

# Sutphen Corporation Stock 395 Industrial Pumper

## TABLE OF CONTENTS

INTENT OF SPECIFICATIONS .....	8
STATEMENT OF EXCEPTIONS TO NFPA 1901 .....	8
QUALITY AND WORKMANSHIP .....	8
PERFORMANCE TESTS AND REQUIREMENTS .....	9
FAILURE TO MEET TESTS .....	9
EXCEPTIONS TO SPECIFICATIONS .....	10
GENERAL CONSTRUCTION .....	10
DELIVERY REQUIREMENTS .....	10
PURCHASER RIGHTS .....	10
U.S.A. MANUFACTURER .....	10
MANUFACTURER'S EXPERIENCE .....	11
ELIMINATION OF DIVIDED RESPONSIBILITY .....	11
FAMA COMPLIANCE .....	11
APPROVAL DRAWING .....	12
WIRING SCHEMATICS .....	12
CHASSIS .....	12
ALUMINUM CAB .....	12
CAB DESIGN .....	12
CAB SUB-FRAME .....	13
CAB TILT SYSTEM .....	13
CAB DIMENSIONS .....	14
FENDER CROWNS .....	14
GRILLE .....	14
CAB INSULATION .....	14
ROOF DESIGN .....	14
EXTERIOR GLASS .....	14
SUN VISORS .....	15
CAB STEPS .....	15
STEP LIGHTS .....	15
CAB STRUCTURAL INTEGRITY .....	15
SEAT BELT TESTING .....	16
MANUAL CAB LIFT .....	16
BARRIER STYLE CAB DOORS .....	16
POWER WINDOWS .....	17
GLOVE BOX .....	17
MOUNTING PLATES .....	17
IN-CAB OVERHEAD STORAGE AREA .....	17
INTERIOR DOOR PANELS .....	17
REFLECTIVE MATERIAL .....	17
CAB ACCESSORY FUSE PANEL .....	17
AIR HORNS .....	18
ALTERNATOR .....	18
FRONT AXLE .....	18
REAR AXLE .....	18
TOP SPEED .....	18
BATTERIES .....	18

## Sutphen Corporation Stock 395 Industrial Pumper

SHORE POWER .....	19
BATTERY CHARGING .....	19
BATTERY JUMPER TERMINAL .....	19
AIR BRAKE SYSTEM .....	20
AIR BRAKING ABS SYSTEM .....	21
AUTOMATIC SLIP RESPONSE .....	21
ASR SWITCH .....	21
PAINTED STEEL BUMPER .....	21
DIAMOND PLATE BUMPER LID .....	22
STORAGE WELL COMPARTMENT .....	22
COOLING SYSTEM .....	22
RADIATOR .....	22
CHARGE AIR COOLER .....	23
COOLANT .....	23
HOSES & CLAMPS .....	23
FAN .....	23
FAN CLUTCH .....	23
SURGE TANK .....	24
DRIVELINE .....	24
ENGINE ENCLOSURE, RAPTOR SKIN COVERING .....	24
ENGINE .....	25
ENGINE WARRANTY .....	25
AIR COMPRESSOR .....	25
STARTER .....	25
FUEL FILTERS .....	25
EXHAUST SYSTEM .....	25
AFTER TREATMENT SYSTEM .....	26
ON-BOARD DIAGNOSTIC (OBD) SYSTEM .....	26
AIR CLEANER/INTAKE .....	26
FUEL PRIMER .....	27
FUEL/WATER SEPARATOR .....	27
ENGINE BRAKE .....	27
DIESEL EXHAUST FLUID TANK .....	27
DOUBLE FRAME RAILS .....	28
FUEL COOLER .....	28
CAB HANDRAILS .....	28
CAB DOOR HANDRAILS .....	29
COAT HOOKS FOR GRAB HANDLES .....	29
HEATER/DEFROSTER/AIR CONDITIONER .....	29
HEATER/DEFROSTER/AIR CONDITIONING CONTROLS .....	30
DEFROSTER DIFFUSER .....	30
AUXILIARY DEFROSTER FAN .....	30
AUXILIARY DEF .....	30
LOAD MANAGER .....	30
AUTOMATIC HIGH IDLE ACTIVATION .....	31
INSTRUMENT PANEL .....	31
MASTER BATTERY & IGNITION SWITCH .....	31
DIESEL PARTICULATE FILTER CONTROLS .....	31
INSTRUMENTATION & CONTROLS .....	31

# Sutphen Corporation Stock 395 Industrial Pumper

CENTER CONTROL CONSOLE .....	33
OVERHEAD CONTROL CONSOLE .....	34
ENGINE WARNING SYSTEM .....	34
CHASSIS WIRING .....	35
MASTER ELECTRICAL PANEL .....	35
PUMP SHIFT MODULE .....	36
HIGH IDLE .....	36
AUXILIARY POWER POINTS .....	36
USB POWER POINT .....	36
VEHICLE DATA RECORDER .....	37
INTERIOR .....	37
LIGHTING CAB EXTERIOR .....	37
LED HEADLIGHTS .....	37
ALTERNATING HEAD LAMP .....	37
DAYTIME RUNNING LIGHTS .....	38
HAND HELD SPOTLIGHT .....	38
LIGHTING CAB INTERIOR .....	38
DOOR LIGHTS .....	38
LIGHTING CREW CAB INTERIOR .....	38
MIRRORS .....	38
HELMET STORAGE .....	39
SEAT BELT WARNING SYSTEM .....	39
DRIVER'S SEAT .....	39
OFFICER'S SEAT .....	39
UNDER SEAT STORAGE .....	39
CREW SEATS .....	39
SCBA BOTTLE BRACKET .....	40
CREW SEAT COMPARTMENT .....	40
STEERING .....	40
SUSPENSION (FRONT) .....	41
ENHANCED FRONT SUSPENSION SYSTEM .....	41
FRONT TIRES .....	42
FRONT HUB COVERS .....	42
REAR HUB COVERS .....	42
REAR TIRES .....	42
MUD FLAPS .....	42
WHEELS .....	42
TRANSMISSION .....	42
TRANSMISSION COOLER .....	43
TRANSMISSION FLUID .....	43
TRANSMISSION SHIFTER .....	43
POWER TAKE OFF .....	44
FRONT TURN SIGNALS .....	44
WHEELBASE .....	44
WINDSHIELD WIPERS .....	44
MISCELLANEOUS CHASSIS EQUIPMENT .....	44
FIRE PUMP WATEROUS CRU-2 4000 GPM .....	44
C-21 HIGH TORQUE PUMP TRANSMISSION .....	45

PUMPING SYSTEMS DELIVERING LESS THAN 4000 GPM FROM DRAFT ARE NOT

## Sutphen Corporation Stock 395 Industrial Pumper

DESIRED AND WILL NOT BE ACCEPTED. NO EXCEPTIONS	.46
PUMP SHIFT	46
PRIMING SYSTEM	46
MANUAL PUMP SHIFT OVERRIDE	46
PUMP CERTIFICATION	46
MECHANICAL PUMP SEAL	47
THREAD TERMINATION	47
PUMP ANODE	47
PRESSURE GOVERNOR / MONITORING DISPLAY	47
OVERHEAT PROTECTION MANAGER	48
INTAKE RELIEF	48
AUXILIARY COOLER	48
VALVES	49
VALVE WARRANTY	49
PUMP SUCTION INLETS	49
SUCTION INLET VALVE STANDARDS (WHERE OPTIONALLY SPECIFIED)	.49
INLET BLEEDER VALVES	49
"ROUND TUBULAR" HIGH-FLOW SUCTION MANIFOLD PIPING	50
INLET ADAPTERS	51
2.5" LEFT SIDE INLET	51
PUMP DISCHARGE OUTLETS	52
DISCHARGE OUTLET BLEEDERS	52
HOSE THREADS	52
DRIVER SIDE 3" FOAM CAPABLE DISCHARGE(S)	53
DRIVER SIDE 3" FOAM LINE CONTROLLERS AND ACCESSORIES	53
DRIVER SIDE FOAM CAPABLE LARGE DIAMETER DISCHARGE	54
DRIVER SIDE 6" FOAM LINE CONTROLLERS AND ACCESSORIES	54
PASSENGER SIDE 3" FOAM CAPABLE DISCHARGE(S)	55
PASSENGER SIDE 3" FOAM LINE CONTROLLERS AND ACCESSORIES	55
PASSENGER'S SIDE FOAM CAPABLE LARGE DIAMETER DISCHARGE	56
PASSENGER'S SIDE 6" FOAM LINE CONTROLLERS AND ACCESSORIES	56
DISCHARGE ADAP	57
DRIVER SIDE REAR 3" FOAM CAPABLE DISCHARGE(S)	57
DRIVER SIDE REAR 3" FOAM LINE CONTROLLERS AND ACCESSORIES	57
PASSENGER'S SIDE REAR FOAM CAPABLE LARGE DIAMETER DISCHARGE	58
PASSENGER'S SIDE 6" FOAM LINE CONTROLLERS AND ACCESSORIES	58
REAR DECK GUN AUXILARY INLET	59
FRONT BUMPER DISCHARGE	59
FRONT BUMPER 2-1/2" PRECONNECT DISCHARGE	59
FRONT BUMPER DISCHARGE FOAM LINE CONTROLLER AND ACCESSORIES	59
PASSENGER'S SIDE REAR DELUGE MONITOR 4" RISER, FLOWS TO 2000-GPM	.60
AUXILIARY DECK RISER	60
TASK FORCE TIPS MONSOON RC - REMOTE CONTROLLED REAR MONITOR(S)	.61
TASK FORCE TIPS MONSOON RC - WIRELESS MONITOR OPERATOR STATION	.61
WILLIAM 5000 GPM MONITOR/NOZZLE	61
DELUGE MONITOR FOAM CAPABLE GATED DISCHARGE	62

## Sutphen Corporation Stock 395 Industrial Pumper

DELUGE MONITOR 8" DISCHARGE .....	62
DELUGE MONITOR WATERWAY FOAM LINE CONTROLLER AND ACCESSORIES .62	
1 3/4" CROSSLAY HOSEBEDS (2 ea.) .....	63
CROSSLAY 2" DISCHARGE .....	63
CROSSLAY DISCHARGE(S) FOAM LINE CONTROLLERS AND ACCESSORIES .64	
HOSE ROLLERS .....	65
CROSSLAY COVER (treadplate) .....	65
DIRECT TANK FILL(foam) .....	65
FOAM SUCTION H .....	65
ACCUMAX 300-GPM FOAM PROPORTIONING SYSTEM .....	65
TRANSMISSION MOUNTED PTO WITH HYDRAULIC PUMP .....	68
CERAMIC COATED ROTARY FOAM PUMP SHAFTS .....	68
MANUAL OVERRIDE .....	68
FOAM TANK REFILL .....	68
FOAM TANK GATED SUCTION, 2-1/2" VALVE & PIPING .....	68
AUXILARY FOAM PUMP GATED SUCTION INLET, 2-1/2" NST MALE, 2-1/2"	
VALVE & PIPING .69	69
AUXILARY FOAM PUMP GATED SUCTION OUTLET, 2-1/2" NST MALE, 2-1/2"	
VALVE & PIPING .69	69
SYSTEM FLUSH .....	70
CAM-LOCK ADAPTERS .....	70
PUMP ENCLOSURE, MID-SHIP S/S MODULAR - TOP MOUNT CONTROLS	
CONTROLS .70	70
PUMP INSPECTION DOORS .....	72
HAND RAILINGS AT TOP MOUNT WALKWAY ENTRANCES .....	72
HANDRAIL BELOW PUMP CONTROL PANEL .....	72
MIDSHIP PUMP TOP MOUNT CONTROLS .....	72
IDENTIFICATION TAGS .....	73
TOP OPERATOR'S PLATFORM/WALKWAY .....	73
NON-SLIP PATTERN-CUT/PUNCTURE-FABRICATED GRIP AREAS .73	73
BRUSHED STAINLESS "TIP-OUT" INSTRUMENT PANEL WITH LIGHT HOOD .74	
GAUGE AND INSTRUMENT LIGHTING .....	74
INSTRUMENT PANEL LIGHTS, LED STRIP STYLE .....	74
ENGINE INSTRUMENTATION .....	74
MASTER PUMP PRESSURE GAUGES, BRONZE NO-SHOK .....	74
TEST GAUGE PANEL .....	75
INDIVIDUAL DISCHARGE GAUGES, 2-1/2" DIAMETER .....	75
FOAM LEVEL - INDICATOR - TANKVISION .....	75
PUMP COMPARTMENT LIGHTS, LED .....	75
TOP-SIDE ACCESS LADDER .....	76
FUEL GAUGE .....	76
AIR HORN BUTTON .....	76
WATER TANK GAUGE .....	76
BODY SUB-FRAME .....	76
APPARATUS BODY .....	77
REAR STEP COMPARTMENTATION .....	78
COMPARTMENTATION LEFT SIDE .....	78
COMPARTMENTATION RIGHT SIDE .....	78
ROLL-UP COMPARTMENT DOORS .....	78

## Sutphen Corporation Stock 395 Industrial Pumper

SCBA CYLINDER COMPARTMENTS .....	79
COMPARTMENT MATTING .....	79
TOOL MOUNTING .....	79
TOOL BOARD .....	79
ADJUSTABLE SHELF .....	79
COMPARTMENT DIVIDER .....	80
ADJUSTABLE VERTICAL SLIDE-OUT PANEL .....	80
ADJUSTABLE ROLLOUT DRAWER .....	80
600# SLIDE-MASTER TRAY .....	80
UNISTRUT .....	80
HOSE BED .....	81
HOSE BED DIVIDER .....	81
HOSE BED COVER .....	81
POWER OPERATED HOSEBED COVERS .....	81
BODY HANDRAILS .....	81
STEPS .....	82
INTERMEDIATE REAR STEP .....	82
RUB RAILS .....	82
ALUMINUM TREADPLATE .....	82
FENDER PANELS .....	83
1000 GALLON FOAM TANK .....	83
MASTER ELECTRICAL PANEL .....	84
BODY ELECTRIC SYSTEM .....	85
BACK-UP ALARM .....	86
COMMUNICATION SYSTEM .....	86
COMPARTMENT LIGHTING .....	87
POWER GROUND STUDS .....	87
LICENSE PLATE BRACKET .....	87
VOYAGER SPLIT SCREEN, 3 CAMERA SYSTEM .....	87
HD STEREO .....	87
REAR TURN SIGNALS .....	88
LED ICC/MARKER LIGHTS .....	88
STEP LIGHTS .....	88
GROUND LIGHTING .....	88
SCENE LIGHTS .....	88
OPTICAL WARNING SYSTEM .....	88
UPPER LEVEL WARNING DEVICES .....	89
WHELEN MINI LED LIGHTBARS .....	89
LOWER LEVEL WARNING DEVICES .....	89
SIREN .....	90
FEDERAL Q2B SIREN .....	90
SIREN SPEAKER .....	90
WHELEN PIONEER PLUS LED BROW LIGHT .....	90
LED LIGHT WHELEN PIONEER .....	90
SUCTION HOSE AND STRAINER .....	91
CORROSION REDUCTION POLICY .....	91
PAINTING .....	95
PAINT-TWO TONE CAB .....	96
PAINTED FRAME .....	96

## Sutphen Corporation Stock 395 Industrial Pumper

LETTERING .....	96
STRIPING .....	96
STRIPE EDGING .....	96
STRIPING, CHEVRON STYLE, REAR BODY, OUTBOARD .....	96
MISCELLANEOUS EQUIPMENT FURNISHED .....	97
WHEEL CHOCKS .....	97
TFT JUMBO SPANNER WRENCH .....	97
TFT JUMBO SPANNER WRENCH .....	97
STORZ ADAPTER .....	97
OPERATION AND SERVICE MANUALS .....	97
WARRANTIES .....	98
MANUFACTURING & LOCATIONS .....	98

## **INTENT OF SPECIFICATIONS**

It is the intent of these specifications to cover the furnishing and delivery to the purchaser a complete apparatus equipped as hereinafter specified. With a view of obtaining the best results and the most acceptable apparatus for service in the fire department, these specifications cover only the general requirements as to the type of construction and tests to which the apparatus must conform, together with certain details as to finish, equipment and appliances with which the successful bidder must conform. Minor details of construction and materials where not otherwise specified are left to the discretion of the contractor, who will be solely responsible for the design and construction of all features. The apparatus will conform to the requirements of the current (at the time of bid) National Fire Protection Association Pamphlet #1901 for Motor Fire Apparatus unless otherwise specified in these specifications.

Bids will only be considered from companies which have an established reputation in the field of fire apparatus construction and have been in business for a minimum of ten (10) years.

Each bid will be accompanied by a set of "Contractor's Specifications" consisting of a detailed description of the apparatus and equipment proposed and to which the apparatus furnished under contract must conform. Computer run-off sheets are not acceptable as descriptive literature.

The specifications will indicate size, type, model and make of all component parts and equipment.

## **STATEMENT OF EXCEPTIONS TO NFPA 1901**

If, at the time of delivery, the apparatus manufacturer is not in compliance, a statement of exceptions must be provided as follows:

- The specific standard affected.
- A statement describing why the manufacturer is not in compliance.
- A description of the remedy, and who the responsible party is.

The document must be signed by an officer of the company, and an authorized agent of the purchaser. **NO EXCEPTIONS**

## **QUALITY AND WORKMANSHIP**

The design of the apparatus must embody the latest approved automotive engineering practices.

The workmanship must be the highest quality in its respective field. Special

consideration will be given to the following points: Accessibility to various areas requiring periodic maintenance, ease of operation (including both pumping and driving) and symmetrical proportions.

Construction must be rugged and ample safety factors must be provided to carry loads as specified and to meet both on and off road requirements and speed as set forth under "Performance Test and Requirements."

### **PERFORMANCE TESTS AND REQUIREMENTS**

A road test will be documented with the apparatus fully loaded and a continuous run of ten (10) miles or more will be made under all driving conditions, during which time the apparatus will show no loss of power or overheating. The transmission drive shaft or shafts, and rear axles will run quietly and free from abnormal vibration or noise throughout the operating range of the apparatus. The apparatus, when loaded, will be approximately 66% on the rear axle. The successful bidder will furnish a weight certification showing weight on the front and rear axle, and the total weight of the completed apparatus at the time of delivery.

- a. The apparatus must be capable of accelerating to 30 MPH from a standing start within 25 seconds on a level concrete highway without exceeding the maximum governed engine RPM.
- b. The service brakes will be capable of stopping the fully loaded vehicle within 35 feet from a speed of 25 MPH on a level concrete highway.
- c. The apparatus, fully loaded, will be capable of obtaining a speed of 50 MPH on a level highway with the engine not exceeding 95% of its governed RPM (full load).
- d. The apparatus will be tested and approved by a qualified testing agency in accordance with their standard practices for pumping engines.
- e. The contractor will furnish copies of the Pump Manufacturer's Certification of Hydrostatic Test (if applicable), the Engine Manufacturer's current Certified Brake Horsepower Curve and the Manufacturer's Record of Construction Details.

### **FAILURE TO MEET TESTS**

In the event the apparatus fails to meet the test requirements of these specifications on the first trial, a second trial may be made at the option of the bidder within thirty (30) days of the date of the first trials. Such trials will be final and conclusive and failure to comply with these requirements will be cause for rejection. Permission to keep and/or

store the apparatus in any building owned or occupied by the purchaser will not constitute acceptance of same.

### **EXCEPTIONS TO SPECIFICATIONS**

The following specifications will be strictly adhered to. Exceptions will be considered if they are deemed equal to or superior to the specifications, provided they are fully explained on a separate page entitled "EXCEPTIONS TO SPECIFICATIONS." Exceptions will be listed by page and paragraph.

Failure to denote exceptions in the above manner will result in immediate rejection of the proposal. In addition a general statement taking "TOTAL EXCEPTION" to the specifications will result in immediate rejection of bid.

### **GENERAL CONSTRUCTION**

The apparatus will be designed and the equipment mounted with due consideration to distribution of load between the front and rear axles so that all specified equipment, including filled water tank, a full complement of personnel and fire hose will be carried without injury to the apparatus. Weight balance and distribution will be in accordance with the recommendations of the International Association of Fire Chiefs and National Fire Association (or American Insurance Association). Certified Laboratories certificate will be submitted by the manufacturer. Weight of apparatus will meet all federal axle load laws.

### **DELIVERY REQUIREMENTS**

The apparatus will be completely equipped as per these specifications upon arrival and on completion of the required tests will be ready for immediate service in the fire department of the purchaser. Any and all alterations required at the scene of delivery to comply with these specifications must be done at the contractor's expense.

### **PURCHASER RIGHTS**

The Purchaser reserves the right to accept or reject any bid. The purchaser also reserves the right to award in their best interest and reserves the right to waive any formalities.

### **U.S.A. MANUFACTURER**

The entire apparatus will be assembled within the borders of the Continental United States to insure more readily available parts (without added costs and delays caused by tariffs and customs) and service, as well as protecting the purchaser should legal action ever be required.

**MANUFACTURER'S EXPERIENCE**

Each manufacturer will have been in business making similar apparatus for a minimum of seventy-five (75) years and must have had single ownership for more than fifty (50) years.

**ELIMINATION OF DIVIDED RESPONSIBILITY**

It is required that each bidder produce both the chassis and complete apparatus. To eliminate divided responsibility and service, the chassis and body must be manufactured by the same Company. Manufacturer will state the number of years the Company has been producing their own chassis and body. Manufacturer will state compliance with the paragraph. NO EXCEPTIONS.

**FAMA COMPLIANCE**

Manufacturer must be a current member of the Fire Apparatus Manufacturer's Association.

### **APPROVAL DRAWING**

After the award of bid and pre-construction conference, a detailed layout drawing depicting the apparatus layout and appearance including any changes agreed upon will be provided for customer review and signature. The drawing will become part of the contract documents. The drawing will consist of left side, right side, frontal and rear elevation views. Apparatus equipped with a fire pump, will have a general layout view of the pump operators panel scaled the same as the elevation views.

### **WIRING SCHEMATICS**

A CD containing wiring diagrams of the apparatus will be provided at the time of delivery.

### **CHASSIS**

The chassis will be manufactured in the factory of the bidder. The chassis will be designed and manufactured for heavy duty service with adequate strength and capacity of all components for the intended load to be sustained and the type of service required. There will be no divided responsibility in the production of the apparatus.

### **ALUMINUM CAB**

The cab will be a full tilt 6-person cab with a 15" rear raised roof designed specifically for the fire service and manufactured by the chassis builder.

Cab will be built entirely by the apparatus manufacturer within the same facilities (no exceptions).

### **CAB DESIGN**

The cab will be designed specifically for the fire service and manufactured by the chassis builder.

The apparatus chassis will be of an engine forward, fully enclosed tilt cab design. There will be four (4) side entry doors.

The cab will be of a fully open design with no divider wall or window separating the front and rear cab sections.

Construction of the cab will consist of high strength 5052H32 aluminum welded to extruded aluminum framing of 6061-T6 material.

The cab roof will utilize extruded, radiused outer corner rails with integral drip channel and box tubing type cross brace supports.

The cab sides will be constructed from extruded door pillars and posts that provide a finished door opening, extruded and formed wheel well openings supports, formed aluminum wheel well liners and box tubing type support braces.

The cab floor and rear cab wall will utilize box tubing type framing and support bracing.

The framework will be of a welded construction that fully unitizes the structural frame of the cab.

The structural extrusion framework will be overlaid with interlocked aluminum alloy sheet metal panels to form the exterior skin of the cab.

The structural extrusion framework will support and distribute the forces and stresses imposed by the chassis and cab loads and will not rely on the sheet metal skin for any structural integrity.

### **CAB SUB-FRAME**

The cab will be mounted to a steel box tube sub-frame, and will be isolated from the chassis, through the use of no less than six (6) elastomeric bushings. The sub frame will be painted to match the primary chassis color.

The sub-frame will be mounted to the chassis through the use of lubricated Kaiser bushing for the front pivot point, and two (2) hydraulically activated cab latches, to secure the rear.

### **CAB TILT SYSTEM**

An electrically powered hydraulic cab tilt system will be provided, and will lift the cab to an angle of 45 degrees, exposing the engine and accessories for service. The system will be interlocked to only operate when the parking brake is set.

The lift system will be comprised of two (2) hydraulic lift cylinders, an electrically driven hydraulic pump, and a control switch. A mechanical locking system will be provided to ensure the cab remains in the raised position in the event of a hydraulic failure. The cab tilt controls will be interlocked to the parking brake to ensure the cab will not move, unless the parking brake is set.

The hydraulic lift cylinders will be connected to a steel cab sub-frame, and not directly to the cab. **NO EXCEPTIONS**

### **CAB DIMENSIONS**

The cab will be designed to satisfy the following minimum width and length dimensions:

Cab Width (excluding mirrors)	98"
Cab Length (from C/L of front axle)	
To front of cab (excluding bumper)	68"
To rear of cab	62"
Total Cab Length (excluding bumper)	130"

### **FENDER CROWNS**

Polished stainless steel front axle fenderettes with full depth radiused wheel well liners will be provided.

### **GRILLE**

The front of the cab will be equipped with a stainless steel grille with sufficient area to allow proper airflow into the cooling system and engine compartment.

### **CAB INSULATION**

The exterior walls, doors, and ceiling of the cab will be insulated from the heat and cold, and to further reduce noise levels inside the cab. The cab interior sound levels will not exceed 90 decibels at 45 mph in all cab seat positions. **NO EXCEPTIONS**

### **ROOF DESIGN**

The cab will be of a one-half 15" raised roof design with side drip rails and will satisfy the following **minimum** height dimensions:

Cab Dimensions Interior	
Front	59"
Rear	70"

Cab Dimensions Exterior	
Front	65"
Rear	80"

### **EXTERIOR GLASS**

The cab windshield will be of a two piece curved design utilizing tinted, laminated, automotive approved safety glass. The window will be held in place by an extruded

rubber molding. The cab will be finished painted prior to the window installation.

### **SUN VISORS**

The sun visors will be made of dark smoke colored transparent polycarbonate. There will be a visor located at both the driver and officer positions, recessed in a molded form for a flush finish.

### **CAB STEPS**

The lower cab steps will be no more than 22" from the ground. An intermediate step will be provided, mid way between the lower cab step, and the cab floor.

The intermediate step will be slightly inset to provide for safer ingress and egress. All steps will be covered with material that meets or exceeds the NFPA requirements for stepping surfaces.

### **STEP LIGHTS**

A white LED strip light will illuminate each interior cab step. These lights will illuminate whenever the battery switch is on and the cab door is opened.

### **CAB STRUCTURAL INTEGRITY**

The cab of the apparatus will be designed and so attached to the vehicle as to eliminate, to the greatest possible extent, the risk of injury to the occupants in the event of an accident.

The apparatus cab will be tested to specific load and impact tests with regard to the protection of occupants of a commercial vehicle.

A test will be conducted to evaluate the frontal impact strength of the apparatus cab to conform to the test J2420 and the "United Nations Regulation 29, Annex 3, paragraph 4, (Test A). A second test will be conducted to evaluate the roof strength of the apparatus cab to conform to the Society Of Automotive Engineers (SAE) SAE J2422/SAE J2420 and "United Nations Regulation 29, Annex 3, paragraph 5, (Test B) and SAE J2420. The evaluation will consist of the requirements imposed by ECE Regulation 29, Paragraph 5.

The test will be conducted by a certified independent third party testing institution.

A letter stating successful completion of the above test on the brand of cab being

supplied will be included in the bid. There will be “no exception” to this requirement.

### **SEAT BELT TESTING**

The seat belt anchorage system will be tested to meet FMVSS 207 Section 4.2a and FMVSS 210 section 4.2. Testing will be conducted by an independent third party product evaluation company.

A copy of the certification letter will be supplied with the bid documents.

### **MANUAL CAB LIFT**

There will be a manually operated hydraulic pump for tilting the cab in case the main pump should fail. Access to the pump will be located under the left corner of the front bumper.

### **BARRIER STYLE CAB DOORS**

Barrier style cab doors will be provided. The lower part of the door will be removed to expose the cab entry step well. The step well will be lined with aluminum treadplate.

The cab doorframes will be constructed from aluminum extrusions fitted with an aluminum sheet metal skin and will be equipped with dual weather seals. The outside cab door window opening will be framed by a black anodized aluminum trim, to provide a clean appearance. The cab doors will be equipped with heavy-duty door latching hardware, which complies with FMVSS 206. The door latch mechanism will utilize control cable linkage for positive operation. A rubber coated nylon web doorstop will be provided.

The doors will be lap type with a full-length stainless steel 3/8" diameter hinge and will be fully adjustable.

All openings in the cab will be grommeted or equipped with rubber boots to seal the cab from extraneous noise and moisture.

The cab doors will be designed to satisfy the following minimum opening and step area dimensions:

Door Opening:	
Front	36.5" x 73"
Rear	36.5" x 73"

All cab doors will have full roll down windows. **NO EXCEPTIONS.**

### **POWER WINDOWS**

All four cab entry doors will have power windows. Each door will be individually operated and the driver's position will have master control over all windows. All four windows will roll down completely. NO EXCEPTIONS.

### **GLOVE BOX**

A glove box will be provided and located directly in front of the officer position.

### **MOUNTING PLATES**

A 3/16" aluminum plate will be mounted on the engine cover for tool mounting.

### **IN-CAB OVERHEAD STORAGE AREA**

An overhead storage area will be provided at the front of the raised roof portion inside of the cab above the rear-facing crew seats. The full-width storage area will be approximately 84" wide x 15.5" high x 17" deep and will have a Zolatone gray/black rubberized, textured finish to match the cab interior. The storage area will be equipped with aluminum lift-up doors.

### **INTERIOR DOOR PANELS**

The interior of the cab entry doors will have a 304 brushed stainless steel scuff plate, contoured to the door, from the door sill down.

### **REFLECTIVE MATERIAL**

The lower portion of the door panels will include a total of 245 square inches of reflective material on each door, exceeding the NFPA requirement of 96 square inches. The layout will be opposing ruby red "chevron" stripes on each side. The red striping will be laid over white 3M reflective materials. The reflective decal will be plainly visible to oncoming traffic when the doors are in the open position.

### **CAB ACCESSORY FUSE PANEL**

A fuse panel will be located underneath the rear facing seat on the officer's side. The fuse panel will consist of six (6) battery hot and six (6) ignition switch circuits. Each circuit will be capable of 10-ampere 12-volt power and total output of 50-amps. The fuse panel will be capable of powering accessories such as hand held spotlights, radio chargers, hand lantern chargers and other miscellaneous 12-volt electrical components.

### **AIR HORNS**

Two (2) Grover 2040 Stuttertone rectangular, chrome plated, air horns will be recess mounted, one (1) each side behind the perforated grille of the bumper. The air horns will be controlled by a toggle switch wired through the horn button. A foot switch for the air horns will also be provided on the officer's side.

### **ALTERNATOR**

A 320 ampere Prestolite/Leece Neville alternator with serpentine belt will be provided. The alternator will generate 260 amperes at idle.

A low voltage alarm, audible and visual, will be provided.

### **FRONT AXLE**

The front axle will be a Meritor™ MFS-20-133A 3.74" drop beam with a capacity of 23,000 pounds. The axle will be hub piloted, 10 stud, furnished with oil seals and come complete with assist cylinder, hoses, and mounting brackets.

### **REAR AXLE**

The rear axle will be a Meritor™ RS-30-185 Single reduction drive axle with a capacity of 31,000 lbs. The axles will be hub piloted, 10 studs, furnished with oil seals.

### **TOP SPEED**

The top speed will be 60 MPH.

### **BATTERIES**

The battery system will be a single system consisting of four negative ground, 12 volt Interstate Group 31 MHD batteries, cranking performance of 950 CCA each with total of 3800 amps, 185 minute reserve capacity with 25 ampere draw at 80 degrees Fahrenheit. Each battery will have 114 plates. Warranty will be accepted nationwide.

The batteries will be installed in a vented 304 stainless steel battery box with a removable aluminum cover to protect the batteries from road dirt and moisture. The battery cover will be secured with four "T" handle rubber hold downs to provide easy access for maintenance and inspection. Stainless steel hardware will be used for installation. The batteries are to be placed on dri-deck and secured with a fiberglass hold down. The batteries will be wired directly to starter motor and alternator.

The battery cables will be 3/0 gauge. Battery cable terminals will be soldering dipped, color-coded and labeled on heat shrink tubing with a color-coded rubber boot protecting the terminals from corrosion.

There will be a 350-ampere fuse protecting the pump primer and a 250-ampere fuse protecting the electric cab tilt pump and other options as required.

### **SHORE POWER**

A shore power connection will be provided with two (2) 110-volt outlets. The location of the outlets will be determined during the pre-construction conference.

### **BATTERY CHARGING**

A Kussmaul Auto Charge 1200 battery system charger will be provided. The Auto Charge 1200 is a fully automatic battery charger with a very high output for vehicles with a single battery system. A remote single bar graph display is provided to indicate the state of charge of the battery system. The rated output will be 40 amps for the battery system.

A Kussmaul Model 091-55-20-120 super electric auto-eject with weatherproof cover and power interrupt will be provided.

An 120 volt Auto Pump air compressor will also be provided to maintain air within the air brake system.

A miniature air filter, that mounts in the output pressure line of the air pump to trap moisture, will be provided. The micron filter element removes contaminants from the air line. A transparent bowl permits easy monitoring of water collected and a manual purge valve allows the operator to conveniently drain the bowl. A Bendix DV2 heated automatic drain valve will be provided.

### **BATTERY JUMPER TERMINAL**

There will be one set (two studs) of battery jumper terminals located by the battery box under the cab. The terminals will have plastic color-coded covers. Each terminal will be tagged to indicate positive/negative.

### **BRAKES** (Front)

The front brakes will be Meritor S-cam style. They will be 16.5" x 6" with heavy-duty return springs, and a double anchor pin design. They will also have quick-change

shoes for fast easy brake relining.

### **BRAKES** (Rear)

The rear brakes will be Meritor S-cam style. They will be 16.5" x 8.625" with heavy-duty return springs, and a double anchor pin design. They will also have quick-change shoes for fast easy brake relining.

### **AIR BRAKE SYSTEM**

The vehicle will be equipped with air-operated brakes. The system will meet or exceed the design and performance requirements of current FMVSS-121 and test requirements of current NFPA 1901 standards.

Each wheel will have a separate brake chamber. A dual treadle valve will split the braking power between the front and rear systems.

All main brake lines will be color-coded nylon type protected in high temperature rated split plastic loom. The brake hoses from frame to axle will have spring guards on both ends to prevent wear and crimping as they move with the suspension. All fittings for brake system plumbing will be brass.

A Meritor Wabco System Saver 1200 air dryer will be provided.

The air system will be provided with a rapid build-up feature, designed to meet current NFPA 1901 requirements. The system will be designed so the vehicle can be moved within 60 seconds of startup. The quick build up system will 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. The vehicle will not be required to have a separate on-board electrical air compressor or shoreline hookup to meet this requirement.

Four (4) supply tanks will be provided. One air reservoir will serve as a wet tank and a minimum of one tank will be supplied for each the front and rear axles. A Schrader fill valve will be mounted in the front of the driver's step well.

A spring actuated air release emergency/parking brake will be provided on the rear axle. One (1) parking brake control will be provided and located on the engine hood next to the transmission shifter within easy reach of the driver. The parking brake will automatically apply at 35 ±10 PSI reservoir pressure. A Meritor WABCO IR-2 Inversion Relay Valve, supplied by both the Primary and Secondary air systems, will be used to activate the parking brake and to provide parking brake modulation in the event of a primary air system failure.

Accessories plumbed from the air system will go through a pressure protection valve and to a manifold so that if accessories fail they will not interfere with the air brake system.

### **AIR BRAKING ABS SYSTEM**

A Wabco ABS system will be provided to improve vehicle stability and control by reducing wheel lock-up during braking. This braking system will be fitted to axles and all electrical connections will be environmentally sealed from water and weather and be vibration resistant.

The system will constantly monitor wheel behavior during braking. Sensors on each wheel transmit wheel speed data to an electronic processor, which will sense approaching wheel lock and instantly modulate brake pressure up to 5 times per second to prevent wheel lock-up. Each wheel will be individually controlled. To improve field performance, the system will be equipped with a dual circuit design. The system circuits will be configured in a diagonal pattern. Should a malfunction occur, that circuit will revert to normal braking action. A warning light at the driver's instrument panel will indicate malfunction to the operator.

The system will consist of a sensor clip, sensor, electronic control unit and solenoid control valve. The sensor clip will hold the sensor in close proximity to the tooth wheel. An inductive sensor consisting of a permanent magnet with a round pole pin and coil will produce an alternating current with a frequency proportional to wheel speed. The unit will be sealed, corrosion-resistant and protected from electro-magnetic interference. The electronic control unit will monitor the speed of each wheel sensor and a microcomputer will evaluate wheel slip in milliseconds.

### **AUTOMATIC SLIP RESPONSE**

The Rockwell/Wabco 4 Channel Anti-lock braking system will be provided. The system will be supplied with (ASR) Automatic slip response. The ASR controls slip under acceleration.

### **ASR SWITCH**

An on/off switch for the Acceleration Slip Resistance will be provided on the dash. This will allow the driver to override the computer and turn the ASR on when at a higher speed for better traction in deep snow or mud.

### **PAINTED STEEL BUMPER**

There will be a 12" high painted formed steel wrap-around (45 degree) bumper provided at the front of the apparatus. The bumper will be mounted to a reinforcement

plate constructed of 1/4" x 12" x 70" carbon steel. The frame rail extension will be a reinforced four-sided boxed frame rail for superior safety protection. A gravel shield will be provided, constructed of .188" aluminum diamond plate. The bumper extension will be approximately 18".

### **DIAMOND PLATE BUMPER LID**

There will be a 1/8" diamond plate cover with latches provided for the front bumper trough. The cover will have a 2" rise to accommodate the storage well requirements.

### **STORAGE WELL COMPARTMENT**

There will be a hose well compartment located in the center of the front bumper. The compartment will run the full width of the bumper and measure approximately 75" wide x 10" long x 5" deep at the ends and 12" deep in the center. The compartment will be constructed of .125" smooth aluminum plate.

### **COOLING SYSTEM**

The cooling system will be designed to keep the engine properly cooled under all conditions of road and pumping operations. The cooling system will be designed and tested to meet or exceed the engine and transmission manufacturer's requirements, and EPA regulations.

The complete cooling system will be mounted in a manner to isolate the system from vibration and stress. The individual cores will be mounted in a manner to allow expansion and contraction at various rates without inducing stress to the adjoining core(s).

The cooling system will be comprised of a charge air cooler to radiator serial flow package that provides the maximum cooling capacity for the specified engine as well as serviceability. The main components will include a surge tank, a charge air cooler, bolted to the top of the radiator to maximize cooling, recirculation shields, a shroud, a fan, and required tubing. All components will consist of an individually sealed system.

### **RADIATOR**

The radiator will be a cross-flow design constructed completely of aluminum with welded side tanks. The radiator will be bolted to the bottom of the charge air cooler to allow a single depth core, thus allowing a more efficient and serviceable cooling system.

The radiator will be equipped with a drain cock to drain the coolant for serviceability. The drain cock will be located at the lowest point of the aluminum cooling system to

maximize draining of the system.

### **CHARGE AIR COOLER**

The charge air cooler will be of a cross-flow design and constructed completely of aluminum with extruded tanks. The charge air cooler will be bolted to the top of the radiator to allow a single depth core.

### **COOLANT**

The cooling system will be filled with a 50/50 mix. The coolant makeup will contain ethylene glycol and de-ionized water to prevent the coolant from freezing to a temperature of -34 degrees F.

### **HOSES & CLAMPS**

Silicone hoses will be provided for all engine coolant lines.

All radiator hose clamps will be spring loaded stainless steel constant torque hose clamps for all main hose connections to prevent leaks. Recirculation shields will be installed where required to prevent heated air from reentering the cooling package and affecting performance.

### **FAN**

The engine cooling system will incorporate a heavy-duty composite 11- blade Z-series fan. It will provide the highest cooling efficiently while producing the lowest amount of noise. This robust yet light-weight fan results in less wear and stress on motors and bearings.

A shroud and recirculation shield system will be used to ensure air that has passed through the radiator is not drawn through again.

The fan tip to radiator core clearance will be kept at a minimal distance to increase the efficiency of the fan and reduce fan blast noise.

### **FAN CLUTCH**

A fan clutch will be provided that will allow the cooling fan to operate only when needed. The fan will remain continuously activated when the truck is placed in pump gear.

### **SURGE TANK**

The cooling system will be equipped with an aluminum surge tank mounted to the officer's side of the cooling system core. The surge tank will house a low coolant probe and sight glass to monitor the coolant level. Low coolant will be alarmed with the check engine light. The surge tank will be equipped with a dual seal cap that meets the engine manufacturer's pressure requirements, and system design requirements.

The tank will allow for expansion and to remove entrained air from the system. There will also be an extended fill neck to prevent system overflow and encroachment of expansion air space. Baffling will be installed in the tank to prevent agitated coolant from being drawn into the engine cooling system.

### **DRIVELINE**

The driveline will be configured with the SPICER LIFE (SPL) Series Model 250 universal joint assembly. This configuration provides longer bearing life with the highest power density available. A high-capacity bearing package with larger needle rollers are sealed with a long life double-lip Viton seal and seal guard to keep grease in and allow a better purge capability. The high power density allows transmission of higher torque with a smaller swing diameter, assisting in tight packaging requirements (184mm swing diameter / 130mm tube diameter / 5mm wall). The 110 mm of slip is boot protected. On-highway lubrication intervals, initial at 350,000 miles or 3 years (whichever comes first) and re-lube at 100,000 miles thereafter.

### **ENGINE ENCLOSURE, RAPTOR SKIN COVERING**

An integral, formed aluminum and composite engine enclosure will be provided. The engine enclosure will be contoured and blended in an aesthetically pleasing manner with the interior dash and flooring of the cab. The enclosure will be kept as low as possible, to maximize space and increase crew comfort.

The enclosure will be constructed from 5052 H2 aluminum plate and GRP composite materials, providing high strength, low weight, and superior heat and sound deadening qualities. The exterior sides will be covered with rubberized carpeting to aid in sound deadening and heat resistance. The top will be covered with a fiberglass grade cover, with a heavy duty, black Raptor Skin, wear resistant covering, further reducing noise and heat in the cab.

The underside of the engine enclosure will be covered with a sound deadening, heat reflective insulation system, and will further minimize noise (DB levels), and eliminate engine heat from the front and rear of the cab. The insulation material will be bonded

with adhesive and mechanically fastened to the underside of the cab. All seams will be sealed to prevent water absorption. **NO EXCEPTIONS.**

### **ENGINE**

The apparatus will be powered by a Cummins Diesel ISX 15 600 HP @ 1800 R.P.M., 1850 ft. lb. torque @ 1200 R.P.M.

### **ENGINE WARRANTY**

The engine will have a five year or 100,000 mile warranty and approval by Cummins for installation in the chassis. There will be no deductible for the first two years. A one hundred dollar deductible will apply for service during the next three years.

### **AIR COMPRESSOR**

The air compressor will be an 18.7 CFM engine driven Wabco.

### **STARTER**

A 12-volt starter will be provided, controlled by a switch on the left lower cab dash.

### **FUEL FILTERS**

The engine fuel filters will be mounted in a manner that is easily accessible for service or replacement. A Cummins approved primary FleetGuard Fuel Pro filter will be remote mounted to the Chassis frame rail. A secondary FleetGuard FF2200 spin on filter will be mounted on the engine.

### **EXHAUST SYSTEM**

The engine exhaust system will include the following components:

- Diesel Particulate Filter (DPF)
- Diesel Oxidation Catalyst (DOC)
- Diesel Exhaust Fluid (DEF)
- Selective Catalytic Reduction Filter (SCR)

The SCR catalyst utilizes the DEF fluid, which consists of urea and purified water, to convert NOx into nitrogen and water. This will meet or exceed 2013 EPA emissions requirements.

The engine exhaust system will be horizontal design constructed from heavy-duty truck

components. The exhaust tubing will be stainless steel to the DPF through to the SCR, aluminized steel from the SCR to the exhaust tip. A heavy duty stainless steel bellows tube will be used to isolate the exhaust system from the engine. The system will be equipped with single canister consisting of a Diesel Oxidation Catalyst (DOC) and a Diesel Particulate Filter (DPF), and will be mounted under the right side frame rail, meeting the specific engine manufacturer's specifications and current emission level requirements. The outlet will be directed to the forward side of the rear wheels, exiting the right side with a heavy duty heat diffuser. The heat diffuser will prevent the exhaust temperature from exceeding 851 deg. F during a regeneration cycle. A heat-absorbing sleeve will be provided on the exhaust pipe in the engine compartment area to reduce the heat, protect the alternator, and also to protect personnel while servicing the engine compartment.

### **AFTER TREATMENT SYSTEM**

To meet EPA requirements of Particulate output, a DPF (Diesel Particulate Filter) is used. To meet EPA requirements of Nitrous Oxide output an SCR (Selective Catalytic Reduction) system utilizing DEF (Diesel Exhaust Fluid) is used.

### **ON-BOARD DIAGNOSTIC (OBD) SYSTEM**

The engine will be equipped with an on-board diagnostic (OBD) system which will monitor emissions-related engine systems and components and alert the operator of any malfunctions. The OBD system is designed to further enhance the engine and operating system by providing early detection of emission-related faults. The engine control unit (ECU) will manage smart sensors located throughout the engine and after-treatment system. The system will monitor component verification and sensor operation. There will be warning lights located in the dash instrument panel to alert the operator of a malfunction. A data port will be provided under the driver's side dash for the purpose of code reading and troubleshooting. All communication will be provided through the J1939 data link.

### **AIR CLEANER/INTAKE**

The engine air intake and filter will be designed in accordance with the engine manufacturer's recommendations. It will be 99.9% effective in removing airborne contaminants when tested per the industry standard SAE J726 procedure and offer a dirt holding capacity of at least 3.0 gm/cfm of fine dust (tested per SAE J726) offering superior engine protection.

The air filter will be located at the front of the apparatus and will be at least 66" above the ground, to allow fording deep water in an emergency situation.

An ember separator will be provided in the engine air intake meeting, the requirements

of NFPA 1901.

An Air Restriction warning light will be provided and located on the cab dash.

### **FUEL PRIMER**

An electric fuel primer will be provided for the apparatus engine. The primer will be mounted on the engine with a bypass ball valve that can be opened for the priming function and closed during normal operation. The primer pump will be activated with a 12-volt switch located next to the primer pump.

### **FUEL/WATER SEPARATOR**

A Cummins approved FleetGuard FH230 Fuel Pro filter will be remote mounted to the Chassis frame rail.

### **ENGINE BRAKE**

The engine will be equipped with a Jacobs compression engine brake. An “On/Off” switch and a control for “Low/High” will be provided on the instrument panel within easy reach of the driver.

The engine brake will interface with the Wabco ABS brake controller to prevent engine brake operations during adverse braking conditions.

A pump shift interlock circuit will be provided to prevent the engine brake from activating during pumping operations.

The brake light will activate when the engine brake is engaged.

### **DIESEL EXHAUST FLUID TANK**

The exhaust system will include a molded cross linked polyethylene tank. The tank will have a capacity of 5 usable gallons and will be mounted on the left side of the chassis frame.

The DEF tank fill neck will accept only a 19mm dispensing nozzle versus the standard 22mm diesel fuel dispensing nozzle to prevent cross contamination. The DEF tank cap will be blue in color to further prevent cross contamination.

A placard will accompany fill location noting DEF specifications.

## **DOUBLE FRAME RAILS**

The chassis frame will be of a ladder type design utilizing industry accepted engineering best practices. The frame will be specifically designed for fire apparatus use.

Each frame rail will be constructed of 3/8" thick-formed high performance Domex steel channels. The outer channel will be 13.188" x 3.50" x .375". Inner reinforcements of 12.31" x 3.13" x .375" will span the front and rear suspension attachment locations. These inner reinforcements will spread the load between the suspension mounts.

Main load bearing rail section modulus will be 29.00 in.<sup>3</sup> with a Resistance to Bending Moment (RBM) of 2,563,130 in/lbs.

Each rail is media blasted to remove scale, oil, and contaminants. This blasting also ensures paint adhesion.

Each rail will be primed with Cathacoat 302HB, a high performance, two component, reinforced inorganic zinc-rich primer with proven cathodic protection of steel structures, prior to assembly.

The cross-members will be constructed of minimum 3/8" formed channels and have formed gusseted ends at the frame rail attachment.

.625 inch, grade 8 flange, Huck bolt fasteners will be used on all permanently attached brackets to the frame to eliminate the need for bolt re-tightening. Additional hardware will be Grade 8 Zinc coated flange head locking fasteners.

The frame will be painted standard glossy black prior to installing wiring harness and other components.

A lifetime warranty will be provided, per manufacturer's written statement.

## **FUEL COOLER**

Installed on the apparatus fuel system will be an Air-To-Liquid aluminum fuel cooler. The fuel cooler will be located in the lowest module of the cooling system.

## **CAB HANDRAILS**

There will be a 24" long, handrail provided and installed, at each cab entrance. The

handrails will be constructed of type 304 stainless steel 1.25 inch diameter tubing with bright finish and knurled gripping surface. Mounting flanges will be constructed from 7 gauge, .180 thick, stainless sheet. Each grab rail will have 90 degree returns to flanges. The ends of grab rail will pass through the flanges and be welded to form one structural unit. The handrails will be mounted using 1.25" SS Hex bolts, with a barrier rubber gasket at each flange.

Sufficient space will allow for a gloved hand to firmly grip the rail.

There will be two (2) rubber coated grab handles provided and mounted on the interior of the cab, one each side, on the windshield post for ingress assistance. The handrail on the driver's side will be approximately 11" long and the handrail on the officer's side will be approximately 18" long.

### **CAB DOOR HANDRAILS**

Two (2) 1.25" diameter knurled stainless steel handrails will be provided on the inside of the rear crew doors just above the windowsill.

### **COAT HOOKS FOR GRAB HANDLES**

There will be a coat hook installed at the top of each exterior cab handrail, for hanging of coats, turnout gear, etc.

### **HEATER/DEFROSTER/AIR CONDITIONER**

There will be a minimum 65,000 cool BTU and 75,000 heat BTU single unit, heater/air conditioner mounted over the engine cover. The unit will be mounted in center of the cab on the engine hood/enclosure. Unit will have a shutoff valve at the right side of the frame, next to the engine. Airflow of the heater/air conditioner will be a minimum 1200 CFM. To achieve maximum cooling, a TM-21 Compressor (10 cu. in.) will be used. There will be ductwork to the floor of the cab, facing forward to provide heat for the front of cab floor area.

The defroster/heater will be a minimum of 35,000 BTU and will be a separate unit mounted over the windshield. There will be eight (8) louvers/diffusers to direct to windshield and door glass. Airflow of the defroster/heater will be a minimum 350 CFM. The unit will be painted Zolatone greystone to match the cab ceiling.

The condenser will be roof mounted and have 65,000 BTU rating. The unit will include three fan motors. Airflow of the condenser will be a minimum 2250 CFM. (This roof-mounted condenser will work at full rated capacity at an idle with no engine heat problems.)

### **HEATER/DEFROSTER/AIR CONDITIONING CONTROLS**

The heater/defroster/air conditioning will be located in the overhead console in the center of the apparatus cab within reach of the driver and officer. The controls will be illuminated for easy locating in dark conditions. The controls will be located in such a way that the driver will not be forced to turn away from the road to make climate control adjustments. Control of all heater/defroster/air conditioning functions for the entire apparatus cab will be achieved through these controls.

Metal deflectors will be provided over the defroster and A/C vents.

### **DEFROSTER DIFFUSER**

A molded diffuser made of durable ABS plastic ductwork system will be provided. It will be form fitted and will attach to the cab's overhead defroster unit to provide temperature controlled air to the windshields. Air flow of up to 280 cfm is balanced and directed across the entire windshield for optimum defrosting capability in all types of weather.

### **AUXILIARY DEFROSTER FAN**

There will be a Red Dot model RD-5-5786-OP 12-volt fan mounted in the cab ceiling, directed at the driver's side windshield. The fan will be activated by a 3-position toggle switch located at the base of the fan. The switch positions will be High, Low and Off.

### **AUXILIARY DEFROSTER FAN**

There will be a Red Dot model RD-5-5786-OP 12-volt fan mounted in the cab ceiling, directed at the Officer's side windshield. The fan will be activated by a 3-position toggle switch located at the base of the fan. The switch positions will be High, Low and Off. The fan will be silver.

### **LOAD MANAGER**

Load manager will have the ability to sequence loads on and off. It will also be able to shed 8 loads when the vehicle is stationary, starting at 12.7 volts lowest priority load to be shed, then respectively at 12.6, 12.4, 12.2, 12.0, 11.8, 11.4 and 11.0 volts DC. Any load that has been shed will be off for a minimum of five minutes, and then if voltage has rebounded above shed voltage, the shed load will automatically come on. There will also be an indicator panel along side the rocker switches, which indicate power is on, battery warning and fast idle. Battery warning indicator will flash at a rate proportional to the voltage discharge rate.

### **AUTOMATIC HIGH IDLE ACTIVATION**

The load management system will be capable of activating the apparatus high idle system when the system voltage drops below 12.3 volts DC. The system will raise engine speed for a minimum of five minutes until voltage exceeds 13.0 volt DC. The load management system will activate the high idle feature before any devices are automatically shed OFF. The high idle function request from the load management device will function only if the appropriate interlocks are present; that is, control of the high idle system is monitored and will be superseded by the state of the interlock control module. The automatic high idle system will be deactivated whenever the brake pedal is pressed, and will remain inactive for two minutes thereafter to allow an operator to override the high idle function and return the engine to idle before PTO engagement.

### **INSTRUMENT PANEL**

The main dash shroud, which covers the area directly in front of the driver from the doorpost to the engine hood, will be custom molded and covered with a non-glare black vinyl. The dash will be a one-piece hinged panel that tilts outward for easy access to service the internal components. The gauge panel will be constructed of durable aesthetically pleasing light gray polymer material, placed over a heavy duty steel backing plate, for added strength and durability.

The gauges will be Beede Instruments, NexSys Link gauges with built-in self-diagnostics and red warning lights to alert the driver of any problems. All gauges and controls will be backlit for night vision and identified for function. All main gauges and warning lights will be visible to the driver through the steering wheel.

### **MASTER BATTERY & IGNITION SWITCH**

The vehicle will be equipped with a keyless ignition, with a three (3)-position Master Battery rocker switch, "Off/ACC/On" and a two (2)-position Engine Start rocker switch, "Off/Start".

### **DIESEL PARTICULATE FILTER CONTROLS**

There will be two (2) controls for the diesel particulate filter. One control will be for regeneration and one control will be to inhibit engine regeneration. These will be located below the steering wheel in the kick panel.

### **INSTRUMENTATION & CONTROLS**

Instrumentation on dash panel in front of the driver:

## Sutphen Corporation Stock 395 Industrial Pumper

- Tachometer/hourmeter with high exhaust system regeneration temperature, and instrument malfunction indicators
- Speedometer/odometer with built in turn signal, high beam, and re-settable trip odometer
- Voltmeter
- Diesel fuel gauge
- DEF (Diesel Exhaust Fluid) gauge
- Engine oil pressure
- Transmission temperature
- Engine temperature
- Primary air pressure
- Secondary air pressure

### Indicators and warning lights in front of the driver:

- Parking brake engaged
- Low air with buzzer
- Antilock brake warning
- Check transmission
- Transmission temperature
- Upper power indicator
- Seat belt
- Engine temperature
- Low oil indicator
- Low voltage indicator
- Air filter restriction light
- Low coolant indicator
- High idle indicator
- Power on indicator
- Check engine
- Stop engine
- Check engine MIL lamp
- DPF indicator
- High exhaust temperature
- Wait to start

### Other indicator and warning lights (if applicable):

- Differential locked
- PTO (s) engaged
- Auto-slip response
- Retarder engaged
- Retarder temperature
- ESC indicator

### Controls located on main dash panel in front of the driver:

- Master power disconnect with ignition switch
- Engine start switch
- Headlight switch
- Windshield wiper/washer switch
- Differential lock switch (if applicable)
- Dimmer switch for backlighting

Controls included in steering column:

- Horn button
- Turn signal switch
- Hi-beam low-beam switch
- 4-way flasher switch
- Tilt-telescopic steering wheel controls

### **CENTER CONTROL CONSOLE**

There will be an ergonomically designed center control console. The console will be constructed of 1/8" smooth aluminum and will be mounted on the engine hood between the driver and officer. The console will have a durable coating to match the color of the engine hood covering and will feature surfaces on each side that are contoured to face the driver and the officer for easy viewing and accessibility. The switches and other customer specified electrical items will be mounted in removable 1/8" smooth aluminum panels with a black wrinkle finish. The console will have an aluminum lift-up lid with quick release latch. The lid will be held in the open position with a gas strut to allow for easy access and serviceability.

Controls located in the console conveniently accessible to the driver:

- Transmission shifter
- Pump shift control with OK TO PUMP and PUMP ENGAGED lights
- Remote mirror control
- Illuminated rocker switches to control high idle, Jacob's brake, siren/horn, siren brake, master emergency, and other customer specified components
- 12V power point (if applicable)

Controls located in the console conveniently accessible to the driver and the officer (center):

- Parking brake control with a guard to prevent accidental engagement

Controls located in the console conveniently accessible to the officer:

- Illuminated rocker switches to control customer specified components that are easily reachable to the officer and do not allow for compromise of the driver's view, and eliminate the need for foot switches
- Surface to recess siren head, radio head, or other desired items as space permits

- 12V power point (if applicable)

Driving compartment warning labels will include:

- HEIGHT OF VEHICLE
- OCCUPANTS MUST BE SEATED AND BELTED WHEN APPARATUS IS IN MOTION
- DO NOT USE AUXILIARY BRAKING SYSTEMS ON WET OR SLIPPERY ROADS
- EXIT WARNINGS

Additional labels included:

- COMPUTER CODE SWITCH
- ABS CODE SWITCH
- FLUID DATA TAG
- CHASSIS DATA TAG

### **OVERHEAD CONTROL CONSOLE**

An ergonomically designed overhead console will be provided above the driver and officer, running the full width of the cab. The overhead console will be constructed from 1/8" aluminum plate and will be painted with a durable finish to match the inside of the cab. There will be seven (7) removable 1/8" smooth aluminum plates with a black wrinkle finish to house switches and other electrical items.

Directly above the driver there will be two (2) panels with no cutouts, unless otherwise specified by the customer.

There will be a panel located to the right of the driver that will be designated for defroster, heat, and air conditioning controls (if specified).

The center overhead panel will be designated for up to seven (7) door ajar indicators. Upon releasing the apparatus parking brake, one or more of these lights will automatically illuminate (flash) when any of the following conditions occur that may cause damage if the apparatus is moved: cab or compartment door is open; ladder or equipment rack is not stowed; stabilizer system deployed; any other device has not been properly stowed.

There will be a panel to the left of the officer as well as two (2) directly above the officer. These panels will have no cutouts, unless otherwise specified by the customer.

### **ENGINE WARNING SYSTEM**

An engine warning system will be provided to monitor engine conditions such as low oil pressure, high engine temperature and low coolant level. Warning indication will

include a STOP ENGINE (red) light with audible buzzer activation and a CHECK ENGINE (amber) light

Note: (Some engine configurations may also include a fluid warning light.)

There will be a master information light bar with 24 lights located across the center of the dash panel that covers up to 24 functions. These are defined under Indicators and Warning Lights above.

### **CHASSIS WIRING**

All chassis wiring will have XL high temperature crosslink insulation. All wiring will be color-coded, and the function and number stamped at 3" intervals on each wire. All wiring will be covered with high temperature rated split loom for easy access to wires when trouble shooting. All electrical connectors and main connectors throughout the chassis will be treated to prevent corrosion.

### **MASTER ELECTRICAL PANEL**

The main chassis breaker panel will be wired through the master disconnect solenoid and controlled by the three-position ignition rocker switch. The breaker panel will be located in front of the officer on the interior firewall and will be protected by a removable aluminum cover. The cover will have an aluminum notebook holder on the exterior face accessible to the officer. The cover will be painted with a durable finish to match the interior of the cab and will be secured with two (2) thumb screws.

The breaker panel will include up to 22 ground switched relays with circuit breaker protection. An integrated electrical sub-panel will be provided and interfaced to the body and chassis through an engineered wire harness system.

Twelve (12) 20-ampere relays and one (1) 70-ampere relay will be provided for cab light bar and other electrical items. If the option for a mechanical siren has been selected two (2) additional relays will be provided.

Up to two (2) additional relay boards with circuit breaker protection will be provided for additional loads as required. Each board will contain four (4) relays. The relay boards will be configured to trip with input from switch of positive-negative or load manager by moving the connector on the board (no tools required).

All relay boards will be equipped with a power-on indicator light (red), input indicator light (green) and power output indicator light (red).

Up to twenty-three (23) additional automatic reset circuit breakers for non-switched loads that are remotely switched (ie: heater fans, hood lights, etc.) will be provided.

All relays and circuit breakers on the relay boards will be pull-out/push-in replaceable.

All circuit breakers on the relay boards will be 20 ampere automatic reset which can be doubled or tripled for 40 or 60-ampere capacity.

The system will utilize Deutch DRC weather resistant connectors at the breaker panel, toe board and main dash connections.

All internal wire end terminals, including locking connectors, will be mechanically affixed to the wire ends by matching terminal crimping presses to assure the highest quality terminations.

All internal splices will be ultrasonically welded connections and all internal wiring will be high temperature GXL type wire that is protected by wiring duct wherever possible.

All switches will be ground controlled; no power going through any rocker switch.

Any switch controlling a relay in the breaker panel will be capable of being set to function only when the parking brake is set. All relays will be tagged with the function that the relay is controlling.

### **PUMP SHIFT MODULE**

A pump shift module with indicating lights will be located within easy reach of the driver. A gear lockup will be provided to hold the transmission in direct drive for pump operation.

### **HIGH IDLE**

The engine will have a "high idle" switch on the dash that will maintain an engine RPM of 1,000. The switch will be installed at the cab instrument panel for activation/deactivation. The "high idle" mode will become operational only when the parking brake is on and the truck transmission is in neutral.

### **AUXILIARY POWER POINTS**

Two (2) 12-volt 20-ampere auxiliary lighter socket type plug-ins, will be provided in the cab, one near the driver and one near the officer.

### **USB POWER POINT**

Two (2) additional 12-volt 20-ampere auxiliary USB charging points, will be provided in the cab.

### **VEHICLE DATA RECORDER**

An Akron / Weldon vehicle data recorder as required by the 2009 edition of NFPA 1901 will be installed. Vehicle data will be sampled at the rate of 1 second per 48 hours, and 1 minute per 100 engine hours.

Free software is available to allow the fire department to collect the data as needed.

### **INTERIOR**

The cab interior will have Zolatone black rubberized, mar resistant, textured finish. The full front and rear headliners and rear firewall will be finished in black Durawear.

### **LIGHTING CAB EXTERIOR**

Exterior lighting and reflectors will meet or exceed Federal Motor Vehicle Safety Standards and National Fire Protection Association requirements in effect at this time.

### **LED HEADLIGHTS**

There will be dual, sealed-beam LED, rectangular headlights in custom housings on each side of the front of the cab. The lenses will be hardened glass. The LEDs will be long-lasting and able to withstand shock and vibration.

These headlights will provide 850 effective lumens in high beam and 750 effective lumens in low beam.

This installation will be a 12V DC configuration and draw 3.6 Amps.

Headlight alignment will conform to SAE J599 AUG. 1997

- DOT Approved FMVSS 108
- SAE J96 ECE Reg. 112
- Sealed to IP67

Manufacturer's warranty: 4-year limited warranty.

### **ALTERNATING HEAD LAMP**

The headlights will have an alternating flash feature for emergency response use.

### **DAYTIME RUNNING LIGHTS**

The headlamps will be provided with a "Daytime Running" feature. The lights will automatically be switched on when the vehicle ignition is switched on.

### **HAND HELD SPOTLIGHT**

One Optronics Blue Eye Model KB-4003, 400,000-candle power hand-held spotlight will be provided, installed at officer's side of cab.

### **LIGHTING CAB INTERIOR**

Interior lighting will be provided inside the front of the cab for passenger safety. Two (2) ceiling mounted combination red/clear LED dome lights with a push button on/off switch in the light lens. One light will be located over each the officer and driver's position. The lights will also activate from the open door switch located in each cab doorjamb.

### **DOOR LIGHTS**

Whelen Model 500 LED flashing lights will be provided in each cab door. The lights will be activated from the open door switch located in each cab doorjamb.

### **LIGHTING CREW CAB INTERIOR**

Interior lighting will be provided inside the crew cab for passenger safety. Two (2) ceiling mounted combination red/clear LED dome lights with a push button on/off switch in the light lens will be provided. The lights will also activate from the open door switch located in each cab doorjamb.

### **MIRRORS**

Two (2) Lang Mekra 300 Series smooth chrome plated Aero style main and convex mirrors will be installed on each side of the vehicle. The main mirror will be 4-way remote adjustable 7" x 16" 2nd surface chromed flat glass. The convex will be 6" x 8" 2nd surface chromed 400 mm radius glass. Each mirror housing assembly will be constructed of lightweight textured chrome ABS with on truck glass and housing back cover replacement. In the event the mirror breaks the glass will be replaceable in (3) minutes or less. The glass will include a safety adhesive backing to keep broken glass in place. The mirror assembly will be supported by a "C" loop bracket constructed of polished stainless steel tube utilizing two point mounting reducing vibration of mirror glass during normal vehicle operation. The lower section of the holder will include a spring loaded single detent position 20 degrees forward with easy return to operating

position without refocusing.

### **HELMET STORAGE**

A universal style helmet bracket will be provided for each riding position.

A placard will be provided for each riding position warning that injury may occur if helmets are worn while seated.

### **SEAT BELT WARNING SYSTEM**

An Akron / Weldon seat belt warning system will be provided, and will monitor each seating position. Each seat will be supplied with a sensor that, in conjunction with the display module located on the dash, will determine when the seat belt was fastened and if the seat is occupied. An icon will represent that the seat is properly occupied. An audible and visual alarm will be activated if the seat is occupied and/or the belt is not fastened in the proper sequence.

### **DRIVER'S SEAT**

The Driver's seat will be a Bostrom Tanker 450 with SCBA bracket, air ride high back, adjustable fore/aft, upholstered with gray tweed Durawear. A 3-point seat belt will be provided.

### **OFFICER'S SEAT**

The officer's seat will be a Bostrom Firefighter™ Tanker 450 ABTS SCBA seat. The seat will have the following features:

- Integrated 3-point seat belt
- "Auto-Pivot & Return" head rest
- Built in lumbar support
- 100% Durawear™ gray tweed seat material

### **UNDER SEAT STORAGE**

There will be a storage compartment under the officer's seat approximately 15" wide x 10.5" tall x 15.5" deep.

### **CREW SEATS**

The crew cab area will have four (4) Bostrom Firefighter™ seats. The seating arrangement will be: two (2) rear facing Bostrom Tanker 450 ABTS SCBA seats and

two (2) forward facing Bostrom 400CT ABTS SCBA flip up seats. The seats will have the following features:

- Integrated 3-point seat belts
- “Auto-Pivot & Return” head rest
- Built in lumbar support
- 100% Durawear™ gray tweed seat material

### **SCBA BOTTLE BRACKET**

The officer and crew seats will come equipped with an H.O. Bostrom SecureAll™ SCBA Locking System capable securing all U.S. and international SCBA brands and sizes while in transit or for storage on fire trucks.

Locking will be achieved by pushing the SCBA unit (bottle) against the pivot arm to engage the automatic lock system. A top clamp will surround the top of the SCBA tank for a secure fit in all directions. The bracket will be equipped with a center guide fork to keep the tank in-place for a safe and comfortable fit in seat cavity.

All adjustment points will utilize one tool and be easily adjustable.

The bracket system will be free of straps and clamps that may interfere with auxiliary equipment on SCBA units.

The release handle will be integrated into the seat cushion for quick and easy release and will eliminate the need for straps or pull cords to interfere with other SCBA equipment.

The bracket system will meet NFPA 1901 standards and requirements of EN 1846-2.

### **CREW SEAT COMPARTMENT**

A compartment will be provided under the forward facing crew seats on the back wall of the cab. The compartment will be full through, with an access door on each side, accessible from the side of the crew cab doors.

### **STEERING**

The steering system will be a TRW wheel to wheel steering system that is tested and certified by TRW, consisting of a heavy duty TRW/Ross Model TAS-85 power steering gear, TRW PS36 steering pump, miter box, drag links, and a thermostatic controlled fan cooled system (set point 185 deg. F to 170 deg. F). The steering gear will be bolted to the frame at the cross-member for steering linkage rigidity. Four (4) turns from lock to lock with an 18" diameter slip resistant rubber covered steering wheel.

Steering column will have six-position tilt and 2" telescopic adjustment. The cramp angle will be 45 degrees with 315mm tires or 43 degrees with 425mm tires providing very tight turning ability.

### **SUSPENSION (FRONT)**

The front suspension will be a variable rate taper-leaf design, 54" long and 4" wide. Long life, maintenance free, urethane bushed spring shackles will be utilized. All spring and suspension mounting will be attached directly to frame with high strength Huck bolts and self-locking round collars. Spring shackles and pins that require grease will not be acceptable. **NO EXCEPTIONS.**

### **ENHANCED FRONT SUSPENSION SYSTEM**

The front suspension will have the handling, stability, and ride quality enhanced by the use of a Ride Tech auxiliary spring system and Koni high performance shock absorbers.

This system will utilize three stage, urethane auxiliary springs, and high performance gas filled shock absorbers to control the deflection of the leaf springs, and dampen vibration normally transmitted to the chassis. This maintenance free system will be custom tuned to the apparatus gross weight rating for maximum performance, while maintaining a soft compliant ride. **NO EXCEPTIONS.**

A (3) three year 36,000 mile warranty will be provided by the manufacturer.

### **SUSPENSION (REAR) 31,000 LB SPRING**

A Reyco model 18308-01 rear spring suspension will be provided. The rear semi-elliptic springs will be 37-1/4" x 3 x 10 leaf with trailing arms. The trailing arms allow free movement of the axle from bump loads and deflections while holding the axle in chassis alignment. This suspension will control axle wrap-up torque caused by accelerating or braking. The trailing arms will be mounted in maintenance free rubber bushings at both ends. The left arm will be adjustable in length for maximum accuracy of chassis alignment.

### **TIRE PRESSURE MONITOR**

A Real Wheels LED tire pressure sensor will be provided for each wheel. The pressure sensor will indicate if a particular tire is not properly inflated. A total of six (6) indicators will be provided.

**FRONT TIRES**

Front tires will be Goodyear 425/65R22.5, load range L, G296 highway tread, single tubeless type with a GAWR of 22,000 pounds. Wheels will be disc type, hub piloted, 22.5 x 12.25 10 stud 11.25 bolt circle. Chrome plated lug nut caps will be provided.

**FRONT HUB COVERS**

Polished stainless steel hub covers will be provided for the front axle.

**REAR HUB COVERS**

Polished stainless steel hub covers will be provided for the rear axle.

**REAR TIRES**

Rear tires will be Goodyear 315/80R22.5, load range L, G291 highway tread, dual tubeless type with a GAWR of 31,000 pounds. Wheels will be disc type, hub piloted, 22.5 x 9 10 stud with 11.25" bolt circle. Chrome plated lug nut caps will be provided.

**MUD FLAPS**

Hard rubber mud flaps will be provided for front and rear tires.

**WHEELS**

The front and rear wheels will be ALCOA® brand aluminum.

**TOW EYES** (Front)

There will be two front tow eyes with 3" diameter holes attached directly to the chassis frame.

**TOW EYES** (Rear)

There will be two tow eyes attached directly to the chassis frame rail and will be chromate acid etched for superior corrosion resistance and painted to match the chassis.

**TRANSMISSION**

The chassis will be equipped with a Generation IV Allison EVS4000 six (6) speed

automatic transmission. It will be programmed five (5) speed, sixth gear locked out, for fire apparatus vocation, in concert with the specified engine.

An electronic oil level indicator will be provided as well as a diagnostic reader port connection. The fifth gear will be an overdrive ratio, permitting the vehicle to reach its top speed at the engine's governed speed. The dipstick is dipped in a rubber coating for ease in checking oil level when hot.

The chassis to transmission wiring harness will utilize Metri-Pack 280 connectors with triple lip silicone seals and clip-type positive seal connections to protect electrical connections from contamination without the use of coatings.

Ratings:	Max Input (HP)	600
	Max Input (Torque)	1850 (lb ft)
	Max Turbine (Torque)	2600 (lb ft)

Mechanical Ratios:	1 <sup>st</sup> -	3.51:1
	2 <sup>nd</sup> -	1.91:1
	3 <sup>rd</sup> -	1.43:1
	4 <sup>th</sup> -	1.00:1
	5 <sup>th</sup> -	0.74:1
	Reverse -	-5.00

### **TRANSMISSION COOLER**

The apparatus transmission will be equipped with a Liquid-To-Liquid remote mounted cooler with aluminum internal components. The cooler will be encased in an aluminum housing and mounted to the outside of the officer's side frame rail for accessibility and ease of service.

### **TRANSMISSION FLUID**

The transmission will come filled with Castrol TranSynd™ Synthetic Transmission Fluid or approved equal meeting the Allison TES-295 specification. **NO EXCEPTION.**

### **TRANSMISSION SHIFTER**

An Allison "Touch Pad" shift selector will be mounted to the right of the driver on the engine cover accessible to the driver. The shift position indicator will be indirectly lit for nighttime operation.

### **POWER TAKE OFF**

A hot shift PTO drive will be provided for the foam system.

### **FRONT TURN SIGNALS**

There will be two Whelen 400 Series LED rectangular amber turn signal lights mounted one each side in the front of the headlight housing and one mounted on each side of the warning light housing.

### **WHEELBASE**

The approximate wheelbase will be 210".

### **WINDSHIELD WIPERS**

Two (2) black anodized finish two speed synchronized electric windshield wiper system. Dual motors with positive parking. System includes large dual arm wipers with built in washer system. One (1) master control works the wiper, washer and intermittent wipe features. Washer bottle is a remote fill with a 4 quart capacity. Washer fill is located just inside of officer cab door.

### **MISCELLANEOUS CHASSIS EQUIPMENT**

Fluid capacity plate affixed below driver's seat.

Chassis filter part number plate affixed below driver's seat.

Maximum rated tire speed plaque near driver.

Tire pressure label near each wheel location.

Cab occupancy capacity label affixed next to transmission shifter.

Do not wear helmet while riding plaque for each seating position.

NFPA compliant seat belt and standing warning plates provided.

### **FIRE PUMP WATEROUS CRU-2 4000 GPM**

The pump will be a single stage, midship mounted, Waterous CRU-2, 4000 gallon per minute, end suction centrifugal type, and will comply with all applicable requirements of

the latest standards for automotive fire apparatus of the National Fire Protection Association.

The pump body will be close grained ductile iron and must be vertically split in two sections for easy removal of the entire impeller shaft assembly, and servicing. Pump body halves will be bolted together on a single horizontal face to minimize chance of leakage and facilitate reassembly.

The impeller will be silicon-bronze, accurately balanced (mechanically and hydraulically), and will have a flame plated hub to assure maximum pump life and efficiency.

Wear rings will be bronze and will be easily replaceable to restore original pump efficiency and eliminate the need for replacing the entire pump casing due to wear.

The impeller shaft will be stainless steel, accurately ground to size and supported at each end by oil or grease lubricated anti-friction ball bearings for rigid and precise support. Bearings will be protected from water and sediment by self-adjusting mechanical seals.

The impeller shaft will be separable between the pump and pump transmission to allow true separation of the transmission from the pump without disassembly of either component. No sleeve type bearings will be used.

### **C-21 HIGH TORQUE PUMP TRANSMISSION**

The pump transmission will be housed in a high-strength aluminum, three-piece, horizontally-split housing and will be rigidly attached to the pump body assembly. The transmission will be of the latest design incorporating a high strength, involute tooth form Hy-Vo chain drive, capable of operating at high speeds to provide smooth, quiet transfer of power.

Deep-groove, anti-friction ball bearings will give support and proper alignment to the impeller shaft assembly. Bearings are oil-splash lubricated, completely separated from the water being pumped, and protected by a V-ring and oil seals.

An internal lubrication system will deliver lubricant directly to the drive chain. This unique design eliminates the need for an external lubrication pump and auxiliary cooling.

The shift engagement will be accomplished by a constant mesh free-sliding collar and will incorporate an internal locking mechanism to insure that collar will be maintained in ROAD or PUMP position.

**PUMPING SYSTEMS DELIVERING LESS THAN 4000 GPM FROM DRAFT ARE NOT DESIRED AND WILL NOT BE ACCEPTED. NO EXCEPTIONS**

**PUMP SHIFT**

The pump shift will be pneumatically operated and will use a standard automotive air valve to control a double action air shift cylinder so that the pump shift remains in its latest position in the event of loss of air pressure. The in-cab control valve will include a detent lock to prevent accidental shifting.

**PRIMING SYSTEM**

The priming system will consist of two parts. The priming pump will be an electrically driven rotary vane priming pump, rigidly attached to the pump transmission. A single push button switch will be provided on the pump operators panel to activate the priming valve and the priming pump. Priming valve actuation may be accomplished while the main pump is in operation, if necessary, to assure a complete, continuous prime.

A total of two (2) priming pumps and priming valves will be provided.

**MANUAL PUMP SHIFT OVERRIDE**

A manual emergency override shift will be provided on the pump panel and may be used by placing both the chassis transmission and the pump air shift control in "neutral" position.

**PUMP CERTIFICATION**

The pump, when dry, will be capable of taking suction and discharging water in compliance with NFPA #1901 chapter 14. The pump will be tested by National Testing and will deliver the percentages of rated capacities at pressures indicated below:

100% of rated capacity @ 100 PSI net pump pressure.

70% of rated capacity @ 150 PSI net pump pressure.

50% of rated capacity @ 200 PSI net pump pressure.

### **MECHANICAL PUMP SEAL**

The pump seal will be a maintenance free mechanical pump type seal.

### **THREAD TERMINATION**

National Standard Thread will terminate the inlets and outlets of the apparatus.

### **PUMP ANODE**

A Waterous pump anode kit assembly will be provided and installed in the pump body. A minimum of four (4) anodes will be installed two (2) in the suction side and two (2) in the discharge side of the pump.

### **PRESSURE GOVERNOR / MONITORING DISPLAY**

Fire Research PumpBoss model PBA400-A00 pressure governor and monitoring display kit will be installed. The kit will include a control module, two (2) 600 psi pressure sensors, and cables. The control module case will be waterproof and have dimensions not to exceed 6 3/4" high by 4 5/8" wide by 1 3/4" deep. Inputs for monitored information will be from a J1939 databus or independent sensors. Outputs for engine control will be on the J1939 databus or engine specific wiring.

The following continuous displays will be provided:

CHECK ENGINE and STOP ENGINE warning LEDs

Engine RPM; shown with four daylight bright LED digits more than 1/2" high

Engine OIL PRESSURE; shown on an LED bar graph display in 10 psi increments

Engine TEMPERATURE; shown on an LED bar graph display in 10 degree increments

Transmission TEMPERATURE; shown on an LED bar graph display in 10 degree increments

BATTERY VOLTAGE; shown on an LED bar graph display in 0.5 volt increments

PSI / RPM setting; shown on a dot matrix message display

PSI and RPM mode LEDs

THROTTLE READY LED.

A dot-matrix message display will show diagnostic and warning messages as they occur. It will show monitored apparatus information, stored data, and program options when selected by the operator.

The program will store the accumulated operating hours for the pump and engine, previous incident hours, and current incident hours in a non-volatile memory. Stored elapsed hours will be displayed at the push of a button. It will monitor inputs and

support audible and visual warning alarms for the following conditions:

- High Engine RPM
- High Transmission Temperature
- Low Battery Voltage (Engine Off)
- Low Battery Voltage (Engine Running)
- High Battery Voltage
- Low Engine Oil Pressure
- High Engine Coolant Temperature

The governor will operate in two control modes, pressure and RPM. No discharge pressure or engine RPM variation will occur when switching between modes. A control knob that uses optical technology will adjust pressure or RPM settings. It will be 2" in diameter with no mechanical stops, a serrated grip, and have a red idle push button in the center.

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

The pressure governor and monitoring display will be programmed to interface with a specific engine.

### **OVERHEAT PROTECTION MANAGER**

A Watrous Overheat Protection Manager will be provided. The valve will automatically dump a controlled amount of water to atmosphere when the pump water exceeds 140 degrees Fahrenheit. The valve will re-set automatically. A light, and an audible alarm will be provided at the pump panel, which will activate when the pump reaches 120 degrees Fahrenheit to warn the operator that the pump is automatically dumping.

### **INTAKE RELIEF**

There will be an Elkhart Model 40 intake relief valve installed on the intake side of the pump. The surplus water will be discharged away from the pump operator and terminate with Male NST hose thread. System is field adjustable.

### **AUXILIARY COOLER**

An auxiliary cooler will be furnished to provide additional cooling to the engine under

extreme pumping conditions. Water from the pump is to be piped to the coils of the heat exchanger allowing the engine fluid to be cooled as required.

### **VALVES**

All valves will be Akron Heavy-Duty swing out 8800/8600 series unless otherwise noted. The valve will have an all cast brass body with flow optimizing stainless steel ball, and dual polymer seats. The valve will be capable of dual directional flow while incorporating a self-locking ball feature using an automatic friction lock design and specially designed flow optimizing stainless steel ball. The valve will not require the lubrication of seats or any other internal waterway parts, and be capable of swinging out of the waterway for maintenance by the removal of six bolts. The valve will be compatible with a slow close device. This valve will be actuated using manual handles, a Rack & Sector, manual gear, or electric actuator. The manual handles will be quickly adjustable to one of eight handle positions, and require only 90 degrees travel.

### **VALVE WARRANTY**

The valves will carry a 10-year warranty.

### **PUMP SUCTION INLETS**

Following specified pump manifold inlets will be of proper inside diameter for rated pump capacity, equipped with strainers of appropriate size for the pump impeller vanes and high flow capacity.

All intakes will be provided with suitable closures capable of withstanding 500 psi, threaded caps will be NST, rocker lug 3" and smaller, long handled larger than 3", non-threaded will be Storz or Cam-Lok as specified.

### **SUCTION INLET VALVE STANDARDS (WHERE OPTIONALLY SPECIFIED)**

Following optionally specified 3" or larger gated intakes (except the tank-to-pump intake) will include a remote controlled valve mechanism that will not permit changing the position of the flow regulating element of the valve from full close to full open, or vice versa, in less than 3 seconds. Where air type actuators are employed, they will include dual (2-each) adjustable needle valve restrictors, bench set/tested, so as to facilitate the slow movement. Where manual gear or electric gear style actuators are employed, the crank or motor will regulate movement speed.

### **INLET BLEEDER VALVES**

Where specified, each gated intake will be equipped with a bleeder valve located

inside pump compartment, upstream gate valve, with remote bleeder control in close proximity to the intake. The specified gated suction bleeders will consist of: 3/4" cast bronze quarter-turn drain/bleeder valves, panel mounted with exterior chrome plated control handle. Controls to be positioned in a single row immediately above runningboard riser, driver and/or passenger sides, identified with color coded permanently engraved identification label.

### **"ROUND TUBULAR" HIGH-FLOW SUCTION MANIFOLD PIPING**

A stainless steel "high-flow" round tubular suction manifold will be furnished, bolted to and easily removable from, the fire pump's 8-inch flanged volute suction inlet. Tubular suction manifold will have a flow capacity exceeding the capacity of the fire pump system, when pumping at draft at an altitude of up to 2000 feet above sea level.

NOTE: Due to the likelihood of deformation and poor flow characteristics, manifolds fabricated of square or rectangular tubing's, regardless of material or metal thickness, are not acceptable.

Tubular suction manifold will be fabricated of type 304 stainless steel, equipped with an 8-bolt stainless steel flange (at pump inlet), minimal "long-sweep" weld elbows (allowing for smooth non-turbulent water flow), and Victaulic roll-grooved joints where appropriate (to allow convenient disassembly). All welds will be "tig" with full depth penetration and smooth uniform outer circumference. Interior of water ways, at elbows will be provided with guide vanes designed and positioned to prevent whirlpool of the water.

All auxiliary exterior side wall taps and/or risers will be "coped" to conform to the radius of larger size waterway, so as to provide unsurpassed flow characteristics. Under no conditions will there be weld slag, misalignment or tubing sections, or projections into the main tributary of the manifold. Split waterways must incorporate "rams-horn" pathway, tee-intersecting waterways are not acceptable.

The suction manifold itself will contain multiple Victaulic and flanged ports or risers, to facilitate the installation of any optionally specified auxiliary suction(s), tank-to-pump suction line(s), and intake relief valve.

All suction manifolds and fittings, suction valves, tubing's, and hoseline assemblies will be pressure tested after installation.

### **6" NON-GATED SUCTION(S), 6" NST CAPPED**

Two (2) each, driver's side non-gated 6" pump suction intake(s) to be provided, each with: 6" removable zinc strainer, 6" NST inlet nipple, and appropriate size interior pump compartment mounted stainless steel intake fitting. Inlet will have minimum extension outboard of the pump panel.

Two (2) each passenger's side with: 6" removable zinc strainer, 6" NST inlet nipple, and appropriate size interior pump compartment mounted stainless steel intake fitting. Inlet will have minimum extension outboard of the pump panel.

### **INLET ADAPTERS**

Five (5) each, Task Force Tips jumbo 5" Storz by 6" NST swivel female master inlet ball intake valve(s), each with: 30-degree inlet elbow, re-configurable hand wheel gear operator with position indicator, adjustable pressure intake relief valve and air bleed-off will be furnished and installed, on the 6" NST male suction inlets, and at the rear 6" inlet outlet. Each appliance is to be provided with a 6" Storz locking cap with cable retainer.

### **2.5" LEFT SIDE INLET**

One 2.5" gated inlet valve will be provided on the left side pump panel. The valve will be supplied with chrome plate female swivel, plug, chain, and removable strainer. The valve will attach directly to the suction side of the pump with the valve body behind the pump panel.

### **"ROUND TUBULAR" HIGH-FLOW STAINLESS STEEL DISCHARGE MANIFOLD**

A stainless steel "**round tubular**" discharge manifold will be furnished, bolted to and easily removable from, the fire pump's 6" diameter discharge outlet flange.

NOTE: Due to the likelihood of high pressure deformation (regardless of wall thickness), manifolds fabricated of square or rectangular tubing's, are not acceptable.

The tubular manifold's main waterway will be commensurate in diameter to feed the quantity and size of optionally specified discharge line "branches" So as to provide unsurpassed flow characteristics, all auxiliary branch reducers will be concentric bell reducers, and all couplings and risers will be "coped" to conform to the radius of the larger size upstream waterway. All capped ends will be spherical for high pressure applications. Flat-mount weld spuds and non-coped risers welded to rectangular fabrications are not acceptable.

All stainless steel welding will be TIG, to assure proper penetration and conformity with original tubing and weld fitting outside diameters. Under no conditions will there be weld slag, misalignment or tubing sections, or projections into any tributaries of the manifold. All elbows will be smooth sweep weld fittings.

See following specifications describing the number/size/locations of outlet gate valves to be furnished.

All flexible discharge lines and bleeder lines, downstream of respective valves, will be reinforced high pressure hose assemblies with stainless steel threaded or Victaulic fittings.

All discharge manifolds and fittings, suction manifolds and fittings, discharge and suction valves, tubing's, and hoseline assemblies will be pressure tested before and after installation.

### **PUMP DISCHARGE OUTLETS**

Each of the following specified 3" or larger discharge valves will have an operating mechanism which will not permit changing the position of the flow regulating element of the valve from full close to full open, or vice versa, in less than 3 seconds.

### **DISCHARGE OUTLET BLEEDERS**

Each of the following specified gated discharges will be equipped with a "discharge outlet bleeder". The specified discharge outlet bleeders will consist of: 3/4" high pressure flexible hose assemblies extending between discharge valve and bleeder valve, 3/4" cast bronze 1/4-turn drain/bleeder valve mounted interior pump compartment, exterior pump panel chrome plated bleeder valve control handle, and color coded (to match corresponding discharge outlet) permanently engraved identification label. Bleeders for side discharges to be located in a single row immediately above runningboard riser.

### **HOSE THREADS**

Where specified, all screw-on/off threads will be NST (National Standard Threads), all "sexless" couplings will be Storz.

### **DRIVER SIDE 3" FOAM CAPABLE DISCHARGE(S)**

One (1) each, driver side 3" gate foam capable discharge(s) are to be furnished, each one provided with: 2-1/2" NST chrome plated brass rocker lug cap with chain, 2-1/2" NST male x 2-1/2" NST rocker lug swivel female 30 degree chrome plated brass elbow extension, 2-1/2" NST male chrome plated brass outlet adapter, 3/4" bleeder valve with exterior remote control, 3" i.d. stainless steel pipe or wire reinforced hose assembly with 3" stainless end fittings, 3" Akron 8800 series ball style 1/4-turn full flow bronze bodied discharge valve with a 12-volt electric actuator with wiring harness (located inside pump enclosure), and an Akron model 9323 Navigator Valve Controller with Position Lights.

### **DRIVER SIDE 3" FOAM LINE CONTROLLERS AND ACCESSORIES**

One (1) each, FoamPro 1-inch diameter Line Controller Assemblies will be provided, one (1) for each of the above specified foam capable 3" driver side gated discharge lines.

Each Line Controller Assembly will include one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly will be provided with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-inch diameter Foam Line Controller Assemblies will have an operational range of foam concentrate flow ranging from 1.8 GPM (6.8L/min) to 60 GPM (227.1 L/min). Example: with 3% foam concentrate ratio: at a minimal foam concentrate flow of 1.8GPM, the Line Controller will service a water flow of 60GPM.

The Line Controller electronic display module will allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution
2. Provide push-button control of foam proportioning rates
3. Display current flow-per-minute of water
4. Display total volume of water discharged during and after foam operations are completed
5. Display total amount of foam concentrate consumed
6. Display injection percentage
7. Simulate flow rates for manual operation
8. Perform setup and diagnostic functions for the computer control microprocessor
9. Allow three injection percentage defaults to be stored

### **DRIVER SIDE FOAM CAPABLE LARGE DIAMETER DISCHARGE**

Two (2) each, driver's side 6" gated discharges to be furnished, each one provided with: 6" stainless steel piping terminating at the side of the apparatus pump enclosure with 6" NST male chrome plated brass outlet adapter, 3/4" bleeder valve with exterior remote control, 6" i.d. stainless steel pipe nipple, 6" Elkhart butterfly style 1/4-turn discharge valve with 12-volt electric actuator and wiring harness (located inside pump enclosure), Akron model 9323 Navigator Valve Controller with Valve Position Indicator Lights located on pump operator's control panel. The controller will show pressure and flow.

### **DRIVER SIDE 6" FOAM LINE CONTROLLERS AND ACCESSORIES**

One (1) each, Foam Pro 1.50-inch diameter Line Controller Assemblies will be provided, for each of the above specified foam capable 6" driver side gated discharge lines.

Each Line Controller Assembly will include one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly will be provided with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-1/2 inch diameter Foam Line Controller Assemblies will have an operational range of foam concentrate flow ranging from 16 GPM (60.5L/min) to 150 GPM (567.6 L/min). Example: with 3% foam concentrate ratio: at a minimal foam concentrate flow of 16GPM, the Line Controller will service a water flow of 533GPM.

The Line Controller electronic display module will allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution
2. Provide push-button control of foam proportioning rates
3. Display current flow-per-minute of water
4. Display total volume of water discharged during and after foam operations are completed
5. Display total amount of foam concentrate consumed

6. Display injection percentage
7. Simulate flow rates for manual operation
8. Perform setup and diagnostic functions for the computer control microprocessor
9. Allow three injection percentage defaults to be stored

### **PASSENGER SIDE 3" FOAM CAPABLE DISCHARGE(S)**

One (1) each, passenger's side 3" gate foam capable discharge(s) are to be furnished, each one provided with: 2-1/2" NST chrome plated brass rocker lug cap with chain, 2-1/2" NST male x 2-1/2" NST rocker lug swivel female 30 degree chrome plated brass elbow extension, 2-1/2" NST male chrome plated brass outlet adapter, 3/4" bleeder valve with exterior remote control, 3" i.d. stainless steel pipe or wire reinforced hose assembly with 3" stainless end fittings, 3" Akron 8800 series ball style 1/4-turn full flow bronze bodied discharge valve with a 12-volt electric actuator with wiring harness (located inside pump enclosure), and an Akron model 9323 Navigator Valve Controller with Position Lights.

### **PASSENGER SIDE 3" FOAM LINE CONTROLLERS AND ACCESSORIES**

One (1) each, FoamPro 1-inch diameter Line Controller Assemblies will be provided, one (1) for each of the above specified foam capable 3" passenger side gated discharge lines.

Each Line Controller Assembly will include one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly will be provided with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-inch diameter Foam Line Controller Assemblies will have an operational range of foam concentrate flow ranging from 1.8 GPM (6.8L/min) to 60 GPM (227.1 L/min). Example: with 3% foam concentrate ratio: at a minimal foam concentrate flow of 1.8GPM, the Line Controller will service a water flow of 60GPM.

The Line Controller electronic display module will allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution
  2. Provide push-button control of foam proportioning rates
  3. Display current flow-per-minute of water
  4. Display total volume of water discharged during and after foam operations are completed
  5. Display total amount of foam concentrate consumed
  6. Display injection percentage
  7. Simulate flow rates for manual operation
  8. Perform setup and diagnostic functions for the computer control microprocessor
  9. Allow three injection percentage defaults to be stored
- PASSENGER'S SIDE FOAM CAPABLE  
LARGE DIAMETER DISCHARGE**

Two (2) each, passenger's side 6" gated discharges to be furnished, each one provided with: 6" stainless steel piping terminating at the side of the apparatus pump enclosure with 6" NST male chrome plated brass outlet adapter, 3/4" bleeder valve with exterior remote control, 6" i.d. stainless steel pipe nipple, 6" Akron butterfly style 1/4-turn discharge valve with 12-volt electric actuator and wiring harness (located inside pump enclosure), Akron model 9323 Navigator Valve Controller with Valve Position Indicator Lights located on pump operator's control panel. The controller will show pressure and flow.

### **PASSENGER'S SIDE 6" FOAM LINE CONTROLLERS AND ACCESSORIES**

One (1) each, Foam Pro 1.50-inch diameter Line Controller Assemblies will be provided, for each of the above specified foam capable 6" passenger's side gated discharge lines.

Each Line Controller Assembly will include one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly will be provided with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-1/2 inch diameter Foam Line Controller Assemblies will have an operational range of foam concentrate flow ranging from 16 GPM (60.5L/min) to 150 GPM (567.6 L/min). Example: with 3% foam concentrate ratio: at a minimal foam concentrate flow of 16GPM, the Line Controller will service a water flow of 533GPM.

The Line Controller electronic display module will allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution

2. Provide push-button control of foam proportioning rates
3. Display current flow-per-minute of water
4. Display total volume of water discharged during and after foam operations are completed
5. Display total amount of foam concentrate consumed
6. Display injection percentage
7. Simulate flow rates for manual operation
8. Perform setup and diagnostic functions for the computer control microprocessor
9. Allow three injection percentage defaults to be stored

### **DISCHARGE ADAPTER**

Four (4) TFT 6" NST swivel female x 5" Storz swivel adapters with caps and chain will be provided.

### **DRIVER SIDE REAR 3" FOAM CAPABLE DISCHARGE(S)**

One (1) each, driver side rear 3" gate foam capable discharge(s) are to be furnished, each one provided with: 2-1/2" NST chrome plated brass rocker lug cap with chain, 2-1/2" NST male x 2-1/2" NST rocker lug swivel female 30 degree chrome plated brass elbow extension, 2-1/2" NST male chrome plated brass outlet adapter, 3/4" bleeder valve with exterior remote control, 3" i.d. stainless steel pipe or wire reinforced hose assembly with 3" stainless end fittings, 3" Akron 8800 series series ball style 1/4-turn full flow bronze bodied discharge valve with a12-volt electric actuator with wiring harness (located inside pump enclosure), and an Akron model 9323 Navigator Valve Controller with Position Lights.

### **DRIVER SIDE REAR 3" FOAM LINE CONTROLLERS AND ACCESSORIES**

One (1) each, FoamPro 1-inch diameter Line Controller Assemblies will be provided, one (1) for each of the above specified foam capable 3" driver side rear gated discharge lines.

Each Line Controller Assembly will include one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly will be provided with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-inch diameter Foam Line Controller Assemblies will have an operational range of foam concentrate flow ranging from 1.8 GPM (6.8L/min) to 60 GPM (227.1 L/min). Example: with 3% foam

concentrate ratio: at a minimal foam concentrate flow of 1.8GPM, the Line Controller will service a water flow of 60GPM.

The Line Controller electronic display module will allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution
2. Provide push-button control of foam proportioning rates
3. Display current flow-per-minute of water
4. Display total volume of water discharged during and after foam operations are completed
5. Display total amount of foam concentrate consumed
6. Display injection percentage
7. Simulate flow rates for manual operation
8. Perform setup and diagnostic functions for the computer control microprocessor
9. Allow three injection percentage defaults to be stored

#### **PASSENGER'S SIDE REAR FOAM CAPABLE LARGE DIAMETER DISCHARGE**

One (1) each, passenger's side rear 6" gated discharges to be furnished, each one provided with: 6" stainless steel piping terminating at the rear of the apparatus with 6" NST male chrome plated brass outlet adapter, 3/4" bleeder valve with exterior remote control, 6" i.d. stainless steel pipe nipple, 6" Akron butterfly style 1/4-turn discharge valve with 12-volt electric actuator and wiring harness (located inside pump enclosure), Akron model 9323 Navigator Valve Controller with Valve Position Indicator Lights located on pump operator's control panel.

#### **PASSENGER'S SIDE 6" FOAM LINE CONTROLLERS AND ACCESSORIES**

One (1) each, Foam Pro 1.50-inch diameter Line Controller Assemblies will be provided, for the above specified foam capable 6" passenger's side rear gated discharge line.

Each Line Controller Assembly will include one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly will be provided with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-1/4 inch diameter Foam Line Controller Assemblies will have an operational range of foam concentrate flow ranging from 16 GPM (60.5L/min) to 150 GPM (567.6 L/min). Example: with 3% foam concentrate ratio: at a minimal foam concentrate flow of 16GPM, the Line Controller will

service a water flow of 533GPM.

The Line Controller electronic display module will allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution
2. Provide push-button control of foam proportioning rates
3. Display current flow-per-minute of water
4. Display total volume of water discharged during and after foam operations are completed
5. Display total amount of foam concentrate consumed
6. Display injection percentage
7. Simulate flow rates for manual operation
8. Perform setup and diagnostic functions for the computer control microprocessor
9. Allow three injection percentage defaults to be stored

#### **REAR DECK GUN AUXILARY INLET**

The piping and valves will be configured to allow the monitor to be fed by either the pump discharge or from an outside source, through the rear 6" inlet/outlet.**FRONT BUMPER DISCHARGE**

#### **FRONT BUMPER 2-1/2" PRECONNECT DISCHARGE**

One (1), front bumper 2-1/2" gated discharge to be provided with: 2-1/2" Akron 8800 series series ball style 1/4-turn full flow bronze bodied discharge valve with a 12-volt electric actuator with wiring harness (located inside pump enclosure), and an Akron model 9323 Navigator Valve Controller with Position Lights, and color coded nameplate located on the pump operator's control panel. The line will be plumbed to the front bumper using 2.5" high pressure hose, and will be provided with a chrome 2.5" swivel located on top of the bumper extension, adjacent to the hose tray.

#### **FRONT BUMPER DISCHARGE FOAM LINE CONTROLLER AND ACCESSORIES**

One (1) each, FoamPro 1-inch diameter Line Controller Assemblies will be provided, one (1) for each of the above specified foam capable gated crosslay hosebed preconnect discharge lines.

Each Line Controller Assembly will include one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly will be provided

with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-inch diameter Foam Line Controller Assemblies will have an operational range of foam concentrate flow ranging from 1.8 GPM (6.8L/min) to 60 GPM (227.1 L/min). Example: with 3% foam concentrate ratio: at a minimal foam concentrate flow of 1.8GPM, the Line Controller will service a water flow of 60GPM.

The Line Controller electronic display module will allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution
2. Provide push-button control of foam proportioning rates
3. Display current flow-per-minute of water
4. Display total volume of water discharged during and after foam operations are completed
5. Display total amount of foam concentrate consumed
6. Display injection percentage
7. Simulate flow rates for manual operation
8. Perform setup and diagnostic functions for the computer control microprocessor
9. Allow three injection percentage defaults to be stored

### **PASSENGER'S SIDE REAR DELUGE MONITOR 4" RISER, FLOWS TO 2000-GPM**

One 4" gated riser is to be furnished, for use with a passenger's side rear top of body monitor. The discharge will be provided with: 4" i.d. stainless steel pipe upstream and downstream of the 4" Akron 8800 series series ball style 1/4-turn full flow bronze bodied discharge valve with a 12-volt electric actuator with wiring harness (located inside pump enclosure), and an Akron model 9323 Navigator Valve Controller with Position Lights. The stainless steel piping will be braced for extreme reaction force loads. The piping will tee off of the driver's side 6" rear discharge and will use the foam controller provided for the rear 6" discharge.

The piping and valves will be configured to allow the monitor to be fed by either the pump discharge or from an outside source, through the rear 6" storz connection.

### **AUXILIARY DECK RISER**

An auxiliary 3.00" FNH connection will be provided on the passenger's side pump panel to allow foam concentrate to be fed into the monitor from an external source. The concentrate plumbing will be 3.0" from the panel and will terminate near the deluge gun with a 3.0" x 2.50" 90 deg. MNPT swivel. The auxiliary inlet and swivel deck outlet will be covered with nickel-plated brass caps when not in use. A 2.50" x 8' reinforced concentrate hose will be provided (shipped loose) with FNPSH swivel connections

each end for connection from the deck concentrate outlet to the nozzle concentrate inlet.

### **TASK FORCE TIPS MONSOON RC - REMOTE CONTROLLED REAR MONITOR(S)**

A TFT model Y4-E11A, Monsoon RC electronically operated Monitor(s) to be provided, for use with the specified deluge discharge outlet(s). Each monitor to be equipped with: a model M-ERP2000-NN 2000-GPM Automatic Nozzle, and model Y4E-RP Panel Mount Remote Control.

The remote control(s) will be located on the specified pump operator's panel, adjacent to its respective foam control.

### **TASK FORCE TIPS MONSOON RC – WIRELESS MONITOR OPERATOR STATION**

A TFT model YE-RF-900 Wireless Monitor Operator Station(s) will be provided, in addition to the above specified Panel Mounted Operator Station. Operator Station is to be provided with a clamp style bracket for mounting to the apparatus.

### **WILLIAM 5000 GPM MONITOR/NOZZLE**

A Williams Ambassador Radio Remote Controlled nozzle will be provided. The unit will be capable of flowing foam solution from 2000 GPM to 5000 GPM. The nozzle will have the capability to perform as an automatic pressure, or fixed gallonage nozzle. These modes will perform as follows:

1. Automatic mode- in this configuration, the nozzle will automatically adjust for flow rates from 2000 GPM to 5000 GPM while maintaining a constant nozzle pressure of 100 PSI  $\pm$  10%.
2. Fixed gallonage mode- this rate can be pre-set prior to discharging at 2000, 3000, 4000, or 5000 GPM @ 100 PSI

The automatic feature is advantageous due to its ability to respond to the water supply at hand. It will adjust to maintain a nearly constant pressure ( $\pm$  10%) regardless of the flow rate (2000-5000 GPM).

The constant gallonage feature allows the operator to "fine tune" the nozzle. By screwing in one of the (4) four (2000-5000) fixed position plugs, the maximum flow rate can be pre-set. This allows the nozzle to perform like an automatic nozzle until this flow reach is obtained. This feature is advantageous when jet pumps from remote locations are supplying foam.

The nozzle will be of the single waterway configuration. The entire waterway will be constructed of stainless steel and will be 8" ID full flow construction to provide minimum friction loss and maximum efficiency.

The nozzle will be operated by a handheld radio remote control. This allows remote operation of the nozzle from a range well in excess of 200' (60 meters). The following features may be operated by the remote control:

Pattern- Fog/Straight Stream

Horizontal rotation 340 degrees (170 degrees each side)

Vertical travel -15 degrees down/ +75 degrees up (from horizontal)

A switch will be provided at the operator's position of each of these controls as well as radios (on/off) over-ride. Manual hand controls will be provided for a third level of redundancy on the monitor. An on-board hydraulic power unit located inside the pump compartment will power the remote features. All electrical components will be supplied in water-resistant enclosures.

**DELUGE MONITOR FOAM CAPABLE GATED DISCHARGE**

**DELUGE MONITOR 8" DISCHARGE**

One each, DELUGE MONITOR 8" gated discharge flanged outlet is to be furnished, overhead the pump module, provided with: 3/4" bleeder valve with exterior remote control, 8" i.d. stainless steel pipe upstream and downstream of valve, 8" Akron butterfly style 1/4-turn discharge valve with 12-volt electric actuator and wiring harness (located inside pump enclosure), and Akron model 9323 Navigator Valve Controller with Valve Position Indicator Lights. The stainless steel piping will be braced for extreme reaction force loads.

**DELUGE MONITOR WATERWAY FOAM LINE CONTROLLER AND ACCESSORIES**

One each, FoamPro 1.50-inch diameter Line Controller Assembly will be provided, for the above specified foam capable 8" DELUGE MONITOR discharge line.

Line Controller Assembly will include one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly will be provided with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-1/2 inch diameter Foam Line Controller Assemblies will have an operational range of foam concentrate flow ranging from 16 GPM (60.5L/min) to 150 GPM (567.6 L/min). Example: with 3% foam concentrate ratio: at a minimal foam concentrate flow of 16GPM, the Line Controller will service a water flow of 533-GPM, or at maximum flow of 150 GPM will service a water flow of 5000-GPM.

The Line Controller electronic display module will allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution
2. Provide push-button control of foam proportioning rates
3. Display current flow-per-minute of water
4. Display total volume of water discharged during and after foam operations are completed
5. Display total amount of foam concentrate consumed
6. Display injection percentage
7. Simulate flow rates for manual operation
8. Perform setup and diagnostic functions for the computer control microprocessor
9. Allow three injection percentage defaults to be stored

### **1 3/4" CROSSLAY HOSEBEDS (2 ea.)**

Two (2), recessed crosslay style hosebeds to be furnished, located transverse above the fire pump plumbing, recessed in top portion of pump module. Each hosebed will accommodate 200 ft. of 1-3/4" double jacket fire hose, "flat-layed", with nozzle attached. Hosebeds to include: swirl finish smooth metal side walls, 1/4" plate swirl finish aluminum hosebed divider, perforated brush finish neutral metal floors or Turtle Tile removable floor gratings, vertical side and horizontal bottom polished stainless steel outboard corner liners (drivers and passengers sides), and the specified crosslay discharge swivel outlets located below hosebed floors.

### **CROSSLAY 2" DISCHARGE**

Each 2" crosslay gated discharge will be provided with: 1-1/2" NST male outlet x 2" inlet 90 degree bronze or stainless steel discharge swivel, hoseline bleeder valve, 2"

i.d. stainless steel pipe or wire reinforced hose with 2" stainless end fittings, 2" Akron 8800 series series ball style 1/4-turn full flow bronze bodied discharge valve with a 12-volt electric actuator with wiring harness (located inside pump enclosure), and an Akron model 9323 Navigator Valve Controller with Position Lights.

### **CROSSLAY DISCHARGE(S) FOAM LINE CONTROLLERS AND ACCESSORIES**

Two (2) each, FoamPro 1-inch diameter Line Controller Assemblies will be provided, one (1) for each of the above specified foam capable gated crosslay hosebed preconnect discharge lines.

Each Line Controller Assembly will include one (1) ultra bright LED digital Line Control Display, one (1) Line Control Driver, one (1) Line Foam Flowmeter, one (1) Line Control Valve, one (1) Foam Inject Check Valve, and one (1) Calibrate Inject Valve with high pressure foam concentrate bypass return line to the foam concentrate reservoir.

In addition to the above accessories, each Line Controller Assembly will be provided with a: Data Bus Cable, Foam Flowmeter Cable, Water Flowmeter Cable, and Power Cables to Line Control Valve and Flowmeters. The 1-inch diameter Foam Line Controller Assemblies will have an operational range of foam concentrate flow ranging from 1.8 GPM (6.8L/min) to 60 GPM (227.1 L/min). Example: with 3% foam concentrate ratio: at a minimal foam concentrate flow of 1.8GPM, the Line Controller will service a water flow of 60GPM.

The Line Controller electronic display module will allow the pump operator to perform the following control and operation functions for each discharge:

1. Choose between plain water or foam solution
2. Provide push-button control of foam proportioning rates
3. Display current flow-per-minute of water
4. Display total volume of water discharged during and after foam operations are completed
5. Display total amount of foam concentrate consumed
6. Display injection percentage
7. Simulate flow rates for manual operation
8. Perform setup and diagnostic functions for the computer control microprocessor
9. Allow three injection percentage defaults to be stored

### **HOSE ROLLERS**

The crosslays will be outfitted with stainless steel hose rollers. The rollers will be on the right, left and bottom of the crosslay hose bed.

### **CROSSLAY COVER (treadplate)**

A hinged treadplate cover will be provided for the crosslays. Vinyl flaps will be provided for the ends. **DIRECT TANK FILL(foam)**

A 2.5" direct tank fill with a 2.5" valve with a 45 degree elbow is to be installed in the rear of the apparatus.

### **FOAM SUCTION HOSES**

Two (2) 3" x 10' Foam suction hoses will be provided. The hose will be equipped with 3" camlock fittings. One (1) fitting will be male, the other fitting will be female. A 3" 90 deg. PVC foam stinger will be included. **ACCUMAX 300-GPM FOAM PROPORTIONING SYSTEM**

The fire pump system will be equipped with a "high-capacity" electronically controlled, direct discharge injection foam proportioning system. It will be demand based, fully automatic and be compatible with all current foam concentrates. Electronics will be EMI/RFI compliant. The foam proportioning operation will be based on direct measurement of water flow, 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. Performance must not be affected by discharge hose length or size, discharge nozzle type or elevation, or incoming water pressure. The system will be capable of controlling up to eight different foam capable discharges; number and sizes of which are specified above. Each foam capable discharge outlet will allow the choice of plain water or foam solution at the percentage chosen by the pump system operator. Each foam capable discharge will be equipped with: one (1) Line Controller, one (1) Foam Flowmeter, one (1) Automatic Foam Control Valve, one (1) Foam Check Valve, one (1) Water Flowmeter and appropriate cables, fittings and hoses.

### **System Operation**

Each foam capable discharge outlet's individual Line Controller (located adjacent to respective discharge gate valve control) manages the flow of foam concentrate, using information received from the waterway's Flow Meter. The Line Controller signals the Automatic Foam Control Valve which proportions the flow of foam concentrate, being injected directly into the water flow downstream of the outlet gate valve. The Line Controller also continuously monitors waterway performance and feeds the Master

Control with information regarding foam concentrate requirements. The Master Control totals concentrate requirements from each flowing discharge outlet and directs the Edwards Rotary Gear Pump to perform accordingly. A diagnostic self-check of the Line Controller electronic control modules will be run each time the system is powered up. Water flow measurement of each foam capable discharge is accomplished by a non-restricting Flowmeter, located upstream of the discharge gate valve. Depending on piping size, flowmeter may be of paddlewheel or magnetic meter design. All system components are to be constructed of non-corrosive materials. To prevent waste of costly foam concentrate, the system allows calibration and performance testing without mixing concentrate with water.

### **Individual Line Controllers**

One (1) microprocessor equipped individual Line Controller is to be provided for each foam capable discharge. Each includes an ultra bright LED digital display for maximum viewing. The display will enable the pump operator to perform the following control and operation functions for each discharge:

Choose between plain water or foam solution

Provide push-button control/adjustment of foam proportioning rates

Display current gallons-per-minute flow of water

Display total amount of water discharged during and after foam operations are completed

Display total amount of foam concentrate consumed after foam operations are completed

Display selected injection percentage

Simulate flow rates for manual operation

Perform setup and diagnostic functions for the computer control microprocessor

Allow three injection percentage defaults to be stored

### **Master Controller**

A single microprocessor equipped Master Controller is to be provided for the proportioning system. It includes an ultra bright LED digital display for maximum viewing. The display will enable the pump operator to perform the following control and operation functions for the total foam proportioning system:

Activate the proportioning system at the push of a button

Display total current flow-per-minute of water

Display total amount of water discharged during and after foam operations are completed

Show total amount of foam concentrate consumed

Perform setup and diagnostic functions for the computer control microprocessor

Flash a "low concentrate" warning when the foam concentrate tank runs low

Flash a "no concentrate" warning and shut the foam concentrate pump off, preventing damage to the pump, should the foam tank empty

### **Low Flow Option**

A FoamPro Low-Flow option will be provided to deliver precision proportioning for low flow applications as specified. Operation will be integrated into system microprocessor control and deliver seamless, automatic adjustments to flow conditions without operator interface.

### **Hydraulic System**

The hydraulic system will include a variable displacement piston pump, and the system must comply with all applicable SAE and DOT standards. The hydraulic system will be provided with a hydraulic oil cooler and an appropriately sized hydraulic reservoir, both designed to maintain the temperature of the hydraulic oil at or below 200 F.

### **Concentrate Pump**

A hydraulic motor driven positive displacement foam concentrate pump, rated at 300 gpm (567.8 L/min) minimum 10 gpm (22.7 L/min) with maximum operating pressure of 250 psi (13.8 BAR), will be installed in a suitable and accessible location. An electronically-operated valve will receive signals from the computer control display to control the flow of hydraulic oil to the hydraulic motor coupled to the concentrate pump. The concentrate pump turns at a variable speed to ensure that the correct proportion of concentrate selected by the pump operator is injected into the fire pump discharge stream.

The foam concentrate pump will be an Edwards Manufacturing all bronze 300 gpm rotary gear pump. Construction features of pump are to include: ball style bearings (no bushings), timing gears (to prevent rotor contact), and solid stainless steel rotor shafts. Pump design and construction materials will all allow the foam pump to run dry without damage.

### **FoamPro AccuMax Components:**

Master Controller, one (1) each

Individual line controllers (one per foam capable discharge outlet)

Flowmeters, for foam concentrate (one per foam capable discharge outlet)

Foam Concentrates Control Valves (one per foam capable discharge outlet)

Check Valves (one per Foam Control Valve)

Flowmeters, foam capable outlet waterway (one per discharge, sized for discharge flow capability)

Edwards Manufacturing Foam Concentrate Pump with Hydraulic Motor drive

Variable displacement piston Hydraulic Pump

Strainer

Molded cables

Placards

### **OEM Supplied Components:**

Hydraulic Hoses and Couplings  
Hydraulic Pressure Gauge  
Hydraulic Temperature Gauge  
Hydraulic Filter Assembly  
Foam concentrates Hoses and Piping  
Oil Cooler Radiator with Fan  
Oil Reservoir with Site Level Gauge  
Hot Shift style Power-Take-Off (PTO)

An installation and operation manual is provided for the foam system, along with a one-year limited warranty by FoamPro/Hypro.

### **TRANSMISSION MOUNTED PTO WITH HYDRAULIC PUMP**

A Chelsea or Muncie gear style "Hot-Shift" vehicle transmission mounted PTO will be provided, complete with interior cab dash mounted shift console with indicator light.

The specified AccuMax foam system will be provided with a hydraulic pump and hose kit, to power the foam concentrate pump mounted hydraulic motor. Hydraulic pump will be mounted to the above specified PTO.

### **CERAMIC COATED ROTARY FOAM PUMP SHAFTS**

The specified positive displacement foam concentrate pump will have "ceramic coated" (hardened) rotor shafts.

### **MANUAL OVERRIDE**

A FoamPro Manual Override option will be provided to provide operator manual control of foam concentrate pump.

### **FOAM TANK REFILL**

One (1), gated 2" tank fill discharge line, from pressure side of foam pump to foam tank will be provided with: tank fill spud located at top front of foam tank, high pressure wire reinforced 2" hose with reusable threaded end couplings. The valve will include a manual actuator on the pump operator's panel.

### **FOAM TANK GATED SUCTION, 2-1/2" VALVE & PIPING**

One (1) each, 2-1/2" inside diameter foam tank gated suction line will be provided, equipped with the following accessories:

**GATE VALVE & CONTROL**

A matching brand bronze 2-1/2" ball style swing-out gate valve will be provided, sandwich bolted between the specified foam pump suction port and foam concentrate tank inlet.

**AUXILIARY FOAM PUMP GATED SUCTION INLET, 2-1/2" NST MALE, 2-1/2" VALVE & PIPING**

Two (2) each, 2-1/2" inside diameter foam pump gated suction lines will be provided, one (1) each side of the pump module. The inlets will allow foam concentrate to be drafted from an outside source (foam concentrate tanker, drums, etc.), without operating the water pump by utilizing the manual override function. Additionally the system will be capable of proportioning dissimilar foam concentrate without contamination the on-board tank. Dissimilar liquids will be introduced to the system by utilizing the auxiliary foam suction valve. The auxiliary inlets will be equipped with the following accessories:

**INLET & PIPING**

The foam pump suction inlet will be located at the driver side pump panel, and will include: 2-1/2" NST chrome plated brass rocker lug plug with chain, 2-1/2" NST male chrome plated brass inlet adapter, removable strainer, 2-1/2" i.d. type 304 stainless steel pipe and smooth-sweep elbows.

**GATE VALVE & CONTROL**

A matching brand bronze 2-1/2" ball style swing-out gate valve will be provided, sandwich bolted between the specified foam pump suction port and foam concentrate inlet fittings. The valve will include a manual actuator adjacent to the inlet.

**AUXILIARY FOAM PUMP GATED SUCTION OUTLET, 2-1/2" NST MALE, 2-1/2" VALVE & PIPING**

Two (2) each, 2-1/2" inside diameter foam pump gated discharge lines will be provided, one (1) each side of the pump module. The outlets will allow foam concentrate to be discharged off-board, without operating the water pump, by utilizing the manual override function. The auxiliary discharges will be equipped with the following accessories:

**INLET & PIPING**

The foam pump suction inlet will be located at the driver side pump panel, and will include: 2-1/2" NST chrome plated brass rocker lug cap with chain, 2-1/2" i.d. type 304 stainless steel pipe and smooth-sweep elbows.

**GATE VALVE & CONTROL**

A matching brand bronze 2-1/2" ball style swing-out gate valve will be provided, sandwich bolted between the specified foam pump discharge port and foam concentrate discharge fittings. The valve will include a manual actuator adjacent to the outlet.

### **SYSTEM FLUSH**

The foam system is capable of being flushed when desired. Plain water will be drafted through the auxiliary foam suction and discharged through the auxiliary foam discharge.

### **CAM-LOCK ADAPTERS**

The following adapters will be provided.

3" F camlock x 3" M NH (2)

3" M camlock x 3" F NPT (2)

3" M camlock cap (2)

### **PUMP ENCLOSURE, MID-SHIP S/S MODULAR - TOP MOUNT CONTROLS CONTROLS**

A pump compartment/module will be furnished, located "mid-ship" of the vehicle, designed for "top-mount" pump controls and instrumentation. The pump compartment will be "fully enclosed", using fabricated sheet metal panels on top, sides, front, and rear. The modular style pump enclosure will be located no more than 1-inch ahead of the apparatus body, and 2-inches rear of the chassis cab.

The entire pump compartment module will be separate from the chassis cab, and apparatus body, rigidly mounted to the chassis frame rails, and designed to allow independent twisting "no-contact" movements of the cab and walk-way or the pump module and apparatus body. The pump module will remain rigid to the chassis frame rails, and fire pump itself will have a flex-mount system as approved by the fire pump manufacturer. The rigid module mount system will prevent unnecessary movement of the pump compartment, and the resulting mis-alignment of runningboards and body rubrails.

### **STAINLESS STEEL CONSTRUCTION**

Pump compartment will be of all-bolted construction, fully enclosed, constructed of minimum 12-gauge type 304 brushed stainless steel. Due to the entire pump house module being constructed of scuff-resistant non-painted brushed stainless steel, neither polished stainless steel nor aluminum treadplate overlays are required for scuff protection.

### **BLEEDER VALVE AND DRAIN VALVE CONTROL PANELS**

The specified passenger side outlet and inlet bleeder valve controls will be located

immediately above the runningboard, installed on a brushed stainless steel horizontal full width bolt-on riser panel. The specified driver side outlet and inlet bleeder valve controls, and master pump drain control will be located immediately above the runningboard, installed on a brushed stainless steel horizontal full width bolt-on riser panel.

### **REMOVABLE ACCESS PANELS**

Driver and Passenger sides of pump module will incorporate brushed stainless steel removable mid-section panels, removal of which allows for pump inspection, service, and maintenance.

The removable side panels will be located above the driver side bleeder and drain valve control panel, and the passenger side bleeder control panel. The panels will be held in place by a minimum of four (4) chrome plated quick release trigger latches, and each removable side panel will also be provided with two (2) chrome plated grab handles to aid in removal and re-installation of the panel.

Passenger side and driver side removable panel openings will be full width of the pump compartment/module by at least 30" tall .

Front of pump module will incorporate a removable door panel, removal of which allows for full access of pump for inspection, service, and maintenance.

Front panel will be constructed of aluminum treadbrite and be held in place by chrome plated D-ring latch.

Front opening will be minimum 68" wide x 25" tall.

### **ACCOMMODATIONS FOR OVERHEAD PRECONNECT HOSEBEDS**

The upper portion of the pump module will be of adequate size to accommodate any optionally specified recessed preconnect hosebed(s) or dunnage areas. This area will be above the control and instrument panels, ahead of the apparatus body and water tank.

### **RUNNINGBOARDS**

Driver's and passenger's side pump panel runningboards to be furnished, extending the full length of the pump module.

unningboards will be at least 10" deep, bolted to and easily removable from the lower pump compartment module. Runningboards will be fabricated of matching stainless steel material, provided with non-slip grip-pattern top step surface. Grip pattern will be open to ground, flow-through for spilt liquids.

### **WALKWAY/OPERATOR'S PLATFORM**

The below specified walk-thru standing operator's platform will be located between chassis cab back panel and front face of pump compartment.

### **PUMP INSPECTION DOORS**

Two (2) lift-up style horizontally hinged pump compartment interior access/inspection doors will be provided, located pump panel, one (1) passenger's side and one (1) driver's side, overhead the removable pump access panels. Inspection doors will be fabricated of brushed stainless steel, equipped with top mounted polished stainless piano hinge, bottom centerline stainless D-ring slam latch, and two (2) underside telescoping air cylinder props to hold in the open position.

### **HAND RAILINGS AT TOP MOUNT WALKWAY ENTRANCES**

Matching material 1-1/4" o.d. tubular railings to be provided, with: chrome plated base bolted end rail brackets, neoprene rubber bracket surface mounting pads, and non-slip surface. Tubular railings to be located, one driver's side, one passenger's side at top mount pump walkway entrance.

### **HANDRAIL BELOW PUMP CONTROL PANEL**

Matching material 1-1/4" o.d. tubular railings to be provided, with: one (1) chrome plated base bolted center rail and two (2) end rail brackets and neoprene rubber bracket surface mounting pads. Tubular railing to be horizontally mounted top mount pump walkway upper riser below pump control panel.

### **MIDSHIP PUMP TOP MOUNT CONTROLS**

A top-mount pump control console will be furnished, located above midship mounted fire pump (top of specified pump compartment/enclosure), full width of pump compartment enclosure. Pump control console to be approximately 14" deep, sloped down towards operator's standing position. The specified pump gauge panel to be located above and to the rear of pump control console.

The upper back portion of the pump control panel will accommodate the specified "opening" instrument panel, and lower forward portion will accommodate the specified inlet/outlet/drain valve and pump controls. See following described removable pump panel access panel(s).

Specified electric valve control consoles will also be mounted below and in-line with respective discharge pressure gauge.

NOTE: Discharge and/or suction controls, especially those, which require slotted

openings in the control panel for travel of the valve control handle will not be acceptable.

### **IDENTIFICATION TAGS**

All discharge controls and outlets, suction controls and inlets, drain valve controls, bleeder valve controls, and all other pump related controls will be properly identified with permanent engraved or cast nameplates describing function and operation of each control. Nameplates for discharge controls, discharge outlets, and respective pressure gauges will be color coded and indicate: numerical sequence, location of outlet, type of discharge, and size of hose to be used. The nameplates will be recessed into the discharge control bezels and discharge and suction drain and bleeder control handles.

Any specified air or electric toggle switch gated pump suction controls, with indicator lights, will be grouped together on pump control console, for ease of identification, equipped with permanently engraved nameplates recessed into a single piece polished stainless steel surround bezel.

NOTE: Discharge and/or suction controls, especially those, which require slotted openings in the control panel for travel of the valve control handle will not be acceptable.

The specified air toggle switch controls with indicator lights will be grouped together on pump control console, equipped with permanently engraved nameplates recessed into a single piece polished stainless steel surround bezel.

### **TOP OPERATOR'S PLATFORM/WALKWAY**

Operator's top-control standing platform/walkway will be located transverse above chassis frame rails, immediately rear of chassis cab. Platform to be 80" side-to-side x at least 24" front-to-rear, mounted to a rigidly supported channel under-structure. The standing platform/walkway and all step surfaces will be fabricated of polished 4-way aluminum with NFPA approved non-slip treadplate pattern. Where the pump panel runningboards are more than 18" below the platform, intermediate non-slip step housings will be furnished, driver and passenger sides, evenly dividing the distance between the runningboard and platform/walkway.

### **NON-SLIP PATTERN-CUT/PUNCTURE-FABRICATED GRIP AREAS**

The specified walkway surfaces and step surfaces will be provided with multiple extra aggressive non-slip step-and-walk areas, "machined" into the top surfaces at designated step and walk locations. The aggressive non-slip areas will consist of a uniform pattern of cut-outs, which are press-formed-up providing a rugged positive no-slip self-draining

foot grip surface. The non-slip grip pattern as provided, will be tested and certified to be in compliance with NFPA Slip-Resistance standards, as described in NFPA 1901: Section 15.7.3.

### **BRUSHED STAINLESS "TIP-OUT" INSTRUMENT PANEL WITH LIGHT HOOD**

The specified pump pressure gauges, discharge pressure gauges, and engine monitors/ instruments will be installed on a brushed stainless steel hinged gauge panel, located above and to rear of pump control panel. The gauge panel is to be equipped with two adjustable-grip chrome plated lift-and-turn latches, located in upper corners. Gauge panel to be of the "tip-out" style, to allow access to back of gauges and interior fire pump compartment. Top full width integral light housing to be furnished.

### **GAUGE AND INSTRUMENT LIGHTING**

Any non-back lit gauges or instruments will be provided with overhead 12-volt lighting, to fully illuminate for nighttime operations. Lighting will be manually switched.

### **INSTRUMENT PANEL LIGHTS, LED STRIP STYLE**

The specified enclosed 12-volt light fixtures will be Whelen or equivalent LED strip lights.

### **ENGINE INSTRUMENTATION**

The engine instrumentation is to be included in the specified fire pump pressure control system "engine governor". Instrumentation will be integral with the Governor Control.

### **MASTER PUMP PRESSURE GAUGES, BRONZE NO-SHOK**

Master pump intake and pump discharge pressure indicating devices will be located within 8" of each other, edge to edge, with the intake (suction) pressure indicating device to the left of the pump discharge pressure indicating device. Gauges to be bronze construction (not plastic), with crystal lenses.

A 4" diameter No-Shok "Duplex" pressure gauge to be furnished, registering 0 x 400 psi, black numerals on white background. Duplex gauge to have two (2) needles, one (1) black needle that indicates pressure at the discharge volute of the fire (water) pump, and one (1) red needle that indicates pressure at the discharge outlet of the specified foam pump. Duplex gauge is to be equipped with a black permanently engraved identification nameplate installed below the gauge, to read: "WATER PUMP DISCHARGE. & FOAM PUMP DISCHARGE"

A 4" diameter No Shok compound style pressure gauge to be furnished, registering --30 x 400 psi, black numerals on white background. Gauge to be piped to suction volute of fire pump, equipped with a black permanently engraved identification nameplate installed below the gauge, to read: "SUCTION."

### **TEST GAUGE PANEL**

One (1), dual test plug assembly to be furnished, installed on specified gauge panel adjacent to respective pump suction and pump discharge gauge. Test plugs to be piped to the fire (water) pump suction cavity and discharge cavity using high pressure clear nylon tubing with brass fittings.

### **INDIVIDUAL DISCHARGE GAUGES, 2-1/2" DIAMETER**

One (1), 2-1/2" diameter NoShok compound style discharge pressure gauges to be furnished, registering 0 x 400 psi, black numerals on white background. Gauge needle will have a "bright orange" tip for improved visibility. Gauges to be located in a uniform manner no more than 6" from its respective discharge valve control. Each gauge and respective discharge valve control to be equipped with color coded permanently engraved identification nameplate to describe numerical sequence, location, type and size of outlet.

The specified engine monitors, pump suction and discharge gauges, and individual gated discharge pressure gauges will be installed on the specified gauge panel. Pressure gauges to be piped to the individual discharge valves and pump suction and discharge volutes using high pressure clear nylon tubing with brass fittings.

### **FOAM LEVEL - INDICATOR - TANKVISION**

One (1), FRC, "Tankvision" foam tank level indicator to be furnished with: weatherproof encapsulated high intensity LED light indicator, 30-ft sensor cable extension for foam tank level indicator, tank level sensing probe, and protected wiring loom. Foam tank level indicator to be mounted on pump control panel. Tank level sensing probe to be located in front of specified foam tank.

### **PUMP COMPARTMENT LIGHTS, LED**

Two (2), Truck-Lite or equivalent 4" round surface mount 12-volt LED pump compartment interior lights to be furnished, mounted ceiling of interior pump compartment drivers and passengers side. Lights to be activated by push-button switch.

### **TOP-SIDE ACCESS LADDER**

There will be a ladder located at the side of the apparatus, at the pump module, to access the top of the vehicle body. The ladder will be a swing out and fold down type. The ladder will be constructed of 12 gauge heavy duty 304L stainless steel. An aggressive non-skid footing surface will be punched into each step. Ladders made from aluminum handrail material or aluminum castings are not acceptable.

### **FUEL GAUGE**

A fuel gauge will be provided at the pump operator's panel to monitor the apparatus fuel level.

### **AIR HORN BUTTON**

A push button switch will be provided on pump operators panel to activate the air horns.

### **WATER TANK GAUGE**

Three (3) Whelen PSTANK LED strip lights will be provided. The lights will be steady burn green, blue, amber and flashing red to indicate liquid level in the foam tank.

### **BODY SUB-FRAME**

The body compartments will be attached to an aluminum sub-frame using aircraft type Huck fasteners. The sub-frame will be constructed from 6" x 2" x 5/16" structural channel, 3" x 1.5" x 3/16" tubing, and 1.5" x 3/16" angle. This sub-frame will rest directly on the chassis frame rails and will be separated from the chassis using 1/4" thick ultra-high-molecular-weight (UHMW) polyethylene pads at all contact points.

The bottom of the side body and rear body compartments will be supported from the chassis frame rails using a steel support system. At the front of the body there will be a minimum of two (2) steel support members constructed from 1/2" x 5" plate and 3/16" thick formed channel. These supports will be secured to the chassis using 5/8" grade-8 zinc-plated bolts. At the rear of the body there will be a heavy-duty steel rear platform constructed from 1/2" x 5" plate, 3/16" and 1/4" thick formed angles and channels, and 2" x 2" x 3/16" tubing. This rear platform will be attached to the chassis frame rails using 5/8" and 3/4" grade-8 zinc-plated bolts. The bottom of the side body and rear body compartments will be attached to the steel support system using aircraft type Huck fasteners.

Self-supporting bodies will not be acceptable. NO EXCEPTIONS

### **APPARATUS BODY**

The body will be constructed of 3/16" #5052 aluminum sheet, #3003 bright aluminum diamond plate and structural aluminum extrusions. The body will be of the modular design to allow for proper flexing of the truck chassis. The body will be custom built and engineered for proper load distribution on the chassis. An insulator material will be used where aluminum and steel are in contact to prevent corrosion.

The ceilings, sidewalls and floors of the body compartments will be constructed of 3/16" 5052-H32 smooth aluminum plate with a tensile strength range of 32,000 to 44,000 psi. Continuous 5356 fill welding will seal compartment panels.

The body framework will be constructed of custom-designed aluminum alloy 6063-T5 extrusions with a tensile strength of 35,000 psi.

To eliminate "dead space" and to maximize compartment interior space, there will be no more than 1/4" between outer and inner walls.

The compartment extrusions will be slotted full-length on backside for uniform fitting of the aluminum plate work that forms the compartment interiors.

The aluminum extrusion profiles will incorporate 1" x 1-3/4" recessed continuous door seal at the bottom of the compartment. The extrusions will be designed to allow unobstructed, sweep-out floors in all compartments.

The front, top, and rear surfaces of body will be covered with .125" bright aluminum diamond treadplate. The forward and rear recessed surfaces will be flush with the corner extrusions.

The compartment tops will extend downward over the extrusions and form a drip molding. The material will be .125 aluminum treadplate with approved aerated service for walking.

The compartment assemblies are to be fastened to the sub-frame with mechanical Huck-type bolts.

The apparatus body will be a separate module from the pump enclosure and will not be fastened together in any manner.

Each compartment will be properly vented with louvers.

### **REAR STEP COMPARTMENTATION**

- A1- There will be a compartment provided at the rear step. The compartment will be approximately 40" wide x 40" high x 29-1/2" deep inside. The compartment will be provided with a roll-up door.

### **COMPARTMENTATION LEFT SIDE**

- L1- There will be a compartment, ahead of the rear wheels approximately 30-1/2" wide x 66" high x 27-1/4" deep inside.
- L2- There will be a compartment above rear wheel approximately 61-1/2" wide x 36-1/2" high x 27-1/4" deep inside.
- L3- There will be a compartment behind the rear wheels approximately 53-1/2" wide x 66" high x 27-1/4" deep.

### **COMPARTMENTATION RIGHT SIDE**

- R1- There will be a compartment ahead of the rear wheels approximately 30-1/2" wide x 66" high x 27-1/4" deep.
- R2- There will be a compartment above rear wheels approximately 61-1/2" wide x 36-1/2" high x 27-1/4" deep.
- R3- There will be a compartment behind the rear wheels approximately 53-1/2" wide x 66" high x 27-1/4" deep.

### **ROLL-UP COMPARTMENT DOORS**

The apparatus body will be equipped with R.O.M Robinson Shutter doors. The door slats will be double wall box frame, manufactured from anodized aluminum with a satin finish. The doors will have the following features:

- Manufactured wholly in the United States.
- Concave individual slat design to prevent loose equipment from hindering door operation.
- Co-Extruded stretch resistant inner seal between slats to prevent metal-to-metal contact and inhibit moisture and dust penetration.
- Interlocking swaged/dimpled end shoes will be utilized to provide a tight fitting assembly and allow for easy removal in the event of damage.
- Effective counter balancing for ease of lifting and lowering the doors.

- One-piece side rail and track to provide an unobstructed slide area and reduce the risk of binding.
- Non-abrasive replaceable water and dust barrier to keep compartment equipment clean and dry.
- A magnetic type switch integral to the door will be supplied for door ajar indication and compartment light activation.
- A full width positive latch bar will be operable with one hand, even with heavy gloves.

A door open indicator light will be provided in the cab.

A 3M clear protective material will be provided along the outer edge of the compartment floor to protect this area from scratches that could occur when installing or removing equipment from the compartments.

### **SCBA CYLINDER COMPARTMENTS**

There will be four (4) spare breathing air cylinder compartments recessed in the rear fender wells, two (2) left and two (2) right. The compartments will have brushed stainless doors equipped with a weather resistant flush fitting thumb latch. The interior of the door will incorporate a rubber seal to keep the compartment free of road debris and moisture. The interior compartment will be constructed of a high-density polyethylene plastic.

### **COMPARTMENT MATTING**

Turtle Tile interlock matting material will be provided in each compartment.

### **TOOL MOUNTING**

The following mounting brackets will be provided.

Sensible Products SH1 (4) each

### **TOOL BOARD**

A Sensible Products "Channel Panel" tool board will be installed in the slide out tray located in compartment L1, and to both sides of the tool boards installed in L3.

### **ADJUSTABLE SHELF**

There will be a total of three (3) adjustable shelves provided and installed in the

specified compartment as described. The shelves will be fabricated of .188" aluminum plate. The shelves will be located in the following compartment(s)

L3, between the rear wall and the divider two (2)  
R3 (1)

### **COMPARTMENT DIVIDER**

There will be a vertical divider/partition provided in compartment L3. The divider will be constructed of .188" thick smooth aluminum plate. The top and bottom of the divider will have a formed flange bolted to the interior of the compartment.

### **ADJUSTABLE VERTICAL SLIDE-OUT PANEL**

There will be a total of two (2) adjustable vertical slide-out tool board with a 250 lb. capacity supplied and mounted on unistrut tracks in compartment L3. Extra compartment lights will be provided and located as needed to properly illuminate the compartment.

### **ADJUSTABLE ROLLOUT DRAWER**

There will be a total of two (2) 250 lb. capacity rollout drawers supplied and installed in the specified compartment. The drawers will be approximately 3" deep and will be mounted on adjustable tracks. The drawers will be located in the following compartment(s)

L1 (1), R1 (1)

### **600# SLIDE-MASTER TRAY**

There will be a total of five (5) Slide-Master pullout drawers provided and installed. The drawers will have a distributed load capacity of 600 lbs. and be capable of extending 70% of its depth. The tray will be fabricated of .188" aluminum plate and have a formed lip that measures 2". The trays will be attached to the floor of the following compartments:

L1 (1), L3 (1), R1 (1), R1 (1), A1 (1)

### **UNISTRUT**

Each compartment will come equipped with 1.625" x .875" x .125" aluminum Unistrut channel. The Unistrut will be securely fastened to the interior walls of the compartment.

### **HOSE BED**

The hose bed will be provided with aluminum slatted flooring radiused at the edges to prevent hose damage from sharp edges. Each hose bed floor section will be removable for easy access to the water tank.

### **HOSE BED DIVIDER**

The hose bed will be divided by two (2) 3/16" aluminum partitions that are fully adjustable by sliding in tracks located at the front and rear of the hose bed. The divider will be located as needed.

### **HOSE BED COVER**

An aluminum two-piece, hinged hose bed cover constructed of .125" aluminum diamond plate and square aluminum extrusion will be provided for the main hose bed.

### **POWER OPERATED HOSEBED COVERS**

A power operated hosebed cover system will be provided. The system will be electrically operated and will use heavy duty linear motors to raise and lower the hosebed covers.

Systems that use hydraulic cylinders with an independent power source are not desired.

The linear operators will be installed at the front of the hosebed, in such a manner, as to allow the hosebed lift actuator pins to be removed if one of the actuators should fail. An alarm will be provided to warn personnel nearby that the covers are in motion.

Switches will be provided to operate each cover independently, and will be installed at the rear of the apparatus.

The hosebed cover power supply will be tied into the parking brake circuit, and will also trigger the accessories up light and warning buzzer in the cab if the parking brake is not set.

### **BODY HANDRAILS**

Handrails will be constructed of type 304 stainless steel 1.25 inch diameter tubing with bright finish and knurled gripping surface. Mounting flanges will be constructed from 7

gauge, .180 thick, stainless sheet. Each grab rail will have 90 degree returns to flanges. The ends of grab rail will pass through the flanges and be welded to form one structural unit. The handrails, will be mounted using 1.25" SS Hex bolts, with a barrier rubber gasket at each flange. Sufficient space will allow for a gloved hand to firmly grip the rail. The rails will be located in the following areas:

(Note: These are in addition to those previously mentioned in the cab section):

There will be one (1) vertical handrail at rear of the body one each side of the rear compartment.

There will be two (2) handrails mounted horizontally, above the pump panel, one (1) on each side as large as possible.

### **STEPS**

The rear of the body will be equipped with fixed steps. The bottom step will measure 14" x 11" to provide a stable footing position. Each additional step above will measure 14" x 8" for clearance while climbing. Thinly fabricated aluminum steps will not be utilized.

The quantity and location of steps and handrails will meet the Current NFPA 1901 pamphlet in effect at the time the apparatus is ordered.

### **INTERMEDIATE REAR STEP**

There will be one (1) full width treadplate rear step, 8" deep, provided at the rear of the apparatus above the rear step compartment and below the hose bed.

### **RUB RAILS**

The body will be equipped with anodized aluminum channel style rub rails at the sides. Rub rails will be spaced away from the body by 1/2" polymer spacers. The rub rails will be polished to a bright finish.

### **ALUMINUM TREADPLATE**

All load bearing aluminum treadplate running boards will be .155 thick bright-annealed finish. Running boards and rear step edges will be flanged down for added strength. Running boards will also be flanged up to form kick plates. All non-load bearing aluminum will be .125" thick bright annealed finish. In areas where aluminum treadplate will function as a load-bearing surface, there will be a heavy steel sub-structure. This structure will consist of 3" channel and 1-1/2" angle welded support. This will assure that there will be no flexing or cracking of running boards.

The aluminum will be insulated from the steel by closed cell foam body barrier material.

Treadplate locations:

1. Skirting around front bumper.
2. The step at the cab entrance.
3. The jump seat steps.
4. The body header.
5. The running boards.
6. The rear step.
7. The top of the compartments.
8. The rear of the apparatus.

### **FENDER PANELS**

The rear fender panels will be painted job color.

### **1000 GALLON FOAM TANK**

The tank will have a capacity of 1000 U.S. gallons.

The tank will be constructed of 1/2" thick polypropylene sheet stock. This material will be a non-corrosive stress relieved copolymer thermo-plastic. The foam tank will be of a specific configuration and is so designed to be completely independent of the body and compartments. All joints and seams will be welded and/or formed and tested for maximum strength and integrity. The top of the tank is fitted with removable lifting eyes designed with a 3 to 1 safety factor to facilitate easy removability. The transverse swash partitions will be manufactured of 3/8" polypropylene and extend from approximately 4" off the floor to just under the cover. The longitudinal swash partitions will be constructed of 3/8" polypropylene and extend from the floor of the tank through the cover to allow for positive welding and maximum integrity. All partitions will be equipped with vent and air holes to permit movement of air and foam between compartments. The partitions will be designed to provide maximum flow. All swash partitions interlock with one another and are welded to each other as well as to the walls of the tank.

The tank will have a combination vent and manual fill tower. The fill tower will be constructed of 1/2" polypropylene and will be a minimum dimension of 8" x 8" outer perimeter. The tower will be located in the left front corner of the tank. The tower will have 1/4" thick removable polypropylene screen and a polypropylene hinged-type cover. The tank cover will be constructed of 1/2" thick polypropylene to incorporate a multi three-piece locking design which allows for individual removal and inspection if necessary.

The sump will be constructed of 1/2" polypropylene and be located in the left front quarter of the tank. The sump will have a minimum of 3" national pipe threaded outlet on the bottom for a drain plug. This will be used as a combination clean-out and drain. All tanks will have a anti-swirl plate located approximately 2" above the sump.

All tank fill couplings will be backed with flow deflectors to break up the stream of foam concentrate entering the tank.

The tank will 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.

The tank will be completely removable without disturbing or dismantling the apparatus structure.

### **MASTER ELECTRICAL PANEL**

The main breaker panel will be wired through the master disconnect solenoid and controlled with a three-position ignition rocker switch. Circuit breakers and flashers will be located at officer's right side lower interior firewall with removable cover and schematic provided with notebook holder on outside cover.

A deluxe breaker panel with up to 22 ground switched relays with circuit breaker protection will be provided.

An integrated electrical sub-panel will be provided and interfaced to the body and chassis through an engineered wire harness system.

Twelve (12) 20-ampere and one (1) 70-ampere relay for cab lightbar and assemblies will be provided. If the option for a mechanical siren has been selected two (2) additional relays will be provided.

Additional four relay boards with circuit breaker protection for additional loads. Maximum two boards (8 relays) per breaker panel. All relay boards set up to trip with input from switch of positive-negative or load manager by moving connector on board (no tools needed to do this).

All relay boards will be equipped with a power-on indicator light (red), input indicator light (green) and power output indicator light (red).

Up to 23 additional automatic reset circuit breakers for non-switched loads that are remotely switched (ie: heater fans, hood lights, etc.).

All relays and circuit breakers on the relay boards will be pull-out/push-in replaceable.

All circuit breakers on the relay boards will be 20 ampere automatic reset which can be doubled or tripled for 40 or 60-ampere capacity.

The system will utilize Deutch DRC weather resistant connectors at the breaker panel, toe board and main dash connections.

All internal wire end terminals, including locking connectors, will be mechanically affixed to the wire ends by matching terminal crimping presses to assure the highest quality terminations.

All internal splices will be ultrasonically welded connections and all internal wiring will be high temperature GXL type wire that is protected by wiring duct wherever possible.

All switches will be ground controlled; no power going through any rocker switch.

Any switch controlling a relay in the breaker panel will be capable of being set to function only when the parking brake is set. All relays will be tagged with the function that the relay is controlling.

### **BODY ELECTRIC SYSTEM**

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

All external harness interfaces will be of a triple seal type connection to ensure a proper connection. The cab/chassis and the chassis/body connection points will be

mounted in accessible locations. Complete chassis wiring schematics will be supplied with the apparatus.

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

All harnesses will be covered with moisture resistant loom with a minimum rating of 300 Degrees Fahrenheit and a flammability rating of VW-1 as defined in UL62. The covering of jacketed cable has a minimum rating of 289 degree Fahrenheit.

All harnesses are securely installed in areas protected against heat, liquid contaminants and damage. The harness connections and terminations use a method that provides a positive mechanical and electrical connection and are in accordance to the device manufacturer's instructions. No connections within the harness utilize wire nut, insulation displacement, or insulation piercing.

All circuits conform to SAE1292. All circuits are provided with low voltage over current protective devices. These devices are readily accessible and protected against heat in excess of component rating, mechanical damage, and water spray. Star washers are not used for ground connections.

### **BACK-UP ALARM**

An Ecco model SA917 automatic self-adjusting electronic back-up alarm producing 87-112 db will be installed at the rear between the frame rails. It will operate whenever the transmission's reverse gear is selected.

### **COMMUNICATION SYSTEM**

A Firecom 3010R single radio intercom will be provided. The system will service the six (6) cab seat positions. The driver and officer will have UHW-10 headsets with radio transmit capabilities. The four crew seats will have UHW-20 headsets with intercom only capabilities.

The system components will be as follows:

- (1) 3010R intercom master station
- (2) UHW-10 headsets with charger and base station#107-3092-00

- (4) UHW-20 headsets with charger #105-3093-00
- (1) Multiple channel wireless base #106-3086-00
- (1) Radio interface cable as required
- (6) Headset hooks #HGR-1

### **COMPARTMENT LIGHTING**

Each compartment will be equipped with two (2) LED light strips which will provide a consistent pattern to illuminate to entire compartment.

### **POWER GROUND STUDS**

There will be a minimum of four (4) threaded power studs provided in the chassis electrical compartment to accommodate the future installation of two-way radios. The studs will be wired as follows:

- One (1) 12-volt 40-amp controlled by the battery switch
- One (1) 12-volt 100-amp ground
- One (1) 12-volt 60-amp controlled by the ignition switch
- One (1) 12-volt 60-amp, direct to the battery

### **LICENSE PLATE BRACKET**

A Cast Products LP0013 cast aluminum license plate bracket with LED light will be provided at the rear of the apparatus.

### **VOYAGER SPLIT SCREEN, 3 CAMERA SYSTEM**

Provided and mounted on the apparatus will be a One (1) HD Voyager® 7" Color Split-Screen, Tri-View, Quad-View LCD Monitor (AOM7694HD); One (1) Rugged Color Camera, 130° Viewing Angle, LED Low light Assist (VCCS130); One (1) Right Color Side Body Camera, 110° Viewing Angle w/ Housing (VCCSIDRCM); One (1) Left Color Side Body Camera, 110° Viewing Angle w/ Housing (VCCSIDLCM); One (1) 50' Camera Cable to LCD Monitor (CEC50); One (1) 15' Camera Cable to LCD Monitor (CEC15); One (1) 15' Camera Cable to LCD Monitor (CEC15); One (1) 6" Double Knuckle Monitor Mount (72706); One (1) ASA adaptor for Non-Tilt Camera.

### **HD STEREO**

A Jensen HD Stereo AM/FM/WB/CD will be provided with four (4) speakers.

### **REAR TURN SIGNALS**

The rear stop/tail/turn signal lights will be Whelen 600 series LED lights mounted in a single polished housing on the rear body panels. The stop/tail lights will be the top light model 600R00BRR. The amber arrow turn signals will be a 60A00TAR, located below the stop/tail lights and the backup lights will be a Halogen model 60J000CU, located below the turn signals.

### **LED ICC/MARKER LIGHTS**

LED type ICC/marker lights will be provided to meet D.O.T. requirements.

### **STEP LIGHTS**

The pump module running board area will be illuminated by Whelen 2G 4" diameter LED lights mounted one each side on the front of the body in chrome flanges.

LED strip lighting will be provided at the front and rear of the body to illuminate all stepping surfaces.

### **GROUND LIGHTING**

The apparatus will be equipped with lighting capable of illumination to meet NFPA requirements. Lighting will be provided at areas under the driver and crew riding area exits and will be automatically activated when the exit doors are opened. The ground lights will be Truck-lite® LED model #44042C. Lighting required in other areas such as work areas, steps and walkways will be activated when the parking brake is applied, provided the ICC lights are on.

### **SCENE LIGHTS**

A pair of Whelen M6 LED scenelights will be installed at the rear of the body facing rearward, and on the back of the cab facing rearward.

### **OPTICAL WARNING SYSTEM**

The optical warning system will be capable of two separate signaling modes during emergency operations. One mode will signal to drivers and pedestrians that the apparatus is responding to an emergency and is calling for the right-of-way and the other mode will signal that the apparatus is stopped and is blocking the right-of-way. Switching will be provided that senses the position of the parking brake.

A master optical warning device switch will be provided to energize all of the optical

warning devices provided. All lights will operate at not less than the minimum flash rate per minute as specified by NFPA.

### **UPPER LEVEL WARNING DEVICES**

The upper level is divided into zones A, B, C and D and the approved lighting package to be provided will be as follows:

Zone A (front) will have one (1) Whelen Freedom 72" Model FN72QLED NFPA 1901 compliant light bar, with twelve (12) LED modules. The light bar will have ten (10) red LED and two (2) clear LED heads and will be mounted on the cab roof.

Zone B (right side) will be covered by the module from the light bar and the right rear stanchion beacon.

Zone C (rear) will have two (2) Whelen Model MCFLED2R Micro Edge Freedom LED light bars, red, mounted on rear stanchions.

Zone D (left side) will be covered by the module from the light bar and the left rear stanchion beacon.

### **WHELEN MINI LED LIGHTBARS**

There will be two (2) Whelen Model FNMINI Mini Freedom series LED light bars provided and mounted above the driver and officer doors. These lights will be wired to a dash mounted switch.

### **LOWER LEVEL WARNING DEVICES**

The lower level is divided into zones A, B, C and D and the approved lighting package to be provided will be as follows:

Zone A (front) will have a stainless steel warning light housing each side with two (2) Whelen 600 Super LED red lights mounted in the front of each housing. The inboard pair of lights is in addition to the minimum NFPA warning system and will be wired through a load-shedding device.

Zone B (right side) will have two (2) Whelen 600 Series Super LED red lights mounted one on the side of the headlight housing and one on the body side at rear of apparatus.

Zone C (rear) will have two (2) Whelen 600 Series Super LED, red lights mounted one each side of the rear of the apparatus.

Zone D (left side) will have two (2) Whelen 600 Series Super LED red lights mounted

one on the side of the headlight housing and one on the body side at rear of apparatus.

### **SIREN**

One (1) Whelen Model 295 SL5A1 electronic siren will be installed at the cab instrument panel complete with noise canceling microphone. The horn button in the steering wheel, a switch on right hand side of cab floor and the control on the siren head will actuate the siren. A selector switch will be provided on the instrument panel for control of horn or siren by steering wheel button.

### **FEDERAL Q2B SIREN**

There will be a Federal Q2B-NN siren installed in the center of the cab grille. The siren will be securely mounted and activated by means of a solenoid and will include a brake.

A siren foot switch will be provided for both the driver and officer, one on each side of the cab floor.

### **SIREN SPEAKER**

One Cast Products SA4201-5-A weatherproof siren speaker will be provided, mounted behind the bumper.

### **WHELEN PIONEER PLUS LED BROW LIGHT**

A Whelen model PFP2 LED brow light will be provided. The light will be mounted at the front of the cab.

The light will be controlled from a switch in the cab.

### **LED LIGHT WHELEN PIONEER**

A Whelen Model PFP2 Pioneer Plus Dual Panel LED floodlight will be provided. The light will be housed in a heavy-duty aluminum housing.

Lumens: 10,000  
Amps: 13  
Volts: 12.8 DC  
Bulb Type: LED  
Width: 14"  
Height: 4-5/8"  
Depth: 3"

The light will be mounted on a telescoping pole. A switch will be located at the light

head.

### **SUCTION HOSE AND STRAINER**

Six (6) 10 ft. lengths of 6" lightweight (KOCHEK) fire department hard suction hose with lightweight long handle couplings and pin lug male couplings will be provided.

The hose will be mounted in a trough and held in position by two heavy-duty quick release straps. Aluminum treadplate scuff plates will be provided on the body side metal where the long handle couplings would otherwise hit the body sides.

### **CORROSION REDUCTION POLICY**

The manufacturer will have in place a formal corrosion reduction program and assembly procedures designed for reducing and eliminating the possibility of corrosion.

It is understood that fire apparatus will operate in harsh environments. At the time of the bid the apparatus manufacturer will show proof of a corrosion policy. Failure to submit this information could be grounds for rejection. If a formal policy is not in place explain in your bid how your firm will take the necessary steps for corrosion reduction. There will be no exception to this requirement.

In addition to a formal program the manufacture will show proof of testing corrosion reduction processes to ASTM B117. A copy of recent test will be included in the bid.

### **Frame Rails**

The chassis frame rails will be coated with a high performance, two component, reinforced inorganic zinc rich primer with a proven cathodic protection makeup preferably Cathacoat 302HB. The surface will be clean and free of all salts, chalk and oils prior to application. Were the primer has been broken during the frame assembly process the area will be touch up to reestablish the seal. Prior to finish paint a second primer Devran 201 will be applied. Once the assembly of the frame is complete and the second primer is applied the entire assembly will be covered with high quality top coat paint preferably Imron 5000 or equal. The manufacturer will submit with the bid a copy of the product brochure and or description of the primer to be used.

### **Electro Plating**

Steel and Iron brackets such as the pump module bracket will be Zinc plated to protect against corrosion. Plating will be in accordance with ASTM B663. The apparatus manufacturer will list all components with plating.

### **Fasteners**

In any area that a stainless steel screw or bolt head is to come in contact with aluminum or steel, painted or non-painted, the fastener will have the underside if the

head pre-coated with nylon. The nylon coating will act as a barrier between the fastener head and the metal or painted surface.

Screw or bolt taped into the metal will be pre-coated with a Threadlocker type material pre-applied on the threads.

When bolting together stainless steel the manufacturer will use a pan-head bolt with nylon coating under the head, a stainless washer with a rubber backing, and a Stover flange nut to secure the bolt.

When mounting aluminum components such as a step to the apparatus body. The manufacturer will use stainless washers with rubber backing. All mounted components will a barrier material between the two surfaces.

All rivet type fasteners will be of the same material being secured.

Whenever possible, pre-drill and tap all holes for mounting components such as lights, steps and hand rails prior to the paint process to reduce the corrosion opportunity. If a hole must be drilled into a previously painted surface, re-establish the paint barrier around the hole and use a flange-type nutsert with a gasket under the flange.

Where possible, minimize the number of stainless trim screws in aluminum. Structural tape and or adhesive will be used were possible for mounting trim to the body or cab.

If a pre-treated screw or bolt is not available, hand apply Dynatex Boltlocker or Theadlocker on the threads of the screw, bolt or nutsert. This will help seal threads from moisture and help prevent the fasteners from loosening.

If lubricant is used when tapping the hole, clean out the lubricant and the shavings before applying blue Threadlocker into the hole.

### **Barrier Tape**

Barrier tape will be used on the backsides of all lights, trim pieces, or other components when bolting them to the apparatus; also when attaching stainless steel over an aluminum surface or when attaching aluminum treadplate to the stainless steel. All instances of dis-similar metals contacting each other require the addition of barrier tape between the metals where contact is made.

Before applying the tape, be sure the metal surface is clean from oil or dirt by cleaning the surface with a 50/50 mix of alcohol and water pr similar solvent.

### **Gaskets**

Gaskets will be used under all snaps, loops and fasteners for such items as for hose bed covers. Reestablish paint seal around the mounting hole edges after drilling.

Mounting with Threadlocker coating will be used.

Flat washers with rubber backing will be used behind all lights that have stainless screws.

### **Rollup Doors**

1 3/4" X 1/16" barrier tape will be used on the frame opening to act as barrier between the aluminum door rail and the painted door opening surface.

Use a paint stick around the holes after drilling and tapping. In mounting the rails, use screws with the nylon under the head and Threadlocker on the threads for mounting the doorframes.

Install barrier tape to the painted surface where the trim is located on top of the door opening.

### **Hinged Doors**

Barrier tape will be applied to the painted surface of the body and on the painted hinge side of the door.

On the hinge side, mount tape out toward the edge to space over the barrel of the hinge, being sure to not touch the door.

Make sure the hinge fits into the extrusion frame with no corner weld beads interfering with the door fit. Do not put the hinge in a bind or cause the stainless steel hinge to touch the aluminum. Install the doors using a truss head bolt with the nylon coating under the head and Threadlocker on the threads.

### **Painting Steel**

The manufacturer will wipe any oil residue dry, remove any rust and remove weld slag or smoke. Clean the surface with solvent before painting. Prime with one even coat of black Color primer, and then spray a topcoat over the primer for the finish coat. After bolts are tightened to the proper torque, touch up the bolt area and ends of the bolts with primer or cold galvanizing coating.

### **Mounting Emergency Lights and Options**

All emergency lights, accessory mountings, Kussmaul covers, and 110 outlet boxes mounted to the body should be mounted with pre-coated Threadlocker and nylon under the head screws or bolts to minimize corrosion between dissimilar metals.

### **Electrical Grounding**

Grounding straps will be installed consisting of a minimum 2-gauge strap bolted to the chassis frame.

A ground cable from the cab to the right side frame rail  
From the alternator to the right side frame rail  
From the pump module frame to the right side truck frame.  
Aerials: from the hydraulic and pump module framework.  
From the pump mount to the truck frame rail.  
From the body module to the right side truck frame.

Proper grounding will help eliminate ground loop problems throughout the truck, reducing the possibility for electrolysis and corrosion to occur. Provide clean connection points on all ground connections, (remove paint where applicable), and spray or brush on electrical sealer as necessary.

When installing foam system pump wiring the power must come from a dedicated breaker to a power solenoid, and then to the power terminal provided by FoamLogix or FoamPro. Pay particular attention to the grounding detail for wire size and good grounding practice, including removing the paint at the point of ground attachment to the chassis. Keep the length of ground wire as short as practically possible.

### **SALT SPRAY TESTING**

Salt spray test will be used to confirm the relative resistance to corrosion of coated and uncoated metallic specimens, when exposed to a salt spray climate at an elevated temperature. Test specimens will be placed in an enclosed chamber and exposed to a continuous indirect spray of neutral (pH 6.5 to 7.2) salt water solution, which falls-out on to the specimens at a rate of 1.0 to 2.0 ml/80cm<sup>2</sup>/hour, in a chamber temperature of +35C. This climate will be maintained under constant steady state conditions.

#### **Method**

Salt fog testing will be performed by placing samples in a test cabinet that has been designed in accordance with Paragraph 4 (Apparatus) of ASTM B117 and operated in accordance with Paragraph 10 (Conditions) of ASTM B117.

A 5% salt solution, prepared by dissolving sodium chloride into water that meets the requirements of ASTM D1193 Specification for Reagent Water, Type IV is supplied to the chamber. At the time the samples are placed into test, the cabinet should be pre-conditioned to the operating temperature of 35°C and fogging a 5% salt solution at the specified rate. The fog collection rate is determined by placing a minimum of two 80 sq. cm. funnels inserted into measuring cylinders graduated in ml. inside the chamber. One collection device will be located nearest the nozzle and one in the farthest corner.

#### **Orientation**

Unless otherwise agreed upon, the samples are placed at a 15-30 degree angle from vertical or tested in the "installed" position. This orientation allows the condensation to

run down the specimens and minimizes condensation pooling. Overcrowding of samples within the cabinet should be avoided. An important aspect of the test is the utilization of a free-falling mist, which uniformly settles on the test samples. Samples should be placed in the chamber so that condensation does not drip from one to another.

### **Test durations**

Test durations will be 500 hours except for sample rotation and daily monitoring of collection rates, the cabinet should remain closed for the duration of the test.

### **PAINTING**

All exposed metal surfaces not chrome plated, polished stainless steel or bright aluminum tread plate will be thoroughly cleaned and prepared for painting. All irregularities in painted surfaces will be rubbed down and all seams will be caulked before the application of the finish coat.

All removable items such as brackets, compartment doors, door hinges, trim, etc. will be removed and painted separately to insure finish paint behind all mounted items. Body assemblies that cannot be finish painted after assembly will be finish painted before assembly. Both aluminum and steel surfaces to be painted will be primed with a two (2)-component primer which is compatible with the finish coat. The apparatus will be finish painted with a polyurethane base/clear system. "No Exception"

A barrier gasket/washer of "High Density Closed Cell Urethane Foam" will be used behind all lights, handrails, door hardware and any miscellaneous items such as stainless steel snaps, hooks, washers and acorn nuts. The gaskets/washers will be coated with pressure sensitive acrylic adhesive. All screws used to penetrate painted surfaces will be pre-treated/coated under the head with nylon and the threads will have pre-coat #80. This procedure will be strictly adhered to for corrosion prevention and damage to the finish painted surfaces.

The following paint process will be utilized:

#### **Surface Preparation:**

1. Wash surface thoroughly with mild detergent.
2. Clean and de-grease with Prep-Sol 3812S.
3. Sand and feather edge using 400 grit or finer on a dual action sander.
4. Remove sanding dust with a cleaner compatible with polyurethane base coat/clear coat final finish.

#### **Substrate treatment:**

1. Use a Metal Conditioner followed with a Conversion Coating product.

**Priming:**

1. Use a priming 615S pretreatment.
2. Use a self etching primer applied to achieve a 1.5 mil dft minimum.
3. Use Prime N Seal sealer compatible with polyurethane base coat.

**Color Coat:**

1. Apply polyurethane base coat 1-2 mil dft minimum.

**Clear coat:**

1. Apply polyurethane clear coat 2 mil dft minimum.

**PAINT-TWO TONE CAB**

The cab exterior surfaces will be two (2) colors. The paint break line will be at the bottom of the windshield.

**PAINTED FRAME**

The frame rails and body subframe will be painted glossy black.

**LETTERING**

Forty (40) 3" 22KT Gold laminate goldleaf letters, with left hand shading and right hand outline to equal 3-5/8" letter, will be provided.

**STRIPING**

A 6" Scotchlite stripe will be provided across the front of the cab and along each side of the apparatus.

An additional 1" Scotchlite stripe will be provided.

**STRIPE EDGING**

A 1/8" black edge will be provided above and below Scotchlite stripe.

**STRIPING, CHEVRON STYLE, REAR BODY, OUTBOARD**

The apparatus will have 6" red and yellow reflective DiamondGrade Chevron style striping affixed to the outboard right and left portion of the rear body. The striping will be set in a manner to have the effect of an inverted "V" shape. The stripe will travel low to high from the outside to the inside.

**MISCELLANEOUS EQUIPMENT FURNISHED**

1 pt. touch-up paint

A bag of stainless steel nuts and bolts, as used in the construction of the apparatus.

**WHEEL CHOCKS**

Two (2) Ziamatic #SAC-44 folding wheel chocks with SQCH-44H holders will be provided. The wheel chocks will be located in a area close to the rear axles easily accessible from the side of the apparatus.

**TFT JUMBO SPANNER WRENCH**

One (1) set of TFT Jumbo LDH spanner wrenches with bracket, will be provided and mounted.

**TFT JUMBO SPANNER WRENCH**

One (1) TFT hydrant wrench/spanner wrench combo set with bracket, will be provided and mounted.

**STORZ ADAPTER**

Four (4) TFT 6" Storz x 5" Storz adapters will be provided.

**OPERATION AND SERVICE MANUALS**

Complete "Operation and Service" manuals will be supplied with the completed apparatus, one (1) printed copy and one (1) CD. Service manual instructions will include service, maintenance and troubleshooting for major and minor components of the truck. The apparatus manufacturer will supply part numbers for major components (i.e. Engine, Axles, Transmission, Pump, etc.). A table of contents, hydraulic, air brake and overall apparatus wiring schematics will be included.

A video demonstration DVD on the operation of the truck will be supplied with the manuals.

### **WARRANTIES**

The following warranties will be supplied:

1. The apparatus will be warranted to be free from mechanical defects in workmanship for a period of one (1) year. The apparatus will be covered for parts and labor costs associated with repairs for a period one (1) year.
2. Life-time warranty on the frame.
3. Seven (7) year warranty on paint.
4. Ten (10) body structural warranty
5. Ten (10) year cab structural warranty
6. Manufacturers Warranties for all major components.

Detailed warranty documents will be included for complete coverage on each of these warranties.

### **MANUFACTURING & LOCATIONS**

The apparatus will be manufactured in facilities wholly owned and operated by the company. A complete stock of service parts, and service will be provided on a 24 hours around the clock basis. The company will maintain parts and service for a minimum period of twenty (20) years on each apparatus model manufactured.

# Sutphen Corporation Stock 395 Industrial Pumper