist in holding doors in open position. A polyester barrier film gasket shall be placed between stainless steel hinge and any dissimilar metals as necessary to prevent corrosion. Door shall overlap compartment vertical sides to resist entry of moisture and sealed with automotive type rubber molding to provide a weather resistant seal.

The hinged door(s) shall have an automotive tailgate style lift-up locking handle. A gasket shall be placed between the handle and the compartment exterior wall. Door latches shall be a single point, double-catch latch, mounted on the interior wall of the compartment panel.

Compartments shall have two (2) flush mounted OnScene LED lights near door opening that will be automatically activated when door is opened, and wired to compartment door ajar warning light provided in cab.

When specified with a pre-connected discharge, the streetside compartment will be open to rear. Brushed stainless steel trim shall be installed at the opening of hose bed area to reduce the chaffing of the hose jacket and protect paint on lower edges of the hose storage area. A black nylon strap webbing cover shall be provided. The cover shall be mechanically fastened at the rear of the hose bed and secured using yellow pulls with reflective bungees and shoulder bolts. A safety sign FAMA22, which warns of the need to secure hose, shall be visible to personnel at rear of hose storage area.

## **OPEN STORAGE AREA**

Upper body open storage area shall be provided with cargo netting of 2" nylon webbing at rear.



# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **DRIP TORCH STORAGE**

There shall be one (1) bolted shelf located on streetside rear body panel above specified tail lights. Two (2) individual brackets shall be provided on shelf for Loveland Fire Rescue Authority drip torches. Each shelf shall be fabricated from 3/16" 3003 aluminum sheet with a 2" vertical flange along the front edge.

## **INTERFACE I-ZONE BRACKETS**

There shall be two (2) aluminum handrail sections with brackets assembled on rear of vehicle provided to lace the fire hose between when moving from house to house during structure fire protection operations. Brackets shall be designed to hold the handrails in position with a quick pin to hold in place for operation. Storage shall be provide inside a compartment for the bracket to hold the handrails when not in use.

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

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

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

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

3M™ Diamond Grade™ Conspicuity striping shall be provided in the rub rail. The striping shall be red in color.

## **FRONT PROTECTION PANELS**

To protect areas subject to intensive wear, scuffing or abuse, protection panels shall be installed on the front vertical body panels (bottom of body to frame level) and wrapped around to the front compartment door opening. The protection panels shall be fabricated from 20 gauge brushed stainless steel.

## **ROOF ACCESS LADDER**

The top of the body shall be accessible from the ground by a folding ladder. The ladder design will have a main ladder section, bolt on upper hand rail section and a folding lower step section for better angle of departure. Ladder stores in a folded position and then pulls out to a comfortable climbing angle. The ladder shall be parallel to the body when in the stored position.

Each cast aluminum step shall be 4-1/2" deep x 16" wide. Hand railing shall be 2-1/8" oval shaped aluminum tubing with a ribbed gripping surface.

The ladder shall be wired to the door ajar warning light in cab to warn the driver that the ladder is in the down position. Ladder shall be mounted to body with stainless steel bolts.

Ladder shall be located on rear streetside of the body.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **WALKWAY/STEP LIGHTS**

There shall be two (2) OnScene Solutions Rough-Service 9" LED lights provided to illuminate the walkway or step area. The lights shall be activated when the parking brake is set.

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

Lighting shall provide illumination at a minimum level of 2 fc (20 lx) on all work surfaces, steps, and walkways. Lighting shall be switchable but activated automatically when the vehicle park brake is set.

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

### General

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

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

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

### Wiring

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

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

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

### Wiring and Wire Harness Construction

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

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

# Loveland Fire Rescue Authority

## Engine Type 4, SVI #1098

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

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

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

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

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

- 1) SAE J156, *Fusible Links*
- 2) SAE J553, *Circuit Breakers*
- 3) SAE J554, *Electric Fuses (Cartridge Type)*
- 4) SAE J1888, *High Current Time Lag Electric Fuses*
- 5) SAE J2077, *Miniature Blade Type Electrical Fuses*

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

### Power Supply

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

### Minimum Continuous Electrical Load

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

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

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

# Loveland Fire Rescue Authority

## Engine Type 4, SVI #1098

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

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

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

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

### Electromagnetic Interference

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

### Wiring Diagram

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

### Low Voltage Electrical System Performance Test

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

## **12 VOLT MULTIPLEX CONTROL CENTER**

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

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

### **Outputs:**

The outputs shall perform all the following items without added modules to perform any of the tasks;

1. Load Shedding: The system shall have the capability to load shed with 8 levels any output. This means you can specify which outputs (barring NFPA restrictions) you would like load shed. Level 1 12.9v, Level 2 12.5V, Level 3 - 12.1V, Level 4 - 11.7V, Level 5 11.3V, Level 6 10.9V, Level 7 10.5, Level 8 10.1. Unlike conventional load shedding devices you can assign a level to any or all outputs.
2. Load Sequencing: The system shall be able to sequence from 0 8 levels any output. With 0 being no delay and 1 being a 1 second delay, 2 being a 2 second delay and so on. Sequencing reduces the amount of voltage spikes and drops on your vehicle, and can help limit damage to your charging system.

# Loveland Fire Rescue Authority

## Engine Type 4, SVI #1098

3. Output Device: The system shall have solid-state output devices. Each solid-state output shall be a MOS-FET (Metal Oxide Semiconductor - Field Effect Transistors); MOS-FETs are solid-state devices with no moving parts to wear out. A typical relay when loaded to spec has a life of 100,000 cycles. The life of a FET is more than *100 times* that of a relay.
4. Flashing Outputs: The system shall be able to flash any output in either A or B phase, and logic is used to shut down needed outputs in park, or any one of several combined interlocks. The flash rate can be selected at either 80, 160 or 200 FPM. This means any light can be specified with a multiplex truck with no need to add flashers. Flashing outputs can also be used to warn of problems or other unique idea you may come up with.
5. PWM: The modules shall have the ability to PWM at some outputs so that a headlight PWM module is not needed.
6. Diagnostics: An output should be able to detect either a short or open circuit. The system should be able report in "real time" a text based message that points the maintenance person to a specific output.

### Inputs:

1. The inputs shall have the ability to switch by a ground or vbatt signal.
2. The inputs shall be filtered for noise suppression via hardware and software so that RF or dirty power will not trick an input into changing its status.

### Auto-Throttle:

The multiplex system shall be able to perform automatic high idle via a network gateway or by using an existing output on a module to provide the proper signals to an OEM Engine ECU. This task should be handled with existing inputs and outputs.

### Displays:

Displays shall be able to provide real time information regarding load shedding and system status, such as network traffic/errors or shorts and open circuits.

### System Network:

The multiplex system shall contain a Peer-to-Peer network. A Master Slave Type network is not suitable for this type of unit. A Peer-to-Peer network means that all the modules are equal on the network; a Master is not needed to tell other nodes when to talk, **No Exceptions.**

### System Reliability:

The multiplex system shall be able to perform in extreme temperature conditions, from 40° to +85° C (-40° to +185° F.) The system shall be sealed against the environment, moisture, humidity, salt or fluids such as diesel fuel, motor oil or brake fluid. The enclosures shall be rugged to withstand being mounted in various locations or compartments around the vehicle. The modules shall be protected from over voltage and reverse polarity.

### WELDON CERTIFICATION

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **MULTIPLEX SYSTEM INTERFACE DISPLAY**

One (1) Weldon V-MUX Vista IV multiplex system interface display(s) with push-button control shall be provided in cab easily accessible to driver and/or passenger. The full-color Vista interface display allows the user to control warning and scene lighting, HVAC controls (when specified), and view on-board diagnostics including service information. This display has a wide operating temperature range, automatic screen switching in response to current conditions, and a sleep mode option to eliminate night glare. The following features shall be included;

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

The multiplex display shall be located in the cab center console for control of all master and emergency lights.

## **CAB CONSOLE**

A center cab console shall be provided between the Driver's and Officer's seats. Console shall be as large as possible and fabricated of 1/8" smooth aluminum. A textured powder coat paint finish shall be provided for durability and finished appearance.

The rear portion of the console shall be provided with open top storage for notebooks or maps. Two (2) adjustable dividers shall be provided in the storage area. The forward portion of console shall be slanted for easy viewing of the specified multiplex display screen, and any siren or radio equipment and within easy access to both Driver and Officer. Two (2) cup holders shall be provided in console.

### **SHOP NOTE**

Full length console (front-rear)

The following options shall be provided in specified console. Final layout to be determined by Loveland Fire Rescue Authority at pre-construction meeting.

- There shall be one (1) communications radio and/or siren 3" filler plate(s) with black powdercoat paint finish provided for future radio/siren location in specified console.
- There shall be two (2) Blue Sea 12 VDC USB port(s) provided in specified console.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **BATTERY SYSTEM**

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

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

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

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

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

One of the following master disconnect switches shall be provided:

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

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

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

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

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

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

## **BATTERY SWITCH**

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

## **BATTERY SOLENOID**

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **BATTERY CONDITIONER**

One (1) Iota DLS-45 /IQ4 battery conditioner with a "smart charger" controller shall be supplied. The battery conditioner shall provide up to 45 amp output for the chassis batteries. The IQ smart charger shall continuously monitor the batteries and provide the proper charge rate in three stages to insure proper battery charging and minimize over-charging. The battery conditioner shall be mounted behind driver seat.

## **CHASSIS AIR BRAKE PUMP**

One (1) Kussmaul Auto-Pump 091-9B-1, 120 VAC, 100 psi air compressor shall be provided and installed to maintain air pressure in chassis air brake system. Compressor is factory set: 75 PSI "On", and 95 PSI "Off" with adjustment differential of 20 PSI. Pump shall be connected to battery charger circuit.

## **SHORE POWER INLET**

One (1) Blue Sea Sure Eject model 7851, 120 VAC, 20 amp shore power inlet(s) shall be provided. The shore power connection shall automatically disengage from vehicle when chassis ignition is engaged. A matching keyed plug shall be shipped loose with completed vehicle.

The protective ground from the shoreline inlet shall be bonded to the vehicle frame.

- The outlet cover shall be red.
- The shore power plug shall be located near the Driver door area.

## **ENGINE COMPARTMENT LIGHT**

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

## **REAR SCENE LIGHTS SWITCHING**

There shall be a switch on streetside rear of body to activate the rear scene lights and any specified rear step lighting. The switch shall be a momentary style and connected to a bi-stable relay, allowing multiple switching locations. The scene lights shall automatically shut-off when the parking brake is disengaged.

## **MAP LIGHT**

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

## **CAB SPOTLIGHT**

There shall be one (1) GoLight LED 20204 motorized, white, 12 VDC, 3 Amp, spotlight(s) that operates via a wired dash mount controller with joystick and on/off button. The joystick controls the motorized 135 degree tilt of the spotlight and the motorized rotation of the light a full 370 degrees. The light continues to move while the joystick is pressed. Once any button is released, the spotlight remains locked in that position until the joystick is moved again. The dash controller also turns the light on and off, so no additional switches are required. The dash mounted remote control allows for fingertip operation and is hard wired to the searchlight.

The Golight is mounted to the surface of vehicle using (4) stainless steel screws and a rubber gasket for a quick, safe and secure attachment. Light shall have a 3 year limited warranty.

### **SHOP NOTE**

Model 20204 is white.



# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **CAB HAZARD WARNING LIGHT**

A hazard warning light is not required by NFPA 1906, but will be provided for vehicle and personnel safety. A Truck-Lite red LED flashing light shall be provided and located in the driving compartment and be illuminated automatically whenever the vehicles parking brake is not fully engaged and any of the following conditions exist:

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

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

- The volume is less than or equal to 4 ft<sup>3</sup> (0.1 m<sup>3</sup>).
- The compartment has an opening less than or equal to 144 in.<sup>2</sup> (92,900 mm<sup>2</sup>).
- The open door does not extend sideways beyond the mirrors or up above the top of the fire apparatus.
- All equipment in the compartment is restrained so that nothing can fall out if the door is open while the apparatus is moving.
- Manually raised pole lights with an extension of less than 5 ft (1.5 m).

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

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

## **BACK-UP ALARM**

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

## **REAR VIEW CAMERA**

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

The camera(s) shall be wired to the cab/chassis supplied Weldon Vista display(s). The rear camera shall activate when the transmission is placed in reverse. If a right camera is provided it shall activate with the right side turn signal and if a left camera is provided it shall activate with the left side turn signal. All camera(s) shall also be activated by a button on the Vista display(s).

## **TAIL LIGHTS**

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

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

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **MIDSHIP MARKER/TURN SIGNAL**

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

## **MARKER LIGHTS**

The body shall be equipped with all necessary side and rear clearance lights and reflectors in accordance with Federal Motor Vehicle Safety Standards (FMVSS) and Canadian Motor Vehicle Safety Standards (CMVSS). Clearance lights shall be Truck-Lite model 18 series, 3 diode LED, reflectorized type to reduce the need for maintenance and lower the amp draw. Clearance lights on body shall be connected to the clearance light circuit of the chassis.

## **CAB STEP LIGHTS / GROUND LIGHTS**

There shall be four (4) OnScene 8" Access LED light(s) installed on the vehicle capable of providing illumination at a minimum level of 2 fc (20 lx) on ground areas within 30 in. (800 mm) of the edge of the vehicle in areas designed for personnel to climb onto or descend from the vehicle to the ground level.

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

## **LICENSE PLATE MOUNTING BRACKET**

A license plate mounting bracket shall not be provided on completed unit.

## **ELECTRONIC SIREN**

One (1) Federal EQ2B 200 watt, electronic siren/amplifier with digital output control head shall be provided and mounted in cab within easy reach of the Driver. Siren power shall be wired through the master warning light switch.

There shall be a siren brake installed in the rocker switch control panel to activate the siren brake.

## **SIREN ACTIVATION**

The siren shall be operated by floor switch located at the driver position and a push button switch on the cab center console at the officer position.

## **SIREN SPEAKER**

One (1) Federal BP200-EF, 200 watt siren speaker shall be provided and recess mounted behind the front bumper.

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **FRONT LED FLOODLIGHT**

One (1) Rigid Industries E-Series model 140312, 40" combination spot/flood LED light(s) with white housing color and cradle mount brackets shall be provided on front of vehicle. The E-Series 40" LED light(s) shall have 18,400 lumen output each.

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

The lights shall be controlled at the multiplex display(s) in the cab.

## **SIDE SCENE LIGHTS**

There shall be four (4) Fire Research Spectra model SPA900-Q70 LED lights provided on the upper body. Light quantity shall be divided equally per side. The light(s) shall be mounted with four (4) screws to a flat surface. It shall be 6 3/4" high by 9" wide and have a profile of less than 1 3/4" beyond the mounting surface. Wiring shall extend from a weatherproof strain relief at the rear of the lamphead.

Each light shall have twenty-four (24) white LEDs. It shall operate at 12/24 volts DC, draw 6/3 amps and generate 7,000 lumens of light. The lens shall redirect the light along the vehicle and out onto the working area. The lamphead housing shall be aluminum with a chrome colored bezel.

The lights shall be controlled at the multiplex display(s) in the cab.

## **REAR SCENE LIGHTS**

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

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

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

The lights shall be controlled at the multiplex display(s) in the cab.

## **TRAFFIC ADVISOR LIGHTS**

A traffic advisor system shall be provided on rear of vehicle using; eight (8) Whelen Wide-angle ION series amber Super-LED lights with clear lens, and 25 Scan-Lock™ flash patterns. The center pair of lights shall be split amber/red. The red lights shall be connected to the brake light circuit on vehicle. Lights shall be individually mounted with chrome bezels and evenly distributed to rear, if split by a hose bed, or walkway.

If necessary directional lights shall be provided with protective guards to prevent damage from equipment being removed or stored in upper body storage area.

The lights shall be controlled by the multiplexing system and provide; Left Arrow, Right Arrow, Center Out, and Wig-Wag patterns. The wig-wag light pattern shall be activated with the E-Master and can be switched to the other patterns at any time through the "TRAFFIC ADVISOR" menu on the Multiplex display.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **FIRECOM INTERCOM SYSTEM**

A Loveland Fire Rescue Authority supplied Firecom intercom system shall be installed to improve the safety of firefighters and rescue professionals through enhanced communication and hearing protection.

If there are more than 5 users 2 wireless base stations will be required.

## **INTERCOM SYSTEM INSTALLATION**

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

### **Front of Cab**

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

### **Rear Crew Area**

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

## **WARNING LIGHT PACKAGE**

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

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

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

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

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

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

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

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

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

## **UPPER LEVEL OPTICAL WARNING DEVICES**

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

## **ZONE A - FRONT WARNING LIGHTS**

There shall be one (1) Whelen Freedom F4N0VLED LED 60" lightbar permanently mounted to the cab roof.

The lightbar configuration (streetside to curbside) shall be:

<u>SECTION</u>	<u>INTERNAL COMPONENTS</u>	<u>LENS COLOR</u>
1	Red Rear Corner LED	Clear
2	Red Front Corner LED	Clear
3	White Long Super-LED	Clear
4	White Long Super-LED	Clear
5	Red Long Super-LED	Clear
6	Red Long Super-LED	Clear
7	White Long Super-LED (Opticom if specified)	Clear
8	White Long Super-LED (Opticom if specified)	Clear
9	Red Long Super-LED	Clear
10	Red Long Super-LED	Clear
11	White Long Super-LED	Clear
12	White Long Super-LED	Clear
13	Red Front Corner LED	Clear
14	Red Rear Corner LED	Clear

All clear lights shall shut down when the parking brake is set to comply with "Blocking" mode requirements as outlined in

The lightbar(s) shall be separately controlled at multiplex display in the cab.

## **GTT OPTICOM**

A GTT Opticom model 795H Infrared LED emitter light with built-in power supply shall be provided inside the specified light bar. Adding the Opticom LED may re-configure the standard light(s) in specified light bar. The LED technology uses less power, has a longer life, and non-visible to the human eye.

The Opticom emitter light shall be activated with light bar and de-activated when the park brake is set and the vehicle is in blocking mode.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## ZONES B AND D - SIDE WARNING LIGHTS

### UPPER REAR CORNER WARNING LIGHTS

There shall be two (2) Whelen M6 series red linear Super-LED lights (M6R) provided, one (1) each side. Each light shall have a red lens and chrome flange.

The lights shall be controlled at the multiplex display(s) in the cab.

### UPPER FORWARD CORNER WARNING LIGHTS

There shall be two (2) Whelen M6 series red linear Super-LED lights (M6R) provided, one (1) each side. Each light shall have a red lens and chrome flange.

The lights shall be controlled at the multiplex display(s) in the cab.

## ZONE C - REAR WARNING LIGHTS

There shall be two (2) Whelen M6 series red linear Super-LED lights (M6R) provided, one (1) each side. Each light shall have a red lens and chrome flange.

The lights shall be controlled at the multiplex display(s) in the cab.

## LOWER LEVEL OPTICAL WARNING DEVICES

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

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

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

## ZONE A - FRONT WARNING LIGHTS

There shall be two (2) Whelen M6 series red linear Super-LED lights (M6R) provided, one (1) each side. Each light shall have a red lens and chrome flange.

The lights shall be controlled at the multiplex display(s) in the cab.

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

There shall be two (2) Whelen M6 series red linear Super-LED lights (M6R) provided, one (1) each side. Each light shall have a red lens and chrome flange.

The lights shall be controlled at the multiplex display(s) in the cab.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

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

There shall be two (2) Whelen 500 series (5" x 2") TIR6 Super-LED lights (50R03ZRR) provided, one (1) each side. Each light shall have a red lens and chrome finished flange.

The lights shall be controlled at the multiplex display(s) in the cab.

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

There shall be two (2) Whelen M6 series red linear Super-LED lights (M6R) provided, one (1) each side. Each light shall have a red lens and chrome flange.

The lights shall be controlled at the multiplex display(s) in the cab.

## ZONE C - REAR WARNING LIGHTS (LOWER REAR CORNERS)

There shall be two (2) Whelen M6 series red linear Super-LED lights (M6R) provided, one (1) each side. Each light shall have a red lens and chrome flange.

The lights shall be controlled at the multiplex display(s) in the cab.

## FIRE PUMP SYSTEM

The following equipment shall be furnished and installed to supply water to the emergency scene:

### DIESEL PUMP

There shall be a Darley HSE 250K diesel engine pump provided on completed unit. Meets 250 gpm @ 150 psi for Type 2 Structure engines, and meets 150 gpm @ 250 psi for Type 3 Wildland engines. The pump shall provide pressure to all discharge valves and be capable of re-circulating tank water through the 2" tank filler valve.

The diesel pump shall be mounted in upper body area and its engine fuel and electrical system shall be common with the truck chassis. The oil drain will be extended below the chassis frame rail.

### ENGINE

Kubota V2403M Diesel: 59 HP turbo, 4 cycle, liquid cooled, 12 VDC, electric start, 40 amp alternator, pressure lubed, oil and fuel pump filters.

The pump power unit shall be furnished as follows;

Dry element, direct mounted air filter with stainless steel air intake ember screen.

Exhaust system equipped with USDA approved spark arrestor and appropriate heat shields to protect various components and personnel from heat related damage/injuries from high exhaust pipe temperatures. The exhaust system shall be routed vertically above the fire apparatus discharged away from any working surfaces and be manufactured from heavy duty aluminized steel exhaust pipe to meet the manufacturer's specifications.

Spin on automotive type fuel and oil filters that meet the engine manufacturer specifications.

Fuel system shall be designed to draw fuel from the apparatus fuel tank thru the use of an inline 12 volt automotive electric fuel pump. The fuel tank pick-up tube shall be designed so as to assure the auxiliary engine will not exhaust the fuel supply of the vehicle. (minimum 10 gallon reserve). A marine grade one way check valve shall be installed in the fuel line to eliminate the possibility of air locks in the fuel line.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

Remote mount oil filter and drain kit shall be provided. A 1/2" crankcase oil drain extension line routed below the frame to facilitate oil changes, with Aeroquip style hose, threaded fittings and drain plug.

Removal of the auxiliary engine alternator is acceptable if an OEM fan belt idler is available and installed.

## **HSE PUMP FEATURES**

Stainless steel shaft, Aluminum alloy gear case and engine adapter, Heat treated alloy steel helical gears  
Mechanical seal, 4" NPT suction inlet, 3" NPT discharge companion flange

## **DIMENSIONS**

50"L x 22"W x 40"H (to top of air cleaner), 886 lbs. (402 kg)

## **PUMP PERFORMANCE**

360 gpm (1362 L/M) @ 150 psi (10.3 bar)

250 gpm (946 L/M) @ 200 psi (13.8 bar)

175 gpm (662 L/M) @ 255 psi (17.6 bar)

125 gpm (473 L/M) @ 294 psi (20 bar)

## **REMOTE PUMP CONTROLS IN CAB**

There shall be a remote pump control panel provided in cab center console for the pump. This panel shall contain the following:

- Hour meter
- Engine RPM
- Pump ignition on/run/start, rotary momentary switch
- Low voltage indicator light
- Glow plug operational light (ignition)
- Low oil pressure indicator light
- Engine overheat indicator light
- Pump water pressure gauge with LED backlight
- Throttle control, rocker switch

## **ADDITIONAL PUMP CONTROLS ON BODY**

A second identical remote pump control panel shall be provided and located on vehicle, location as required. The electrical system master switch shall provide the power for the operation of the pump assembly.

The wiring for the pump assembly shall be run in a separate loom isolated from the main vehicle wiring loom.



# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **PUMP MOUNTING**

The pump and water cooled diesel power unit assembly shall be mounted on a sub frame in upper body area in such a manner so as to eliminate vibration while operating and will provide suitable access for performing routine maintenance. The pump and power unit assembly shall be designed so the entire assembly may be easily removed as a unit to gain access to plumbing or components below.

A slotted hinged cover with latches shall be provided over the pump and power unit assembly. The area around the assembly shall remain open for maintenance and air circulation and the radiator shall be located behind a removable or swing-away expanded metal screen.

Unit shall run off the chassis fuel tank with a check valve for fuel feed to pump must be easily accessible.

## **DARLEY THREE YEAR PUMP WARRANTY**

The fire pump shall be warranted by Darley for a period of three (3) years from the date of delivery to the Loveland Fire Rescue Authority.

## **PUMP DRAIN VALVE**

A Trident brand pump drain shall be controlled at the pump operator's panel. The control shall be a round 1/4 turn handle with recessed label identified as "Master Drain", easily actuated with a gloved hand.

## **AIR PRIMING PUMP CONTROL AT PUMP PANEL**

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

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

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

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

## **DISCHARGE RELIEF VALVE**

A Darley 3" (75 mm) discharge pressure relief valve shall be provided on the discharge side of the pump. Made of high-strength bronze alloy for corrosion resistance and long service life. The pressure relief valve automatically activates at a preset pressure up to 800 psi. Remote panel control provides ON/OFF selector valve, large handwheel pressure setting control, flush valve and strainer. Switch attachment actuates pilot light to indicate open or closed valve. Mechanical override allows manual valve closure.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **INTAKE RELIEF VALVE**

An Akron Brass model 53 intake pressure relief valve shall be provided. The intake pressure relief valve shall have a flange to allow mounting to a 4-bolt pump intake flange. The unit shall be adjustable from 50 to 250 psi and be factory set at 125 psi. Provisions for adjusting or servicing the valve {will/shall} be provided.

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

## **FIRE PUMP TEST**

The pump shall undergo a fire pump test per applicable sections of NFPA 1901 or 1906 standards, prior to delivery of the completed apparatus.

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

The entire pump, both suction and discharge passages, shall be hydrostatically tested to a pressure of 500 psi (3400 kPa) for a minimum for 10 min.

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

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

## **FIRE PUMP TEST LABEL**

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

## **SAFETY SIGN**

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

## **ALTITUDE REQUIREMENT**

The apparatus shall be designed to meet the specified rating at 5,000 feet (1,525 meters) altitude.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## FOAM SYSTEM

The apparatus shall be equipped with a FoamPro 2001 electronic, fully automatic, variable speed, direct injection, discharge side foam proportioning system. The system shall be capable of handling Class A foam concentrates and most Class B foam concentrates. The foam proportioning operation shall be based on direct measurement of water flows, and remain consistent within the specified flows and pressures. System must be capable of delivering accuracy to within 5% of calibrated settings over the advertised operation range when installed according to factory standards. The system shall be equipped with a digital electronic control display suitable for installation on the pump panel. Incorporated within the control display shall be a microprocessor that receives input from the system flowmeter(s), while also monitoring foam concentrate pump output, comparing values to ensure that the operator preset proportional amount of foam concentrate is injected into the discharge side of the fire pump.

Paddlewheel-type flowmeter(s) shall be installed in the discharges specified to be "foam capable." When the use of more than one flowmeter is required, an interface electronics module will be provided to totalize these flows and send the flow total to the microprocessor in the computer control display.

The digital computer control display shall enable the pump operator to perform the following control and operation functions for the foam proportioning system:

- Provide push-button control of foam proportioning rates from 0.1% to 9.9%, in 0.1% increments
- Show current flow-per-minute of water
- Show total volume of water discharged during and after foam operations are completed
- Show total amount of foam concentrate consumed
- Simulate flow rates for manual operation
- Perform setup and diagnostic functions for the computer control microprocessor
- Flash a "low concentrate" warning when the foam concentrate tank(s) runs low
- Flash a "no concentrate" warning and shut the foam concentrate pump off, preventing damage to the pump, should the foam tank(s) empty

A 12-volt electric motor drive positive displacement foam concentrate pump, rated up to 2.5 gpm (9.5 L/min) @ 150 psi with operating pressures up to 400 psi (27.6 BAR), shall be installed in a suitable, accessible location. The system will draw a maximum of 40 amps @ 12 VDC. A pump motor electronic driver (mounted to the base of the pump) shall receive signals from the computer control display and power the 1/2 hp (0.40 kW) electric motor directly coupled to the concentrate pump in a variable speed duty cycle to ensure that the correct proportion of concentrate preset by the pump operator is injected into the water stream.

Full flow check valve shall be provided to prevent foam contamination of fire pump and water tank or water contamination of foam tank.

Components of the complete proportioning system shall include:

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

An installation and operation manual shall be provided for the unit, along with a one-year limited warranty by the manufacturer. The system must be installed and calibrated by a Certified FoamPro Dealer.

The system design shall have passed environmental testing which simulates heavy use on off-road mobile apparatus. Testing shall have been conducted in accordance to SAE standards.

# Loveland Fire Rescue Authority

## Engine Type 4, SVI #1098

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

### **REMOTE FOAM START/STOP**

A remote start/stop feature shall be available to be incorporated into the 2000/3012 series proportioners. This option shall allow the operator to start and/or stop the operation of the proportioner from more than one location on the apparatus. Included in this option are a special control module, a local start/stop switch with LED lamp for mounting near the control module, a remote start/stop switch with LED lamp for remote mounting, and the 20 foot interface cable.

### **HOSE THREADS**

Hose threads shall be National Standard (NST) on all base threads on the apparatus intakes and discharges, unless otherwise specified. (NST and NH are the same thread)

### **PLUMBING SPECIFICATIONS**

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

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

### **STAINLESS STEEL INTAKE MANIFOLD**

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

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

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

### **STAINLESS STEEL DISCHARGE MANIFOLD**

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

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

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

### **PLUMBING SYSTEM FINISH**

The plumbing system shall not be painted. The piping and valves shall remain natural color.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **STAINLESS STEEL PLUMBING WARRANTY**

The stainless steel plumbing shall be free of defects in material and workmanship for a period of ten (10) years, or 100,000 miles (or 160,934 kilometers), whichever occurs first, starting thirty (30) days after the original invoice date.

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

## **INTAKES**

The pump shall have a sufficient number and size of intakes to perform the apparatus pump system certification test.

If the couplings on the suction hose carried on the apparatus are of a different size from that of the pump intake(s) or have means of hose attachment other than that provided on the intake(s), an adapter(s) shall be provided to allow connection of the suction hose to the pump intake(s).

Safety sign FAMA25, which warns of the need for training prior to operating the apparatus, shall be located on pump operator's panel.

Each intake shall have a removable or accessible strainer inside the connection. The strainer(s) shall restrict spherical debris that is too large to pass through the pump.

At least one (1) valved intake shall be provided that can be controlled from the pump operator's position. The valve and piping shall be a minimum 2-1/2 in. (65 mm) nominal size. If the intake is 2-1/2 in. (65 mm) nominal size, the intake shall be equipped with a female swivel coupling with NH threads.

Any 3 in. (75 mm) or larger intake valve except the tank-to-pump intake valve shall be a slow-operating valve.

Each valved intake shall be equipped with a bleeder valve having a minimum 3/4 in. (19 mm) pipe thread connection to bleed off air or water. The bleeder valve shall be operational without the operator having to get under the apparatus. If a valved appliance is attached to an intake, it shall be equipped with a 3/4 in. (19 mm) bleeder valve on each intake. Bleeder valves for valved intakes 4 in. (100 mm) and larger not located at the pump operator's panel shall be located where the bleeder valve controls are visible and operationally functional while the operator remains stationary at the valved intake position.

Each valved intake having a connection size larger than 3 in. (75 mm) shall be equipped with an adjustable automatic pressure relief device installed on the supply side of the valve to bleed off pressure from a hose connected to the valved intake. The automatic pressure relief device shall be adjustable from a minimum of 90 psi (620 kPa) to at least 185 psi (1275 kPa). The pressure relief device, when preset at 125 psi (860 kPa), shall not allow a pressure rise greater than 60 psi (400 kPa) at the device inlet while flowing a minimum of 150 gpm (570 L/min). The pressure relief device shall discharge to atmosphere.

All intakes shall be provided with caps or closures capable of withstanding a hydrostatic gauge pressure of 500 psi (3400 kPa). Intakes having male threads shall be equipped with caps. Intakes having female threads shall be equipped with plugs. Where adapters for special threads or other means for hose attachment are provided on the intakes, closures shall be provided for the adapters in lieu of caps or plugs. Caps, plugs, or closures for 3-1/2 in. (90 mm) and smaller intakes shall remain secured to the apparatus when removed from the intakes.

If the suction inlets are to be equipped with a valve, Siamese, or adapter that will remain in place while the apparatus is in motion, that valve, Siamese, or adapter shall not project beyond the apparatus running board. The purchaser shall specify if any valve, Siamese, or adapter is to be permanently installed on an intake and identify the brand and model of such item.

The completed apparatus shall have the following intake(s);

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **2-1/2" INTAKE, REAR**

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

- One (1) Akron Brass 8800 series Gen II, manual type 2-1/2" (65 mm) valve(s), Stainless Steel ball with HydroMax technology. Each valve shall be equipped with a Class 1 stainless steel weld type valve adapter on inlet side, and discharge side with drain port.
  - Valve(s) shall be controlled with a chrome handle directly connected to valve.
- Each intake shall have a 2-1/2" (65 mm) NSTF chrome swivel adapter with strainer provided.
  - The specified adapter shall be provided with a 2-1/2" (65 mm) NSTM chrome plated plug with chain.
- One (1) Innovative Controls model 3003000, 3/4" brass 90 degree ball type drain valve(s) with lift type handle which can be opened under pressure, with color coded label shall be provided. Valve(s) shall be located on bottom of pump panel or drain the lowest point in the plumbing.

## **2-1/2" DIRECT TANK FILL**

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

- One (1) Akron Brass 8800 series Gen II, manual type 2-1/2" (65 mm) valve(s), Stainless Steel ball with HydroMax technology. Each valve shall be equipped with a Class 1 stainless steel weld type valve adapter on inlet side, and discharge side with drain port.
  - Valve(s) shall be controlled with a chrome handle directly connected to valve.
- Each intake shall have a 2-1/2" (65 mm) NSTF chrome swivel adapter with strainer provided.
  - The specified adapter shall be provided with a 2-1/2" (65 mm) NSTM chrome plated plug with chain.

## **TANK TO PUMP CHECK VALVE**

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

## **TANK TO PUMP VALVE**

A 3" (75 mm) full flow ball valve shall be installed between the fire pump and the water tank. The connection between the tank and the pump shall be capable of the flow recommendations as set forth in the latest edition of NFPA 1901. A non collapsible flexible hose shall be incorporated into the tank to pump plumbing to allow movement in the line as the chassis flexes to avoid damage during normal road operation. The tank to pump valve shall be controlled from the pump operator's panel.

The tank to pump valve shall be as follows;

- One (1) Akron Brass 8800 series Gen II slow-operating, actuated type 3" (75 mm) valve(s), Stainless Steel ball with HydroMax technology. Each valve shall be equipped with a Class 1 stainless steel weld type valve adapter on inlet side, and discharge side with drain port.
  - Akron valve(s) shall be controlled with a Class 1 air toggle switch located on the pump operator's panel and connected to Class 1 air cylinder to actuate valve(s).
  - A dual position air control switch shall be located in cab center console and on the pump operator's panel.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **DISCHARGES**

A minimum of three (3) 2-1/2 in. (65 mm) outlets shall be provided on any pump rated at 750 gpm (3000 L/min) or greater, and a minimum of one (1) 2-1/2 in. (65 mm) outlet shall be provided on any pump rated at less than 750 gpm (3000 L/min).

The piping and valves supplying any preconnected 1-1/2 in. (38 mm), 1-3/4 in. (45 mm), or 2 in. (52 mm) hose line, including the piping to the preconnected hose storage areas shall be at least 2 in. (52 mm) in size.

All discharge outlet connections, except connections to which a hose will be preconnected, shall be equipped with caps or closures capable of withstanding a hydrostatic gauge pressure of 100 psi (700 kPa) over the maximum pump close-off pressure or 500 psi (3400 kPa), whichever is greater.

Where adapters are provided on the discharge outlet connections, the closures shall fit on the adapters.

Caps or closures for outlet connections smaller than 4 in. (100 mm) shall remain secured to the apparatus when removed from the connection.

Each discharge outlet shall be equipped with a valve that can be opened and closed smoothly at pump discharge gauge pressures of 250 psi (1700 kPa).

The flow-regulating element of each valve shall not change its position under any condition of operation that involves discharge pressures to the maximum pressure of the pump.

The means to prevent a change in position shall be incorporated in the operating mechanism and shall be permitted to be manually or automatically controlled.

Any 3 in. (75 mm) or larger discharge valve shall be a slow-operating valve.

All 1-1/2 in. (38 mm) or larger discharge outlets shall be equipped with a drain or bleeder valve having a minimum 3/4 in. (19 mm) pipe thread connection for draining or bleeding off pressure from a hose connected to the outlet.

Any 2-1/2 in. (65 mm) or larger discharge outlet that is located more than 42 in. (1070 mm) above the ground and to which a hose is to be connected, but that is not in a hose storage area, shall be equipped with a sweep elbow of at least 30 degrees downward.

The completed apparatus shall have the following discharge(s);

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **FRONT DISCHARGE**

### **2" DISCHARGE**

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

- One (1) of the discharge(s) shall flow water and foam.
- One (1) Akron Brass 8900 series Gen II, manual type 2" (52 mm) valve(s), Stainless Steel ball with HydroMax technology. Each valve shall be equipped with a Class 1 stainless steel weld type valve adapter on inlet side, and discharge side with drain port.
  - Valve(s) shall be controlled with a chrome handle directly connected to valve. Valve shall be mounted at front bumper with handle arranged through bumper gravel shield with protection from accidental adjustment during operation.
- There shall be a 2" (52 mm) VFC x 1-1/2" (38 mm) NSTM brass or chrome plated 90 degree swivel elbow provided for each discharge.
- One (1) Innovative Controls model 3003000, 3/4" brass 90 degree ball type drain valve(s) with lift type handle which can be opened under pressure, with color coded label shall be provided. Valve(s) shall be located on bottom of pump panel or drain the lowest point in the plumbing.
- A discharge pressure gauge is not required with the remote valve control.

### **FRONT BUMPER GROUND SWEEP SNOZZLES**

The front bumper shall be provided with 1/2" ground sweep nozzles with 145 degree spray angle (approx. 16 GPM @ 100 PSI) with spray overlap. Two (2) Bete 1/2" NPT brass fan type nozzles with vertical adjustable brass nozzle joints shall be provided and mounted, one (1) each corner of bumper and plumbed to valve using high pressure flexible 1/2" hose.

- One (1) of the discharge(s) shall flow water only.
- Two (2) KZ #KZ84DM 1/2" (12 mm) 12 VDC electric stainless steel on/off valves shall be provided to control the front ground sweep nozzles. Each valve shall be individually controlled with 12 VDC on/off switches located in cab near driver, and labeled "Front Spray Bar".
- One (1) Innovative Controls model 3003000, 3/4" brass 90 degree ball type drain valve(s) with lift type handle which can be opened under pressure, with color coded label shall be provided. Valve(s) shall be located on bottom of pump panel or drain the lowest point in the plumbing.



# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **REAR STREETSIDE DISCHARGE**

Each discharge(s) shall have a stainless steel trim ring.

## **2-1/2" DISCHARGE**

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

- One (1) of the discharge(s) shall flow water and foam.
- One (1) Akron Brass 8800 series Gen II, manual type 2-1/2" (65 mm) valve(s), Stainless Steel ball with HydroMax technology. Each valve shall be equipped with a Class 1 stainless steel weld type valve adapter on inlet side, and discharge side with drain port.
  - Valve(s) shall be controlled with a push/pull type chromed "T" handle connected to the valve. The control handle shall be located adjacent to the plumbing connection.
- Each discharge shall have a 2-1/2" (65 mm) NSTF x 2-1/2" (65 mm) NSTM chrome plated 30 degree downsweep elbow provided.
- One (1) Innovative Controls model 3003000, 3/4" brass 90 degree ball type drain valve(s) with lift type handle which can be opened under pressure, with color coded label shall be provided. Valve(s) shall be located on bottom of pump panel or drain the lowest point in the plumbing.
- One (1) Innovative Controls/NoShok 2-1/2" liquid filled gauge(s) with red (foam) LED backlighting activated with pump engagement.
  - Gauge(s) shall have a white background with black text and blue (water) or red (foam) pie indicator.
  - Gauge(s) shall have a range from 0 to 400 PSI.
  - The gauge shall have a die cast zinc, chrome plated bezel with color-coded labels insert and a color-coded gauge trim ring. Labels shall be UV and scratch resistant and meet SAE standards where applicable.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **REAR CURBSIDE DISCHARGE**

Each discharge(s) shall have a stainless steel trim ring.

## **2-1/2" DISCHARGE**

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

- One (1) of the discharge(s) shall flow water and foam.
- One (1) Akron Brass 8800 series Gen II, manual type 2-1/2" (65 mm) valve(s), Stainless Steel ball with HydroMax technology. Each valve shall be equipped with a Class 1 stainless steel weld type valve adapter on inlet side, and discharge side with drain port.
  - Valve(s) shall be controlled with a push/pull type chromed "T" handle connected to the valve. The control handle shall be located adjacent to the plumbing connection.
- Each discharge shall have a 2-1/2" (65 mm) NSTF x 2-1/2" (65 mm) NSTM chrome plated 30 degree downsweep elbow provided.
- There shall be a 2-1/2" (65 mm) NSTF x 1-1/2" (38 mm) NSTM "Y" adapter provided for discharge(s).
- One (1) Innovative Controls model 3003000, 3/4" brass 90 degree ball type drain valve(s) with lift type handle which can be opened under pressure, with color coded label shall be provided. Valve(s) shall be located on bottom of pump panel or drain the lowest point in the plumbing.
- One (1) Innovative Controls/NoShok 2-1/2" liquid filled gauge(s) with red (foam) LED backlighting activated with pump engagement.
  - Gauge(s) shall have a white background with black text and blue (water) or red (foam) pie indicator.
  - Gauge(s) shall have a range from 0 to 400 PSI.
  - The gauge shall have a die cast zinc, chrome plated bezel with color-coded labels insert and a color-coded gauge trim ring. Labels shall be UV and scratch resistant and meet SAE standards where applicable.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **BOOSTER REEL DISCHARGE**

There shall be two (2) Hannay SBEF series booster hose reel discharge(s) with polished aluminum finish, and electric rewind motor located as required, or per itemized compartment layout.

- Power rewind control(s) shall be in a position where the operator can observe the rewinding operation and not be more than 72 in. (1830 mm) above the operator's standing position, and shall be marked with a label indicating its function.
- Each booster hose reel shall be equipped with a Hannay FH-3 hose guide rollers.
- Each booster hose reel shall be supplied with 150' x 3/4" diameter, 800 PSI rubber booster hose with 3/4" NST hardcoat aluminum couplings. Color of hose shall be red.
- An TFT model B-BGT, 1" pistol grip nozzle shall be provided with specified booster hose reel. Each reel shall be provided with a nozzle storage bracket.
- Two (2) of the discharge(s) shall flow water and foam.
- Two (2) Class 1 10BV, manual 1" (25 mm) in-line brass ball valve(s) shall be provided. Valve shall be equipped with react angular chromed 1/4 turn control knob to manually open and close the valve(s) with recessed 3" x 1" area for label.
- Two (2) Innovative Controls model 3003000, 3/4" brass 90 degree ball type drain valve(s) with lift type handle which can be opened under pressure, with color coded label shall be provided. Valve(s) shall be located on bottom of pump panel or drain the lowest point in the plumbing.
- A discharge pressure gauge is not required with the remote valve control.

## **TANK FILL VALVE**

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

- One (1) Akron Brass 8800 series Gen II, manual type 2" (52 mm) valve(s), Stainless Steel ball with HydroMax technology. Each valve shall be equipped with a Class 1 stainless steel weld type valve adapter on inlet side, and discharge side with drain port.
  - The specified Akron valve(s) shall be configured for 12 VDC electric actuation.
- Two (2) Akron 9323 Navigator Pro electric valve position controller and wire harness with full color LCD display visible from all angles, true position feedback, user programmable presets, % open text shown on valve bar graph, and VMUX capable integration shall be located on the pump operator's panel, and cab center console.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **MASTER INTAKE/PRESSURE GAUGES**

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

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

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

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

- Gauge(s) shall have a white background with black text.
- Gauge(s) shall have a range from -30" to 400 PSI.

## **REAR SCENE LIGHTS SWITCHING**

There shall be a switch on streetside rear of body to activate the rear scene lights and any specified rear step lighting. The switch shall be a momentary style and connected to a bi-stable relay, allowing multiple switching locations. The scene lights shall automatically shut-off when the parking brake is disengaged.

## **PUMP SAFETY AND TEST LABELS**

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

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

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

## **PUMP PANEL LIGHTING**

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

## **FUEL LEVEL GAUGE**

An auxiliary fuel gauge shall be provided and located on pump operators panel with other specified gauges to display the chassis fuel level.

## **BACK PACK FILLER VALVE**

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **POLY WATER TANK**

The water tank capacity shall be approximately 750 US gallon or 624 Imperial gallons. Certification of the tank capacity shall be recorded on the manufacturer's record of construction and shall be provided to the purchaser upon delivery of the apparatus.

## **CONSTRUCTION**

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

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

## **WATER FILL TOWER AND COVER**

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

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

## **SUMP**

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **OUTLETS**

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

## **MOUNTING**

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

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

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

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

## **CENTER OF GRAVITY**

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

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **WATER TANK LEVEL GAUGE**

There shall be two (2) Innovative Controls SL series 10-LED water tank level gauge(s) for indicating water tank level. The tank level gauge shall indicate the liquid level on an easy to read display.

Each tank level gauge system shall include:

- A pressure transducer that is mounted on the outside of the tank in an easily accessible area.
- A super bright LED bar graph display with a visual alarm at 1/4 of a tank. The display shall also provide an output to activate an audible alarm or secondary visual alarm at 1/4 of a tank.
- A set of weather resistant connectors to connect the digital display to the pressure transducer and to the apparatus power.

One (1) tank level gauge each upper side rear corner of body.

## **CAB MOUNTED WATER TANK INDICATOR**

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

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

## **WATER TANK LEVEL INDICATOR**

There shall be two (2) Innovative Controls Monster SL Plus series 180 degree visible 20-LED water tank level gauge(s) for indicating water tank level. The tank level gauge shall indicate the liquid level on an easy to read display.

Each tank level gauge system shall include:

- A pressure transducer that is mounted on the outside of the tank in an easily accessible area.
- A 180 degree visible super bright LED bar graph display with a visual alarm at 1/4 of a tank. The display shall also provide an output to activate an audible alarm or secondary visual alarm at 1/4 of a tank.

A set of weather resistant connectors to connect the digital display to the pressure transducer and to the apparatus power.

The red "1/4" level light shall flash when the tank level drops below "1/4" of the tank capacity. The light shall be installed in a vertical orientation and be de-activated whenever the parking brake is released.

## **UPF POLY WATER TANK WARRANTY**

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

## **FILL TOWER PROTECTION**

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

Incorporated into protection panel, will be storage area for two (2) 5 gallon pales of foam.

# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **CLASS A POLYPROPYLENE FOAM CELL**

There shall be one (1) 30 US gallon or 24.6 Imperial gallons polypropylene foam cell incorporated into the polypropylene water tank. This foam tank capacity shall be deducted from water tank size specified.

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

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

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

## **FOAM TANK LEVEL GAUGE**

There shall be one (1) Innovative Controls SL series 10-LED foam tank level gauge(s) for indicating foam tank level. The gauge shall indicate the liquid level on an easy to read display.

Each tank level gauge system shall include:

- A pressure transducer that is mounted on the outside of the tank in an easily accessible area.
- A super bright LED bar graph display with a visual alarm at 1/4 of a tank. The display shall also provide an output to activate an audible alarm or secondary visual alarm at 1/4 of a tank.
- A set of weather resistant connectors to connect the digital display to the pressure transducer and to the apparatus power.



# Loveland Fire Rescue Authority

Engine Type 4, SVI #1098

## **EQUIPMENT PAYLOAD WEIGHT ALLOWANCE**

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

## **EQUIPMENT**

The following equipment shall be furnished with the completed wildland vehicle;

- One (1) container of assorted stainless steel nuts, bolts, screws and washers used in the construction of the apparatus shall be provided with the completed apparatus.
- There shall be two (2) Zico SAC-44-E NFPA approved folding aluminum wheel chocks provided for 44" diameter tires that together will hold the vehicle when loaded to its GVWR or GCWR, on a hard surface with a 20 % grade, with the transmission in neutral, and the parking brake released.
  - The wheel chock(s) shall be mounted ahead of rear wheels, below body on streetside.
- Two (2) Bright Star Lighthawk LED GenII flashlight(s) shall be provided. Each flashlight shall be orange in color. Each flashlight shall have a 12 volt DC charger and vehicle mount kit. The flashlights shall be wired to battery direct unless otherwise specified by the customer.
- Two (2) flashlight(s) shall be mounted in the rear cab area on back of center console.
- Three (3) Kochek 4.0" x 8' and three (3) 2.5" x 8' Flexlite PVC flexible suction hose shall be provided with completed unit. The hoses shall have light weight Storz, 2-lug couplings provided.
- One (1) 4" barrel strainer(s) with foot valve shall be provided with completed unit. Barrell strainer hard suction end shall match provided hard suction(s).
  - The suction hose(s) shall be mounted on streetside above wheels in formed aluminum hard suction tray(s).
- One (1) 2-1/2" Swivel NHF x 1-1/2" NHM 2-Way Ball Vavle(s) shall be provided with completed unit.
- Loveland Fire Rescue Authority supplied NFPA required fire hose and nozzles shall be provided on completed unit before placing vehicle in service.

## **REMAINING NFPA MINOR EQUIPMENT BY PURCHASER**

All other minor equipment not specified above, but required by NFPA 1906 for wildland vehicles, section 5.7 shall be supplied and mounted by Loveland Fire Rescue Authority before the unit is placed in emergency service.