Briefing Sheet

Tab X, Version 1

Lead Department: Fire **Action Officer:** Todd Wright, Fire Chief

Subject: KME Aerial Purchase

Action Requested: Adopt Resolution approving purchase of KME Aerial Platform

Briefing: 11/13/06 **Public Hearing:** None **Action:** 11/27/06

Expedite less than 30 days: Yes

If yes, explain rationale: *Due to 320-380 day build time staff would like to award purchase agreement immediately*

Executive Summary: FY 07 budget authorizes the replacement of the Fire Department 1984 Grumman Aerial Platform. The funding appropriated is 850 K. 800 K is for the apparatus replacement and 50 K is for loose equipment replacement. The KME Aerial Platform cost based on fire department needs include:

Apparatus cost	$ 830,832.00
3 Year Bumper to Bumper Warranty	$ 7,215.00
100% performance Bond	$ 3,738.74
Total	**$ 841,785.74**

Background: Staff advertised RFP in August 2006. One proposal from KME was received at the first bid opening. The project was advertised again. No additional proposals were received on the second bid opening. Staff evaluated the one proposal received from KME. 57 clarifications were identified that needed to be satisfactorily answered by the bidder. KME provided satisfactory response to all 57 clarifications.

KME was asked if they would sell the apparatus to the Town of Morrisville with the following options for $795,000:

Apparatus cost	$ 830,832.00
3 Year Bumper to Bumper Warranty	$ 7,215.00
100% performance Bond	$ 3,738.74
100% Prepay Discount	$ (33,233.28)
KME Total	**$ 808,552.46**

KME agreed to sell the apparatus for $795,000. with the identified options with one exception. KME counter offered a 2 year bumper to bumper warranty.

Staff Recommendation: Staff recommends the Town purchase the KME Aerial Platform with the following options: 100% performance bond, 2 year bumper to bumper warranty, and 100% prepay discount for $ 795,000.00

Board/Committee Review: None

Meeting Date: **Public Comment:** **Action:**

Minutes:

Recommendation:

History of Briefing: *This section should only address past briefings, hearings, actions, etc.*

Date: Discussion/Board Direction:

List Attachments:

- Attachment 1 KME proposal
- Attachment 2 Aerial Platform Offer/Clarifications
- Attachment 3 MFD Aerial Platform Specifications

Resource Impact: time/funds/equipment

Staff time required if item is approved: Low

Funding Source: FY 07 Apparatus Capital Improvement Fund

Resources Utilized:

Staff Coordination: Mark agree, disagree or review. (2nd Briefing is used when information has significantly changed from one briefing to the next.)

Required	Staff Member	1st Briefing	2nd Briefing
X	Town Manager	Agree	
X	Town Clerk	Reviewed	
X	Senior Director Resources Management	Agree	
X	Senior Director Development Services	Agree	
X	Senior Director Community Services	Agree	
X	Public Information Officer	Reviewed	
X	Budget and Analysis Manager	Agree	
	Planning Director		
	Town Engineer		
	Building Codes Administrator		
	Police Chief		
X	Fire Chief	Agree	
	Parks & Recreation Director		
	Public Works Director		
	Economic Development		

If disagreeing, explain:

Public Information Plan: Answer the following questions and notate the level of PI Plan needed

Question	**YES or NO**
Does the item's subject matter affect the majority of our population?	No
(**Note:** specify the target audience within the Executive Summary section above.)	
Would action have a direct effect, positive or negative, on community services?	Yes
Does the item propose an internal policy change?	No
Does the item propose an external policy change that would result in an amendment to our town codes, ordinances, Land Use Plan, or Zoning Map?	No
Does the item require an appropriation of funds equal to or over $90,000?	Yes
Will/does the item relate to a Capital Improvements Project?	Yes
Are there any ordinance or general statute requirements for public notification?	No
(**Note:** If so, cite the ordinance or general statute language within the Executive Summary section above.)	
Does the item require a Public Hearing?	No
Will there be a public forum session held on the subject to gather input?	No
Public Information Plan	**Mark w/ X**
"Get Noticed" - five or more YES answers	
"Legal Ease" - three or four YES answers	X
"Standard Issue" - two or less YES answers	

KME PROPOSAL SHEET

DATE: September 15, 2006

FOR: **TOWN OF MORRISVILLE**

MAILING ADDRESS: **100 Town Hall Drive**

MORRISVILLE	**WAKE**	**N.C.**	**27560**
(City)	(County)	(State)	(Zip)

Bidder hereby proposes to manufacture and furnish to Purchaser, subject to Purchaser's acceptance of the Bidder's proposal and the proper execution of the appropriate contract, the following apparatus and equipment to be built in accordance with the attached specifications, whether purchase is made via KME contract or customer purchase order.

Quantity: One (1) KME Model: **PREDATOR 102 FOOT HEAVY DUTY REAR MOUNT AERIAL TOWER DEVICE**

For the sum of **Eight-Hundred Thirty Thousand, Eight Hundred Thirty-Two Dollars & 00 Cents**

$830,832.00 **F.O.B.:** **MORRISVILLE, N.C.**
(Less applicable taxes if any).

NOTE: If customer requires a 100% performance bond, ADD $4.50 per $1000.00 of contract price.

Delivery is to be made subject to all clauses of the attached contract, within approximately 320-380 calendar days from receipt of the **CONTRACT** by the Bidder. Company will not be liable for any delay, failure to make delivery, or other default due to strikes or labor unrest, war, riot, federal, state or local government action, fire, flood or other disaster or acts of God, accidents, breakdown of machinery, lack of or inability to obtain materials, parts or supplies, or any other causes or circumstances beyond the reasonable control of Company which prevent or hinder Company's manufacture and/or delivery of the Apparatus.

The Bidder's right to withdraw this proposal, if not accepted within thirty (30) days from the above date is hereby acknowledged.

Respectfully submitted by,

_____
Sales Representative

Dealer: Jack L. Slagle Fire Equipment & Supply Co., Inc.
1100 Bill Tuck Highway
South Boston, Va. 24592

OPTIONS TO PROPOSAL:

If customer desires to pay for 100% of the purchase price within thirty (30) days of purchase order / contract signing, an amount of $33,233.28 can be deducted from the final invoice price.

If customer desired to pay for 50% of the purchase price within thirty (30) day of purchase order / contract signing, an amount of $14,539.56 can be deducted from the final invoice price.

If customer desires a three (3) year "Bumper to Bumper" warranty, ADD $

If customer desires a five (5) year "Bumper to Bumper" warranty, ADD $

GENERAL INFORMATION:

The proposed apparatus will be constructed to withstand the severe and continuous use encountered during emergency fire fighting services. The apparatus will be of the latest type, carefully designed and constructed with due consideration to the nature and distribution of the load to be sustained.

These specifications detail the proposal for general design criteria of cab and chassis components, aerial device, fire pump and related components (if applicable), water tank (if applicable), fire body, electrical components, painting, and equipment.

All items of these proposal specifications will conform to the National Fire Protection Association Pamphlet No. 1901, latest edition.

KME will furnish satisfactory evidence of the our ability to construct, supply service parts and technical assistance for the apparatus specified.

KME is providing liability and facility insurance equaling $25,000,000.00, which is one of the highest available in the fire industry. Reference attached documentation.

COMPLETION DOCUMENTATION

At the time of delivery, at least one (1) copy of the following documents will be provided:

1. Owners name and address.
2. Apparatus manufacturer, model, and serial number.
3. Chassis make, model, and serial number.
4. GAWR of front and rear axles.
5. Front tire size and total rated capacity in pounds.
6. Rear tire size and total rated capacity in pounds.
7. Chassis weight distribution in pounds with water and manufacturer mounted equipment front and rear.
8. Engine make, model, serial number, number of cylinders, bore, stroke, displacement and compression ratio, rated horsepower and related speed per SAE J690, Certificates of Maximum Net Horsepower for Motor Trucks and Truck Tractors, and noload governed speed.
9. Type of fuel and fuel tank capacity.
10. Electrical system voltage and alternator output in amps.
11. Battery make and model, capacity in CCA.
12. Transmission make, model and serial number. If so equipped chassis transmission PTO(s), make model and gear ratio.
13. Pump make, model, rated capacity in gallons per minute, (liters per minute where applicable) and serial number.
14. Pump transmission make, model, serial number and gear ratio.
15. Auxiliary pump make, model, rated capacity in gallons per minute (liters per minute where applicable) and ,serial number.
16. Water tank certified capacity in gallons.
17. Aerial device type, rated vertical height in feet, rated horizontal reach In feet, and rated capacity in pounds.
18. Paint code/s numbers.
19. Company name and signature or responsible company representative.
20. Aerial certification records.

B) If the apparatus has a fire pump, the pump manufacturers certification of suction capability.

C) If the apparatus has a fire pump, a copy of the apparatus manufacturers approval for stationary pumping applications.

D) If the apparatus has a fire pump, the engine manufacturer's certified brake horsepower curve for the engine furnished, showing the maximum noload governed speed.

E) If the apparatus has a fire pump, the pump manufacturer's certification of hydrostatic test.

F) If the apparatus has a fire pump, the Underwriters Laboratory certification of inspection and test for the fire pump.

G) Weight documents from certified scale - showing actual loading on the front axle, rear axle(s) and overall vehicle (with the water tank full but without personnel, equipment and hose) - will be supplied with the complete vehicle to determine compliance with NFPA 1901.

H) Written load analysis and results of electrical performance test required in NFPA 1901.

I) If the apparatus is equipped with a water tank, the certification of water tank capacity.

The proposed chassis will be certified by KME as conforming to all applicable federal motor vehicle safety standards (FMVSS) in effect at the date of contract. This will be attested to by the attachment of a FMVSS certification label on the vehicle by KME, who will be recognized as the responsible final manufacturer.

KME will be responsible for preparing and maintaining a record file of parts and assemblies used to manufacture the proposed apparatus. These records will be maintained in KME's factory for a minimum of twenty (20) years. The file will contain copies of any and all reported deficiencies, all replacement parts required to maintain the apparatus, and original purchase documents including specifications, contract, invoices, incomplete chassis certificates, quality control reports and final delivery acceptance documents, the purchaser will have access to any and all documents contained in this file upon request.

GENERAL CONSTRUCTION

The proposed apparatus, assemblies, subassemblies, component parts, etc., will be designed and constructed with the due consideration to the nature and distribution of the load to be sustained and to the general character of the service to which the apparatus is to subjected when placed in service.

All parts of the apparatus will be designed with a factor of safety which is equal to or greater than that which is considered standard and acceptable for this class of equipment in fire fighting service.

All parts of the proposed apparatus will be strong enough to withstand general service under full load.

The apparatus will be so designed that the various parts and readily accessible for lubrication, inspection, adjustment and repair.

The apparatus will be designed and constructed, and the equipment so mounted, with due consideration to distribution of the load between front and rear axles that all specified equipment, including a full complement of specified ground ladders, full water tank, loose equipment, and firefighters will be carried without overloading or injuring the apparatus.

The aerial ladder will be designed as a modular component of the apparatus. The aerial ladder, its support structure, and outrigger system will be designed to comprise an integrated assembly, removable from the carrier vehicle as a single self supporting unit. The design will facilitate repair, modifications or replacement of the aerial device, apparatus body, or chassis individually, as required by wear from use, obsolescence, or for purposes of refurbishment.

SINGLE-LINE RESPONSIBILITY

KME is providing single source manufacturing. KME designs, manufactures and builds our own fire apparatus cab, chassis, body and aerial device. This capability provides a consistent design and manufacturing procedures that will reduce warranty issues and provide ease in parts replacement.

CRITERIA AND CODE CONFORMANCE

The proposed KME aerial ladder will be designed to conform to the intent of NFPA-1901 Standard for Automotive Fire Apparatus.

The following additional design criteria will be applicable to this specification to the extent specified herein:

American Society for Testing and Materials (ASTM) A-36 Specification for Structural Steel

Society of Automotive Engineers, Inc. (SAE) SAE Hand-book American Welding Society (AWS)

AWS014.4-77 Classification and Application of Welded Joints for Machinery and Equipment

American Society of Non-Destructive Testing (ASNT). ASNT Guidelines; Procedure SNT-TC-1A.

The aerial device will be designed, fabricated, and tested in accordance with these codes and specifications.

SERVICE CENTER AND PARTS DEPOT

KME has an authorized service center, with a staff of factory-trained mechanics, well versed in all aspects of service for all major components, of the apparatus within a 300 mile radius of the Purchaser. In addition, KME will maintain a separate service facility at the manufacturing site, in order to satisfy the need for possible major emergency service work.

PRICES AND PAYMENTS

The bid price will be F.O.B. Destination, on a delivered and accepted basis at the Fire Department.

Total price on KME's proposal sheet will include all items listed in these specifications. Listing any items contained in the specification as an extra cost item, unless specifically requested to do so in these specifications, will automatically be cause for rejection.

KME will compute pricing less federal and state taxes. It is understood that any applicable taxes will be added to the proposed prices, unless the purchaser furnishes appropriate tax exempt forms.

DELIVERY TIME

KME is proposing to complete the apparatus delivery time based on the number of calendar days, starting from the date the sales contract is signed and accepted by KME Fire Apparatus.

Delivery Time: 320-380 Calendar Days

BOND REQUIREMENTS

An original bid bond will be submitted with the KME's proposal. The bond will be for an amount equal to 10% of the proposed bid price.

KME's bonding company will meet the following requirements:

1. An acceptable surety as outlined by the department of treasury on their most recent federal register at a limit of at least $10,000,000;

2. A.M. Best rating of "A" or better with a financial rating of at least "VIII"; and

3. Licensed as a surety in the state where the sale is to be made.

PERFORMANCE BOND – OPTIONAL ITEM

A performance bond will be supplied by the KME upon acceptance of the signed sales contract for the apparatus. The performance bond will be for an amount equal to the full contract price (i.e. 100% bond).

MATERIAL AND WORKMANSHIP

All equipment furnished will be guaranteed to be new and of current manufacture, to meet all requirements of purchaser’s specifications.

All workmanship will be of high quality and accomplished in a professional manner so as to insure a functional apparatus with a pleasing, aesthetic appearance.

SALES ENGINEER

KME will designate a competent individual, acceptable to the purchaser; to perform the contractor's sales engineer functions. The sales engineer will provide a single point interface between the purchaser and KME on all matters concerning the contract.

APPROVAL DRAWINGS

Detailed blue prints will be approved by the purchaser prior to any metal being sheared or cut for the unit. The purchaser, KMEs representative, and KME will each have a copy of this blue print. Upon purchaser's approval, this print will become a part of the total contract.

Drawing will show, but is not limited to, such items as the chassis being utilized, lights, sirens, all compartment locations and dimensions, special suctions, discharges, etc. Blue print will be a visual interpretation of the unit as it is to be supplied.

INSPECTION VISITS

KME will provide three (3) factory inspection trips for three (3) Fire Department representatives, to KME's facility.

Air transportation, meals, lodging, and other requisite expenses will be the bidder's responsibility.

Transportation will be via commercial airlines.

The factory visits will occur at the following stages of production of the apparatus:

1.) Pre-construction / blueprint review
2.) Pre-paint
3.) Final inspection upon completion

The purchaser maintains the right to inspect the apparatus, within KME's normal business hours, at any other point during construction. Expenses incurred during non-specified inspection visits will be the responsibility of the purchaser.

During inspection visits, the purchaser reserves the right to perform actual performance tests to evaluate completed portions of the unit. Testing will be accomplished with the assistance and resources of the contractor.

DELIVERY

Delivery of the apparatus to the Fire Department will remain KME's responsibility.

A qualified and responsible representative of KME will deliver the apparatus to the Fire Department.

INSTRUCTION MANUALS/DRAWINGS, SCHEMATIC

In accordance with standard commercial practices, applicable to each vehicle (including body and special equipment) furnished under the contract, the following listed manuals and schematics, in the quantity specified, will be provided at time of delivery of each vehicle.

KME will supply at time of delivery, two (2) copies of a complete operation and service manual covering the complete apparatus as delivered and accepted. The manual will contain the following:

A) Descriptions, specifications, and ratings of chassis, pump (if applicable), and aerial device (if applicable).
B) Wiring diagrams
C) Lubrication charts
D) Operating instructions for the chassis, any major components such as a pump and any auxiliary systems.
E) Instructions regarding the frequency and procedures recommended for maintenance.
F) Parts replacement information

VEHICLE FLUIDS PLATE

As required by NFPA-1901, KME will affix a permanent plate in the driver's compartment specifying the quantity and type of the following fluids used in the vehicle:

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

A) Engine oil
B) Engine coolant
C) Chassis transmission fluid
D) Pump transmission lubrication fluid
E) Pump primer fluid
F) Drive axle(s) lubrication fluid
G) Air-conditioning refrigerant
H) Air-conditioning lubrication oil
I) Power steering fluid
J) Cab tilt mechanism
K) Transfer case fluid
L) Equipment rack fluid
M) Air compressor system lubricant
N) Generator system lubricant
O) Aerial systems

PRINCIPLE APPARATUS DIMENSIONS & G.V.W.R.

The principle dimensions of the completed apparatus will not exceed the following maximum acceptable dimensions:

KME's PROPOSED DIMENSIONS:

- OVERALL LENGTH:	561"
- OVERALL WIDTH:	100"
- OVERALL HEIGHT:	144"
- WHEELBASE:	248"

The axle and total weight ratings of the completed apparatus will not be less than the following minimum acceptable weight ratings:

- MINIMUM FRONT G.A.W.R.:	22,500 lbs.
- MINIMUM REAR G.A.W.R.:	58,000 lbs.
- MINIMUM TOTAL G.V.W.R.:	80,500 lbs.

KME will include the principle dimensions, front G.A.W.R., rear G.A.W.R., and total G.V.W.R. of the proposed apparatus. Additionally, KME will provide a weight distribution of the fully loaded, completed vehicle; this will include a filled water tank, specified hose load, 2,500 lbs. of miscellaneous equipment allowance in accordance with NFPA-1901 requirements, and an equivalent personnel load of 200 lbs. per seating position.

UNDERWRITERS LABORATORIES INC. (UL) EXAMINATION AND TEST PROPOSAL FOR AUTOMOTIVE FIRE APPARATUS

GENERAL

The proposed unit will be tested and certified for KME Fire Apparatus by Underwriters Laboratories Inc. (UL) Underwriters Laboratories Inc. (UL) is recognized worldwide as a leading third party product safety certification organization for over 100 years. UL has served on National Fire Protection Association (NFPA) technical committees for over thirty years.

INDEPENDENT TESTING ORGANIZATION QUALIFICATIONS

1. UL is a nationally recognized testing laboratory recognized by OSHA.

2. UL complies with the American Society for Testing and Materials (ASTM) Standard ASTM E543 "Determining the Qualifications for Nondestructive Testing Agencies."

3. UL has more than 40 years of automotive fire apparatus safety testing experience and 16 years of factory aerial device testing and Certification experience. UL has more than 100 years of experience developing and implementing product safety standards.

4. UL does not represent, is not associated with, nor is in the manufacture or repair of automotive fire apparatus.

5. All work outlined in NFPA 1914, current Edition, including nondestructive testing, will be conducted at the manufacturer's facility. In addition, the following test work outlined in Section 20.24, Certification Tests, of NFPA 1901 will be conducted:

(a.) 1-1/2 Times Rated Capacity on Level Ground Stability Test: A load of 1-1/2 times rated capacity (as specified by the manufacturer) will be suspended from the tip of the aerial ladder, or the platform of the elevating platform, when it is in the position of least stability. If the manufacturer specifies a rated capacity while flowing water, then one times the water load and the worst case nozzle reaction will be added to the stability test weights. The apparatus will show no signs of instability. For a water tower, the stability test includes 1-1/2 times the weight of the water in the system and 1-1/2 times the maximum nozzle reaction force when it is in the position of least stability.

(b.)1-1/3 Times Rated Capacity on a 5 degree Slope Stability Test: A load of 1-1/3 times rated capacity will be suspended from the tip of the aerial ladder, the platform of the elevating platform, or the tip of the water tower when it is in the position of least stability. The apparatus will show no signs of instability.

(c.)Aerial Device Water System Tests:

A friction loss test will be conducted for an aerial device equipped with a permanent water system and has a rated vertical height of 110 ft. or less. The standard model flow test results will be provided to the manufacturer. If the water system has been modified from the standard model configuration, a new flow test will be conducted to determine that the friction loss in the water system between the base of the swivel and the monitor outlet does not exceed 100 psi with 1000 gpm flowing and the water system at full extension.

(d.) A maximum vertical height flow test will be conducted to determine that the water system is capable of flowing 1000 gpm at 100 psi nozzle pressure with the aerial device at full elevation and extension. If the apparatus is equipped with a fire pump designed to supply the water system, the test will be conducted using the onboard fire pump. The intake pressure to the fire pump will not exceed 20 psi.

6. UL provides the manufacturer a complete written Examination and Test Report for each aerial device inspection performed at the manufacturer's facility. This Report specifies the points of inspection and results of such examinations and tests. The test report that is required by NFPA 1914, will include the following test results:

(a.) Torque verification of all mounting bolts including bolt size, grade, and torque specification.

(b.) The following NDT methods and results will be recorded:

All ferrous welds will be magnetic particle inspected for defects. All nonferrous welds will be visually inspected, and if questionable defects are identified, a penetrating dye will be used to further evaluate the quality of the weld. All bolts and pins will be ultrasonically inspected for internal flaws.

(c.) The following measurements will be taken and recorded in the examination and test record: bearing clearance and backlash, elevation cylinder drift, engine speed operating rpm, relief pressure, stabilizer extension cylinder drift, ladder section twist, hardness readings, base rail thickness, winch drift, extension brake drift, and extension cylinder drift.

7. All test work for fire pumps outlined in NFPA 1901, Edition will be conducted.

8. UL has included a list of all factory aerial device manufacturers for whom testing is currently being conducted on a regular basis.

9. UL carries ten million dollars in excess liability insurance for bodily injury and properly damage combined.

TESTING PERSONNEL

The UL inspectors performing the test work on the units are certified to Level II in the required NDT methods, under the requirements outlined in ASNT document CP-189.

The actual person(s) performing the inspection will present for review proof of Level II Certification in the required NDT methods.

Prior to submittal to the automotive fire apparatus manufacturer, the final Report will be reviewed by the Supervisor of Fire Equipment Services and a Registered Professional Engineer, both of whom are directly involved with the aerial device certification program at UL.

CERTIFICATION

1. When the unit successfully meets all the requirements outlined in NFPA 1901, 2003 Edition, UL will issue a Certificate of Automotive Fire Apparatus Examination and Test stating the units compliance with NFPA-1901.

2. When the unit successfully meets all the requirements outlined in NFPA 1901, 2003 Edition, UL will issue a Certificate of Automotive Fire Apparatus Examination and Test stating the units compliance with NFPA-1901.

GENERAL APPARATUS DESCRIPTION "AERIAL"

The unit will be designed to conform fully to the **"Aerial Fire Apparatus"** requirements as stated in the **NFPA 1901 Standard (2003 Revision)**, which will include the following required chapters as stated in this revision:

Chapter 1	Administration
Chapter 2	Referenced Publications
Chapter 3	Definitions
Chapter 4	General Requirements
Chapter 8	Aerial Fire Apparatus
Chapter 12	Chassis and Vehicle Components
Chapter 13	Low Voltage Electrical Systems and Warning Systems
Chapter 14	Driving and Crew Areas
Chapter 15	Body, Compartments and Equipment Mounting
Chapter 16	Fire Pump & Associated Equipment
Chapter 19	Water Tanks
Chapter 20	Aerial Devices
Chapter 23	A.C. Line Voltage

CAB SAFETY SIGNS

The following safety signs will be provided in the cab:

- A label displaying the maximum number of personnel the vehicle is designed to carry will be visible to the driver.
- “Occupants must be seated and belted when apparatus is in motion” signs will be visible from each seat.
- “Do Not Move Apparatus When Light Is On” sign adjacent to the warning light indicating a hazard if the apparatus is moved (as described in subsequent section).
- A label displaying the height, length, and GVWR of the vehicle will be visible to driver. This label will indicate that the fire department must revise the dimension if vehicle height changes while vehicle is in service.

CHASSIS DATA LABELS

The following information will be on labels affixed to the vehicle:

Fluid Data

a) Engine Oil
b) Engine Coolant
c) Chassis Transmission Fluid
d) Pump Transmission Lubrication Fluid
e) Pump Primer Fluid (if applicable)
f) Drive Axle(s) Lubrication Fluid
g) Air Conditioning Refrigerant
h) Air Conditioning Lubrication Oil

i) Power Steering Fluid
j) Cab Tilt Mechanism Fluid
k) Transfer Case Fluid
1) Equipment Rack Fluid
m) Air Compressor System Lubricant
n) Generator System Lubricant
o) Front tire cold pressure
p) Rear tire cold pressure

Chassis Data

a) Chassis Manufacturer
b) Production Number
c) Year Built
d) Month Manufactured
e) Vehicle Identification Number

Manufacturers weight certification:

a) Gross Vehicle (or Combination) Weight Rating (GVWR or GCWR)
b) Gross Axle Weight Rating, Front
c) Gross Axle Weight Rating, Rear

KME CAB AND CHASSIS:

"PREDATOR" LFD CAB TYPE
-FULL TILT
-LONG FOUR DOOR (LFD) STYLE
-ALUMINUM CONSTRUCTION
-CONTOUR WINDSHIELD

The cab will be a custom medium side opening four (4) door, aluminum, tilt style, built specifically for fire service.

The cab will be fully enclosed, capable of comfortably seating ten (10) fire fighters in full fire fighting turnout gear, cab over engine design, with integral tilt mechanism and engine access on top of doghouse.

OPEN SPACE DESIGN

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

CAB DIMENSIONS

Minimum Cab Dimensions:

Overall width	96"
Inside width across ceiling	88"
Front area floor to ceiling	61 3/4"
Top of front seat to ceiling	44" (depending upon seat type)
Seat back to steering wheel	21 1/4" (depending upon seat type)
Inside width from door to engine enclosure at floor	Driver Compartment 25" Passenger Compartment 22-1/4"
Forward door opening	73"H x 37"W
Forward door recessed step	30"W x 8-1/2"D
Rear door opening	79 3/4"H x 31"W
Rear door recessed step	20"W x 8-1/2"D
Crew seat area width	88"
Outer crew seat risers to rear wall	49 1/2"
Centerline axle to rear wall	67 1/2"

Glass Area Dimensions:

Windshield (Contour)	2,900 sq. in.
Side door window, retractable	1,450 sq. in. each
Side fixed crew windows	550 sq. in. each

CAB MATERIAL

The cab will be fabricated from 5052 aluminum alloys, utilizing the minimum material thickness as follows:

Cab side panels	.125 thick (1/8")
Cab roof	.125 thick (1/8")
Forward cab front sheet	.125 thick (1/8")
Interior cab panels	.125 thick (1/8")
Other panels	.125 thick (1/8")
Cab doors	.1875 thick (3/16"
Engine enclosure side panels	.250 thick (1/4")

STEPPING, STANDING, & WALKING SURFACES

All stepping, standing, and walking surfaces on the body will meet NFPA #1901 anti-slip standards.

Aluminum tread plate utilized for stepping, standing, and walking surfaces will be Alcoa No-Slip type. This material will be certified to meet the NFPA #1901 standard. Upon request by the purchaser, the manufacturer will supply proof of compliance with this requirement. All vertical surfaces on the body, which incorporate aluminum tread plate material, will utilize the same material pattern to provide a consistent overall appearance. (There will be No Exceptions allowed for this paragraph)

CAB - BASE CONSTRUCTION

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

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

CRASH TESTING CERTIFICATION

To ensure the safety of the cab occupants and cab integrity, proof of third party testing will be provided. The cab will be certified for SAEJ2422 side impact, SAEJ2420 with ECER29 cab front impact, and ECER29 cab roof strength.

CAB ROOF

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

There will be a full length, polished aluminum rain gutter running horizontally along each side of the cab, over the doors and side windows.

The roof over the rear crew area will be raised six (6) inches to ensure adequate headroom and maneuverability.

Crew area floor to ceiling	59 1/2"
Top of crew seat to ceiling	41" (depending upon seat type)

REAR CREW AREA NOTCHED ROOF

The center roof section over the rear seating area will be notched for the aerial device.

The raise roof notch will be 50" wide to accommodate the aerial device.

CAB DOORS

Four (4) side-opening doors will be provided.

The cab doors will be totally aluminum construction with an extruded aluminum frame and a 3/16" thick aluminum outer door skin.

Doors will be full height from the step to the cab roof rain gutter and enclose the step area when the doors are closed.

The forward cab door opening will be a minimum of 37" wide, and the rear cab door opening will be a minimum of 31" wide. The rearward cab doors will have a radius cutout allowing the door opening to protrude forward over the cab wheel well, while providing full access to the rear crew area.

There will be a heavy duty piano type stainless steel hinge on each door of a minimum pin diameter of 5/16" with hinges slotted for ease of horizontal and vertical adjustment. There will be a cab door seal and, doors will close flush with the side of the cab.

A heavy-duty 6" wide belting material will be utilized to prevent the cab doors from opening greater than 90 degrees.

ENTRY STEP AREA

Each of the forward entrance steps will be a minimum of 8-5/8" deep x 28-1/4" wide with the floor board recessed a minimum of 3" to avoid "shin knocking". Each step will be fabricated of aluminum tread plate. The cab step risers will be overlaid with aluminum tread plate.

Each of the rear entrance steps will be a minimum of 8-5/8" deep x 22-1/4" wide. An intermediate step will be provided between the lower entrance step and the crew area floor for ease of entry and egress. Each set of steps and respective step risers will be fabricated of aluminum tread plate.

AUXILARY CAB STEPS – FORWARD CAB DOORS

An auxiliary cab step will be provided under each front cab door, outside of the cab.

The step will be constructed from aluminum with tread plate on the vertical supports and the stepping surface will be Grip-Strut anti-slip material.

AUXILARY CAB STEPS – REARWARD CAB DOORS

An auxiliary cab step will be provided under each rear cab door, outside of the cab.

The step will be constructed from aluminum with tread plate on the vertical supports and the stepping surface will be Grip-Strut anti-slip material.

DOOR LATCHES

Heavy-duty cast paddle latches will be provided on the interior and exterior of each cab door.

ELECTRIC WINDOWS

Both front cab doors shall be equipped with electric operated windows.

The control for each door shall be an automotive style located on the inside door panel within easy reach of the driver and officer.

The driver shall also have a control to operate the passenger's side window; a single control shall be located on the driver's lower instrument panel.

Both crew cab doors shall be equipped with electric operated windows.

The control shall be an automotive style located on the inside door panel within easy reach of the crew cab passengers.

CAB DOOR INTERIOR OVERLAYS

The lower and full width portion of each door interior will have brushed stainless steel scuff plates to provide maximum wear protection. These plates will extend above the inside cab floor level when the doors are closed.

Each interior cab door panel will be equipped with Scotchlite material and will cover a minimum area of 96 in^2.

CAB DOOR JAMB OVERLAYS

Each cab door jamb will be equipped with a polished stainless steel scuff plates to protect the cab paint when exiting and entering the cab.

The scuff plate will extend from the bottom of the door to the top of the door.

EXTERIOR CAB TRIM

A high luster stainless steel trim band will be provided along the cab sides, same height as the bumper.

Black vinyl trim molding will be installed along the top and bottom of the trim band.

EXTERIOR CAB WALL OVERLAY

An aluminum tread plate overlay will be provided on the exterior rear cab wall. The tread plate overlay will be sealed with caulking around the edges to prevent moisture from getting between the cab and the overlay.

WINDSHIELD/GLASS

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

All glass will be tinted.

The windshield will be of a contour design for improved visibility and style.

A fixed window will be provided on each side of the cab behind the forward cab doors.

WINDSHIELD WIPERS AND WASHER

Electrically operated, pantographic, wet arm, self-parking windshield wipers will be installed beneath both the drivers and officers' front windshield. The motor assembly will be installed and accessible from inside the forward dashboard of the cab while the ¾ gallon washer fluid reservoir and pump will be installed and readily accessible in engine enclosure compartment.

The driver of the vehicle will be able to control wiper state (ON/OFF), speed (LOW /HI), and intermittent delay time (DLY) as well as washer pump (ON) utilizing a clearly labeled lever control on the steering column.

CAB HANDRAILS

Four (4) 1-1/4" diameter x 28" long, knurled, bright anodized aluminum handrails will be provided, located one at each cab door entrance.

Handrail stanchions will be chrome plated and offset when necessary to prevent "hand-pinching" when opening or closing the doors.

Formed rubber gaskets will be provided between each stanchion base and the cab surface.

INTERIOR GRAB RAILS

Four (4) vertical 12" black cast aluminum "D" style entry assist handles will be located one (1) each side of cab interior on the "A" post and one (1) each side of the cab interior on the "C" post in the crew area to assist in entry and exiting of the cab.

Each front cab door will be provided with one (1) black cast aluminum grab handle on the interior door panel to assist in entry and exiting of the cab and for closing the door.

Each rear cab door will be provided with one (1) black cast aluminum grab handle on the interior door panel to assist in entry and exiting of the cab and for closing the door.

Each rear cab door will also be provided with one (1) black cast aluminum safety rail, located horizontally across the rear door window opening.

AIR INTAKE/OUTLET

There will be an air intake, a minimum size of 490 square inches of open area, in the center front cab sheet for maximum air flow.

Two (2) air inlets / outlets, a minimum size of 40.8 square inches each for maximum cooling, will be located one (1) on each side of the cab horizontally above wheel well. This design will permit proper ducting of air through the engine compartment and cooling system.

The air intake and outlets will be covered with a cast aluminum housing, secured with stainless steel fasteners.

An ember separator will be provided on the air intake side to prevent hot burning embers from entering the air filtering system.

WHEEL WELL LINERS

The front cab wheel wells will be equipped with fully removable, bolt-in, aluminum inner wheel well liners.

The liners will extend full depth into the truck frame.

The completely washable wheel well liners will be designed to protect the cab substructure, inner panels, and other miscellaneous installed components from road salts, debris, dirt accumulation and corrosion.

FENDERETTES

The cab wheel well openings will be trimmed with replaceable, bolt-in, polished stainless steel fenderettes.

The fenderettes will be secured to the cab with stainless steel threaded fasteners along the internal perimeter of the wheel well.

Rubber welting will be installed between the fenderettes and the cab side panel.

MUD FLAPS

Heavy duty, black rubber type mud flaps will be provided behind the front wheels.

CAB MIRRORS

Each forward cab door will have a Moto-Mirror Plus 16" x 6-1/2", heated and motorized, stainless steel, West Coast type mirror mounted on a swing-away, bow type, stainless steel bracket.

Each mirror will be individually remote controlled from the driver's position.

The mirror heating elements will be controlled by a single dash mounted switch.

Two (2) 6" diameter, stainless steel, convex spot mirrors will also be provided and mounted one (1) on each main mirror bracket.

INTERIOR CAB TRIM

The dash will be constructed of a Vinyl overlay ABS custom formed material to create an ergonomically designed interior to be user friendly and functional for the driver and officer.

The instrument cluster will be centered in front of the driver and all gauges will be custom fitted in the ABS with a non-glare pewter panel.

All warning lights and indicators will be clustered in the lower center portion for easy identification and will be backlit for easy identification when activated.

The transmission gear selector will be integrated into the center dash assembly toward the driver for easy access.

There will be provisions for mounting of a switch panel in the center of the dash between the driver and officer. The top center of the dash assembly will contain one (1) large removable access door for access to the main chassis wiring panels and breaker panels.

The forward overhead panel will be covered with a one-piece custom formed ABS vinyl overlay, which will have integrated windshield defroster/heat vents

The drivers overhead will contain AC, heat and defroster controls.

The inner cab doors will be constructed of a custom formed vinyl overlay ABS material. The ABS door panels will terminate approximately ten (10) inches above the cab floor.

STORAGE/RADIO COMPARTMENTS

There will be a compartment provided under each front seat with a latched access door. The compartment under the driver and officer seat will measure 8-3/4"W x 7-7/8"D x 4-3/4"H.

BARYFOL FLOORING

The floor of the driver's compartment and the floor of the crew area will be lined with Baryfol vinyl composite flooring to comply with NFPA noise and heat requirements.

The material utilized for this application will be certified to meet the NFPA 1901, 1999 revision for antislip walking surfaces. Manufacturer to supply proof of compliance for this item. (No Exceptions)

INTERIOR REAR WALL OVERLAY

The interior rear wall of the cab will be covered with padded Imperial 1200 upholstery to give durability and to match the other upholstered areas of the cab.

A twelve inch high polished aluminum tread plate scuff plate will be provided from the floor level up on the rear interior cab wall.

ENGINE ENCLOSURE

The forward portion of the engine enclosure will be covered with a vinyl ABS material formed overlay to match the balance of the cab interior. To allow maximum "elbow room" for the driver and officer, the forward portion of the engine enclosure will feature a contour shape. The engine enclosure will not significantly obstruct the driver's vision in any direction. The inside of the enclosure will be insulated to protect against heat and noise.

A padded, hinged access door will be provided in the top rearward portion of the engine enclosure. The door will allow access to the engine oil, transmission fluid, and power steering fluid level dipsticks, and the coolant recovery tank. The access door will be provided with two (2) flush mounted latches and gas shock holders. There will be a vinyl ABS material cover over the access door to give a cleaner look to the top of the engine enclosure and doghouse area.

ENGINE ENCLOSURE SCUFF PLATES

A brushed stainless steel scuff plates will be provided on the rear vertical surface of the engine enclosure. The location will be on the vertical section of the engine enclosure next to the driver and officer and below the jump seats in the rear crew area. The scuff plates will extend a minimum of 6" above the floor at each seating area.

******* CAB SEATING & ACCESSORIES *******
DRIVER'S SEAT

The driver's seat will be a high back Seats Inc. 911 "Universal", 6-way electric "ABTS" seat. The seat will have a tapered, padded seat cushion with mechanical suspension.

A red integrated 3-point shoulder harness with lap belt will be provided as standard equipment.

OFFICER'S SEAT

A Seats Inc #911 Universal Series "ABTS", fixed seat with an SCBA storage area, padded cradle seat back, and integral headrest will be installed at the officer's seating position.

A red integrated 3-point shoulder harness with lap belt will be provided as standard equipment.

REAR FACING SCBA SEATS (OUTBOARD)

Two (2) Seats Inc. #911 Universal Series "ABTS", fixed seats with an SCBA storage area, padded cradle seat backs, and integral headrest will be installed rear facing directly behind the driver's seat and the officer's seat.

A red integrated 3-point shoulder harness with lap belt will be provided as standard equipment.

FORWARD FACING SCBA SEATS (CENTER)

Two (2) Seats Inc. #911 Universal Series, individual flip-up seats with ABTS, an SCBA storage area, padded cradle seat back, and integral headrest will be installed centered on the rear cab wall.

Heavily padded flip-up seat bottom cushions will be provided for these seats.

A red integrated 3-point shoulder harness with lap belt will be provided as standard equipment.

FORWARD FACING SCBA SEAT STORAGE BASE

The two (2) forward facing SCBA seats will be mounted to a self-contained seat box mounted to the floor and rear wall of the cab.

The seat box will span the full width of the seat areas and the depth will be such that the fold down seat cushion will extend past the forward edge.

The box will be fabricated of 1/8" thickness smooth aluminum that will be texture painted GRAY same as the cab interior.

The box will have four (4) access doors, one (1) per end and two (2) on the front facing side. Each door will be bottom hinged and latched with a positive type push button latch mechanism (black in color.)

SEAT UPHOLSTERY

The seats will be upholstered with heavy duty Imperial 1200 black material.

PADDED SCBA OPENING COVERS

Five (5) removable padded covers will be provided for the SCBA openings.

WALKAWAY BRACKET

Five (5) Ziamatic model #ULLH Walkaway bracket(s) will be installed. A positive latching mechanical means of holding the S.C.B.A. device in its stowed position, will be provided such that the S.C.B.A. unit cannot be retained in the mount unless the positive latch is engaged. The release mechanism will be accessible to fire department personnel while seated. The bracket model will accommodate the fire departments SCBA type.

SEAT BELTS

Any forward facing seat not equipped with ABTS (All Belts To Seat) seatbelts; will be equipped with red, three-point, fully retractable, shoulder harness type seat belts.

Any rearward facing seat not equipped with ABTS (All Belts To Seat) seatbelts; will be equipped with two-point, fully retractable, red, lap type seat belts.

CAB INTERIOR TOOL BOARDS - TWO (2)

Located outboard of each forward facing SCBA seat, there will be a removable tool mounting board.

Each 3/16" thickness aluminum tool board with a "DA" finish will be bolted to two (2) horizontally mounted unistrut tracks mounted directly to the wall.

Tool board size will be maximum for the space provided.

UPHOLSTERY - GRAY

All ABS formed material panels, as well as all of the interior upholstery panels will be medium gray in color.

The upholstered cab overhead and rear wall portions will utilize gray Imperial 1200 upholstery with padding underneath to provide additional insulation.

ADVANCED OCCUPANT RESTRAINT SYSTEM

The cab will be equipped with advanced occupant restraint systems. This system will function in the event of a side roll over and will be compatible with occupants ranging from a 5th percentile female to 95th percentile male. This system consists of a roll sensor, seat and occupant pretensioner; buckle pretensioners and inflatable side airbags. This system will be functionally active while the truck is in operation.

ROLL SENSOR

The roll sensor continually monitors the roll rate and angle of the vehicle, and deploys safety devices when a roll event occurs. Deployment determination is made by a combination of vehicle angle and angular rate. Vehicle deployment angle will never exceed 60 degrees.

The roll sensor performs self-diagnostics each time the vehicle is started. A dash-mounted light will turn off after approximately 10 seconds if the sensor is functioning. During operation, the roll sensor monitors for proper connection to each safety device in the vehicle once per second. If improper connection is measured at any device or if an internal fault occurs, the roll sensor will illuminate the dash-mounted light. The system will continue to function in the event of non-critical faults. System diagnostics are on the SAE J1587 bus.

DRIVER'S POSITION

If the Driver's position is equipped with a suspension seat, in addition to the 3-point seat belt, an occupant and seat pretensioning system and an inflatable side airbag will be used.

In the event a non-suspension seat is used in the Driver's position, a buckle-pretensioning device will be used in conjunction with an inflatable side airbag. The seat and occupant pretensioning system should function and position the occupant prior to the side airbag deployment.

OFFICER'S POSITION

In addition to the 3-point seat belt, the Officer's position will be equipped with a buckle pretensioning device and inflatable side airbag. A hybrid or pyrotechnic inflator will inflate the side airbags. The bag should remain inflated to the extent of providing head cushioning for 10 seconds after inflation. Pretensioners should be compatible with either ABTS or body mounted seats and seat belts. Buckle pretensioners will be used on static or power seats where there is no air suspension. The buckle pretensioners must be capable of stroking 125 mm.

MID POSITIONS

In addition to the 3-point seat belt, the mid-row positions will be equipped with a buckle pretensioning device and inflatable Side Airbag. A hybrid or pyrotechnic inflator will inflate the side airbags. The bag should remain inflated to the extent of providing head cushioning for 10 seconds after inflation. Pretensioners should be compatible with either ABTS or body mounted seats and seat belts. Buckle pretensioners will be used on static or power seats where there is no air suspension. The buckle pretensioners must be capable of stroking 125 mm.

SUN VISORS

To provide maximum protection for the driver three (3) Lexan sun visors measuring 19"L x 7-1/2"W, with shock retainers, will be recess mounted in the overhead panel. The center sun visor will be deleted when the overhead console is provided.

MAP BOOK STORAGE

A map book compartment will be provided for horizontal storage of four (4) 3" 3-ring binders, which will be front loaded. The storage compartment will be constructed from 1/8" aluminum which will be painted job color with texture type GRAY paint to match the cab interior.

The forward open area of the storage compartment will have a 2" wide heavy duty nylon strap to secure the books in place during transit.

Final layout and location to be determined at prebuild conference.

ANTENNA INSTALLATION

Two (2) antenna mounting base(s) model #MATM with 17' of coaxial cable will be provided and installed as directed on the cab roof. The attached antenna wire(s) will be run to the right side cab dash area, unless otherwise specified.

******* CAB INSTRUMENTATION & CONTROLS *******
DRIVER'S OVERHEAD PANEL

The drivers overhead panel will contain all controls for cab air conditioning. The following controls will be provided: mode selector switch, front fan speed switch, rear fan speed switch, air conditioning on/off switch, and temperature switch. All switches will be clearly labeled, adequately backlit, and installed in an easily removable panel.

DRIVER'S RIGHT KNEE PANEL

The drivers right knee panel will contain four (4) multi-function, multiplexed switches. One switch will be utilized as panel dimming, another for steering wheel horn select, and another for engine fast idle. The fourth switch will be spare.

The illuminated switches will be clearly labeled and will possess integral LED indicators that will illuminate green or red, given the programmed state of the switch.

CENTER DASHBOARD PANEL

The dashboard panel between the driver and officer will contain ten (10) multi-function, multiplexed switches to control chassis functions (headlights, windshield wipers, etc), a park brake control knob, a transmission shift control panel, and the vehicle siren control head.

All items on the center dashboard panel will be within easy reach of both the driver and the officer.

An information center display that has four (4) integral multi-function, multiplex switches will also be installed in the center dashboard panel.

EMERGENCY SWITCH CONTROL CONSOLE

The emergency switch control console will be provided in the dashboard panel between the driver and officer. This switch console will separate the emergency/auxiliary functions from the regular chassis functions. Programmable touch pad type switches with integral LED indicator lights will be provided.

A master warning light control switch will be provided, which will allow presetting of emergency light switches and will have a red integral indicator light. A primary warning light switch will be provided next to the master switch, along with a total of seven (7) load manageable emergency switches. The tenth switch will be the ground light switch.

All switches will have switch function labeling and an integral LED indicator light.

DRIVERS DASHBOARD PANEL

The main instrument panel will be centered in front of the driver and will have a hinged bottom with two ¼ turn latches at the top. The driver dash panel will be 1/8" aluminum with an anti-glare, pewter brushed surface. The drivers dashboard panel will contain an instrument warning light cluster and gauges.

The instrument cluster will be installed in the lower center of the driver's dashboard panel. It will be directly connected to the J1939 data bus as well as the multiplex system data bus and will possess 32 printed messages that can be illuminated from behind by LEDs of a color specific to the importance level of the message.

The instrument cluster will be black, dead-front, flush mount and of the 32 laser-etched messages, with the bottom 12 being removable to allow a different message label to be inserted. The cluster will possess a hidden integral test switch to right of the laser etched blue logo, that will allow the operator to illuminate all indicator lights without cycling the ignition switch.

The standard cluster will contain the following messages, as required, per the type of chassis being utilized and the options selected.

- Right and left directional arrows (green in color)
- Ignition ON indicator (yellow in color)
- Hi beam indicator (blue in color)
- Battery ON indicator (green in color)
- Parking brake ON indicator (red in color)
- Check transmission indicator (yellow in color)
- Cab not latched indicator (red in color)
- Stop engine indicator (red in color)
- Check engine indicator (yellow in color)
- ABS warning indicator (red in color)
- Transmission temperature high indicator (red in color)
- Low air rear (red in color)
- Low air front (red in color)
- Low coolant level (yellow in color)
- Engine protect indicator (blue in color)
- Fuel restriction indicator (yellow in color)
- Water in fuel indicator (yellow in color)
- Wait to start indicator (yellow in color)
- External AC connect indicator (red in color)
- Fasten seat belts indicator (red in color)
- Fast idle indicator (yellow in color)
- Do not move truck indicator (red in color)
- Okay to pump indicator (green in color) [if required]
- Inter axle lock indicator (green in color) [if required]
- Driver controlled differential lock indicator (green in color) [if required]
- ATC disable indicator (red in color) [if required]
- ATC active (yellow in color) [if required]
- Retarder active indicator (yellow in color) [if required]
- Retarder ON indicator (yellow in color) [if required]
- Block heater on (yellow in color) [if required]
- 4X4 indicator (green in color) [if required]

The main instrument panel will contain eight (8) primary gauges and will have available space for two (2) additional gauges.

An ignition and engine start switch will be located on the driver's side dash panel.

Each gauge will have a raised glass lens with polished chrome trim ring and be backlit by integral LED's.

Each gauge will also possess an integral red warning light with a pre-programmed warning point.

Gauges monitoring drive-train component status will be of the direct data bus type capable of displaying information broadcast on the J1939 data-link.

With the exception of the mechanical air pressure gauge, each gauge will have an output capable of activating an audible alarm inside the dashboard.

The eight (8) primary gauges will consist of:

- Vehicle speedometer (0-85 mph) with digital odometer
- Engine tachometer (0-3500 rpm) with digital hourmeter
- Engine oil pressure (0-100 psi) warning at 6 psi
- Engine coolant temperature (100-280 °F) warning at 220 °F
- Transmission oil temperature (130-340 °F) warning at 240 °F
- Vehicle battery voltage (8-18 VDC) warning at 11.8 VDC
- Mechanical rear and front air reservoir dual pressure (0-150 psi) warning at 60 psi
- Analog fuel level (0-4/4) warning at 1/8
- Inner axle lock control switch
- Secondary fuel primer control switch
- Low engine coolant indicator light and alarm
- Outrigger(s) extended indicator light

Located below the main dash panel to the left of the steering column, will be the location for the pump shift control with indicator light.

A display will be provided on the dash for the electrical Es-Key multiplex system. The exact location will determined by the totality of instruments and switches on the cab dash.

The display will be in easy reach of the officer to view information.

AERIAL POWER CONTROLS

There will be a ladder power and a PTO engagement switch located in the overhead switch console.

A ladder PTO and a ladder hour meter will be furnished adjacent to the power switches. See ladder description for details.

MOBILE DATA TERMINAL AREA

There will be a flat surface area in front of the officer for placement of a laptop computer.

CENTER OVERHEAD PANEL

An overhead console with pewter panel will be provided on the cab roof between the driver and officer to permit installation of cab stereo, intercom systems, arrow stick controls, etc.

The overhead panel will be approximately 27" wide x 4" high x 13" deep and will be texture paint to match the interior of the cab.

The overhead console will not obstruct the driver's vision through the officer's side window.

CLIMATE CONTROL SYSTEM

A climate-control system will be provided for total cab environmental comfort. This system will provide heat, cooling and defrost capabilities to various areas in the cab.

The system will consist of two (2) evaporator units, mounted in the center overhead of the cab. One (1) will provide comfort air and defrost for the front of the cab and one (1) will provide comfort air for the back of the cab.

The ceiling mounted evaporator/heater unit for the front will include the following:

* Dual high output blower.

* High efficiency coil that includes "rifled" tubing and oversized header tubes for maximum refrigerant distribution.

* Four (4) front comfort AC/heat louvers located two (2) each side of the cab overhead, facing the driver and officer seat positions and will be adjustable.

* Four (4) defrost louvered outlets will be positioned across the windshield to provide optimum coverage. These outlets will also be adjustable.

* Four (4) adjustable floor heat louvers will be provided, one (1) each below the driver and officer seat positions and one (1) under each rear facing rear crew seat.

* Damper controls are pneumatically operated to provide air discharge to the windshield, front overhead air discharge louvers or floor position as required and will be located above the driver seat position.

* An electric water valve in the heat mode controls temperature.

* Unit housing is fully insulated.

*** Heating BTU: 50,000**

*** Air Conditioning BTU: 34,000**

* CFM: 410 @ 13.8 volts

The ceiling mounted evaporator/heater unit for the crew area will include the following:

* Dual high output blower

* High efficiency coil which includes, "rifled" tubing and oversized header tubes for maximum refrigerant distribution

* Air discharge for high output adjustable louvers positioned to provide maximum comfort in all rear seating positions

* Unit housing is fully insulated.

*** Heating BTU: 52,000**

*** Air Conditioning BTU: 36,400**

* CFM: 440 @ 13.8 volts

A 12-volt roof top condenser will be strategically positioned on the cab roof so as not to interfere with any emergency lighting systems and will include the following:

* High performance, long life fan assemblies. Fan motors are sealed around housing and shaft areas.

* Condenser and coil design includes rifled tubing for maximum efficiency. Coil is painted black.

* Condenser unit includes receiver drier with hi/lo pressure switch.

* Wire harness includes necessary wiring for clutch circuit as well as a separate power relay circuit.

* 14 gauge mounting brackets

* 16-gauge condenser frame and fan shroud
* 16 gauge aluminum cover, E-coated white

Mounting design enables easy servicing of all components and unit replacement if necessary.

The evaporator units will be covered with an ergonomically designed custom ABS panel to provide maximum headroom and a pleasing appearance.

CAB WALL AND CEILING INSULATION

One (1) inch thick foam insulation will be provided between the upholstered and rear wall panels, for additional climate and sound protection.

CAB TILT ASSEMBLY

The cab tilt mechanism will be custom designed for ease of maintenance and will consist of two (2) hydraulic cylinders with a maximum lift capacity of 19,625 pounds.

Hydraulic lines will be rated at 20,000 PSI burst pressure.

Each cylinder will have an attached hydraulic locking mechanism, in the event of a hydraulic failure.

Hydraulic cylinders will be detachable to allow removal of the engine for major service.

A mechanical cylinder stay bar and release will be provided to insure a positive lock in the tilted position.

The two (2) rear outboard cab latches will be of the hydraulic pressure release, automatic relatching type, and provide an automatic positive lock when the cab is lowered. The latch must not disengage or experience any damage when subjected to a pull apart tensile load of 6,000 lbs. The hydraulic pressure required to unlock the latch will not exceed 550 PSI. The latch will withstand 5,000 PSI without leaks or damage and withstand 1,000 continuous cycles of operation under a load of 1,000 lbs at liftoff.

The tilt pump will be electric over hydraulic type, with a pressure rating of not less than 4,000 PSI.

The cab tilt device shall be both electrically and hydraulically interlocked to prevent inadvertent activation of the cab tilt system.

A **"CAB NOT LATCHED"** indicator light will be provided in the cab dash warning cluster.

A dual switch control will be provided for the cab tilt system. (Location to be determined at prebuild.)

AUXILIARY MANUAL CAB LIFT

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

PRIMARY CHASSIS FRAME SYSTEM

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

The frame will consist of two channels fastened together by cross members.

All structural fasteners used in the frame will be Grade 8 with vibration resistant aircraft nuts.

Hardened steel washers will be used under all bolt heads and nuts to avoid stress concentrations.

Top flange will be free of bolt heads.

All spring hangers will be steel castings.

Each main frame rail will be 10-1/4" x 4" x 3/8", fabricated from 110,000 PSI minimum yield steel.

A full length inner frame liner will be provided that extends from the front of the chassis to the rear body mount.

A third inner liner will be provided between the front and rear axle spring hangers.

Total section modulus of each rail, with liner, will be 38.73 in^3 and the total resisting bending moment (RBM) will be 4,260,300 in-lbs, per rail.

The chassis frame assembly, consisting of frame rails, crossmembers, axles and steering box, will be finish painted before installation of any electrical wiring, fuel system components, or air system components.

FRONT BUMPER

A 12" high by 101" wide, two (2) ribbed, bright finish, stainless steel front bumper will be provided. The bumper will be wrap design to match the contour of the front cab sheet.

The bumper will be extended 20" with a polished 3/16" thickness polished aluminum tread plate gravel shield enclosing the top and both ends.

The extension structure will consist of heavy duty frame rail material.

The bumper will be reinforced with a 1/4" X 9" steel channel. The reinforcement will be attached between the bumper and the chassis frame rails.

BUMPER STORAGE WELL - CENTER

One (1) storage well constructed of 1/8" aluminum will be installed in the gravel shield. This storage well will be located in the center of the bumper extension.

Storage capacity will be for 200 feet of 1-3/4" double jacket fire hose and nozzle with the lid in the closed position.

The floor of the storage well will have a minimum of four (4) drain holes.

The floor will be overlaid with black Dri Dek material for added hose aeration.

CENTER HOSE WELL HINGED LID

One (1) hinged and latching lid constructed of 3/16" thickness polished aluminum tread plate material will cover the center bumper storage well.

The lid will be hinged on the cab side and latched with a 6" stainless steel "D" ring latch device.

A gas strut will be mounted on the end of the lid opposite the cutout for preconnecting the fire hose.

FRONT TOW HOOKS

Two (2) chrome plated tow hooks will be provided, mounted below the front bumper attached directly to the frame.

AERIAL TRAVEL SUPPORT

An aerial travel support for the aerial device will be provided and located as close to the front axle as possible.

FRONT AXLE

Front axle will be a Meritor MFS-20-133A-N, includes low friction "Easy Steer" bushing technology for maximum steering ease and longer life.

The front axle will be rated at 22,500 lbs.

FRONT DISC BRAKES

Meritor EX-225, 17" disc brakes will be provided for the front axle. Automatic slack adjusters are provided as standard equipment.

FRONT AXLE OIL SEALS

Stemco premium oil seals with viewer glass will be provided on the front axle.

FRONT SUSPENSION

Front suspension will be progressive rate front leaf springs. The spring will be permanently pinned at the front and have a shackle double pinned mounting at the rear. Suspensions allowing the spring to float freely at the ends without a permanent pin will not be acceptable.

Double acting hydraulic shock absorbers will be furnished on the front axle. The shock absorbers will have a minimum bore of 1.38" and an outside diameter of approximately 3-1/4".

The front leaf springs will have a minimum of 10 leaves, a minimum length of 51", and a minimum width of 3-1/2".

The capacity at ground will be 23,000 lbs.

All springs will be of center bolt design.

All spring pins will be positively restrained from rotating in brackets and shackles.

REAR AXLE

Rear axle assembly will be a tandem, Meritor RT-58-185 single reduction with a capacity of 58,000 lbs.

Axles will have a gear reduction as required.

A driver controlled inner axle lock for RT series axles will be provided on the cab dash within easy reach of the driver.

Oil seals will be provided as standard equipment.

MAXIMUM ROAD SPEED

The rear axle/s will be geared for an approximate vehicle top speed of 65 MPH.

REAR BRAKES

Brakes will be "S" Cam, 16-1/2" x 7" size and will be full air actuated with automatic slack adjusters.

REAR SUSPENSION

A Raydan AL-600 air ride suspension will be provided for the tandem rear axle assembly.

The suspension will have a weight rating equal to the rear axle weight rating up to 58,000 pounds.

******* AIR & BRAKE SYSTEM *******
BRAKE SYSTEM

A dual circuit, air operated braking system, meeting the design and performance requirements of FMVSS-121 and the operating test requirements of NFPA 1901, current edition shall be installed. They will be direct air type with dual air treadle in the cab. The system shall be powered by an engine mounted, gear driven air compressor protected by a heated air dryer.

The air system shall be plumbed with reinforced, air brake tubing/hose in conformance to SAE J844-94, Type B and U.S.D.O.T. standards. The compressor discharge shall be plumbed with stainless steel braided hose lines with a Teflon lining. Nylon air lines shall be enclosed in high temperature convoluted loom run along the inside frame rails, secured with non-conductive, corrosion resistant strapping mounted with stand-off fasteners. Cord reinforced rubber hose lines with brass fittings shall be installed from frame rail to axle mounted air connections.

The air system shall provide a rapid air build-up feature and low pressure protection valve with light and buzzer, designed to meet the requirements of N.F.P.A. 1901, current edition.

ABS SYSTEM

An Anti-Skid Braking System (ABS) will be provided to improve braking control and reduce stopping distance. This braking system will be fitted to axles and all electrical connections will be environmentally sealed, water weatherproof, and 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 service trouble shooting, provisions in the system for an optional diagnostic tester will be provided. The system will test itself each time the vehicle is started and a dash mounted light will go out once the vehicle is moving above 4 mph. 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 will signal 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 sensor wheel slip. A deviation will be corrected by cylindrical brake application and release. If a malfunction occurs, the circuit will signal the operator and the malfunctioning half of the system will shut down. The system is installed in a diagonal pattern for side to side control. The system will insure that each wheel is braked in optimum efficiency up to 5 times a second.

The system will also control application of the auxiliary engine exhaust or drive line brakes to prevent wheel lock.

BRAKE AIR RESERVOIRS

There will be a minimum of four (4) air reservoirs and be installed in conformance with best automotive practices.

An additional 1200 cu. in. air reservoir will be provided for the accessory air outlet.

Reservoir capacity total will be a minimum of 8555 cu. in.

AIR DRYER SYSTEM

A Rockwell/Wabco System Saver 1200 heated air dryer will be furnished. An automatic moisture ejector on the primary, or wet tank, will also be furnished.

AIR LINES

The entire chassis air system will be plumbed utilizing reinforced, Synflex air lines. All of the air lines will be color coded to correspond with an air system Schematic and will be adequately protected from heat and chafing.

AIR COMPRESSOR

Air compressor will be a Wabco brand, minimum of 18.7 cubic feet per minute capacity. Air brake system will be the quick build up type. The air compressor discharge line will be stainless steel braid reinforced Teflon hose.

A pressure protection valve will be installed to prevent the use of air horns or other air operated devices should the air system pressure drop below 80 psi (552 kPa).

The chassis air system will meet NFPA 1901, latest edition for rapid air pressure build-up within sixty (60) seconds from a completely discharged air system. This 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 sixty (60) seconds build-up time.

PARKING BRAKE

Parking brake will be of the spring-actuated type, mounted on the rear axle brake chambers. The parking brake control and red application warning light will be mounted on the cab instrument panel.

The parking brake will be plumbed to provide all wheel lock-up when applied.

******* WHEELS, TIRES & ACCESSORIES ********
WHEELS AND TIRES

Polished aluminum wheels will be furnished for the front axle and all eight (8) rear wheel positions of the tandem rear axle.

Chrome lug nut covers and hub covers will be provided.

Two (2) front wheels will be a aluminum, 22.5" x 12.25", hub piloted type.

Two (2) front tires will be 425/65R x 22.5, 20 ply tubeless radials, highway tread, with a rating of up to 23,000 lbs.

Eight (8) rear wheels will be 22.5" x 9".

Eight (8) rear tires will be 315/80R x 22.5, 18 ply tubeless radials, with a rating of 60,880 lbs.

The front tires will be highway tread, with a traction tread provided for the rear tires.

The front and rear tires will be Goodyear brand tires that will meet the weight requirement of the wheels and axles.

******* ENGINE, TRANSMISSION & ACCESSORIES *******

ENGINE

The engine will be a Cummins, Model ISM 500, diesel, turbo-charged, per the following specifications.

Max. Horsepower	500 HP @ 2100 RPM
Governed Speed	2100 RPM
Peak Torque	1550 lb. ft. @ 1300 RPM
Cylinders	Six (6)
Operating Cycles	Four (4)
Bore & Stroke	4. 9 x 5.8 in.
Displacement	661 cu. in.
Compression Ratio	16.1:1
Governor Type	Limiting Speed
Drive line Size	1810 Series
Radiator Size	1200 sq. in.

The engine oil filters will be engine manufacturers branded or approved. The engine oil filters will be accessible and easily serviced or replaced.

An air-operated fan clutch will be provided.

The engine will be installed in accordance with the engine manufacturer's instructions, and the chassis manufacturer will be able to furnish proof of engine installation approval by the engine manufacturer.

COOLING/RADIATOR

Radiator will be steel with bolted top and bottom tanks. The cooling system will be designed for a minimum of seven (7) PSI operation. There will be a sight glass in the radiator to check the coolant level without removing the radiator cap. The core construction will be tube and fin with a minimum of four (4) tubes per row and a minimum of ten (10) fins per inch.

Engine coolant will be treated with supplementary coolant additives (SCA's) required by engine manufacturers. Engine coolant will provide anti-freeze protection to -30° F. The mixture will be per engine manufactures specifications.

RADIATOR SKID PLATE

A removable heavy duty fabricated steel skid plate assembly will be provided at the radiator area beneath the chassis frame rails.

COOLANT HOSE CLAMPS

All coolant hoses will be equipped with constant torque type hose clamps.

TRANSMISSION FLUID COOLER

Transmission oil to liquid cooler will be furnished.

SILICONE ENGINE HOSES

Silicone rubber hoses will be furnished for the engine and heater system.

ENGINE WATER FILTER AND COOLANT

The engine manufacturer's required water filter will be furnished as provided by the manufacturer.

Coolant additive will be provided in the cooling system as recommended by the engine manufacturer.

LOW COOLANT INDICATOR LIGHT AND ALARM

A low engine coolant indicator light located in the dash instrument panel will be provided.

An audible alarm will be provided to warn of the low coolant condition.

ENGINE FAST IDLE

A fast idle for the electronic controlled engine will be provided. The fast idle will be controlled by an ON/OFF switch on the dash.

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

AIR CLEANER

An engine air cleaner will be provided and will include a dry type element. Air cleaner will be installed in accordance with the engine manufacturer's recommendations.

TRANSMISSION

An Allison World Transmission, Model 4000EVSR, electronically controlled, automatic transmission will be provided. Transmission specifications will be as follows:

Max. Gross Input Power	580 HP
Max. Gross Input Torque	1675 lb. ft.
Input Speed (Range)	1700- 2300 RPM
Shift Calibrations	5 Speed (6^{th} not avail. for fire appl.)
Direct Gear (Pumping)	4^{th} (Lock-up)
Direct Gear Ratio	1.00:1
Overdrive Ratio	0.74:1

Transmission installation will be in accordance with the transmission manufacturer's specification. The transmission will be readily and easily removable for repairs or replacement.

The transmission will contain a built-in output retarder, controlled by an on/off switch on the dash, and actuated by utilizing the brake pedal.

A back-lighted, touch-pad type shift control will be mounted in the cab, convenient to the driver. Shift control will be approved by the transmission manufacturer.

Retarder control will be through a switch on the dash, with activation of the retarder in conjunction with the brakes via the brake pedal.

A temperature gauge and indicator light will be provided for retarder monitoring.

DRIVE LINES

Drive lines will be Dana (Spicer) 1810 series. The chassis manufacturer will utilize an electronic type balancing machine to statically and dynamically balance all drive shafts. The chassis manufacturer will be able to provide proof of compliance with all drive shaft manufacturer's standards and specifications.

Primary drive lines will be 1810 series.

EXHAUST SYSTEM

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

The muffler will be fabricated from steel sheet and of a size compatible with the engine exhaust discharge.

Exhaust tubing will be a minimum of 16 gauge cold rolled steel.

Any flexible exhaust tubing will be HDT stainless steel type.

All flex tubing clamps will be Flex-Seal II, packed with a pliable sealant, creating an emission type joint.

To minimize heat build-up, exhaust tubing within the engine compartment will be wrapped with an insulating material.

The exhaust will discharge on the PASSENGER side of the apparatus forward of the rear axle.

A straight, chrome plated, exhaust deflector will be installed on the exhaust outlet.

PROVISIONS FOR PLYMOVENT EXHAUST EXTRACTION SYSTEM

The exhaust will discharge out the officer side of the apparatus, forward of the rear axle. The exhaust outlet will be modified to connect with a Plymovent ventilation system. The exhaust outlet will be straight pipe, terminating minimum 2.5” forward of rear tire, minimum 2.5” below rubrail/body, flush with outboard of rubrail/body.

FUEL TANK

Fuel tank will be a minimum of 100 gallon capacity. It will have a minimum fuel filler neck of 2" ID.

A 1/2" minimum diameter drain plug will be provided.

The tank will be fabricated from hot rolled, pickled and oiled steel.

Provisions for an additional feed line and fuel level float will be provided for apparatus manufacturer's use.

Fuel tank will be installed behind the rear wheels between the frame rails.

All lines to and from the engine will be medium pressure aircraft type wire braid hoses.

Fuel filtration will meet the requirements of the engine manufacturer.

FUEL COOLER

A fuel cooler will be provided, in accordance with manufacturer's specifications.

FUEL LINE SHUTOFF

A fuel line shut-off valve will be provided between the fuel tank and the primary fuel filter.

AUXILIARY ELECTRIC FUEL PUMP

A secondary electric fuel pump for repriming will be furnished, with a switch on the dash.

FUEL POCKET

A fuel fill will be provided in the DRIVER side rear wheel well area.

A Cast Products heavy duty cast aluminum spring loaded hinged fill door, labeled for the proper type fuel will be provided. Fuel fill will not interfere with optional air bottle compartments, if provided.

DUAL POWER STEERING

Steering will be dual **Sheppard** integral, power assist type, utilizing an engine driven hydraulic pump, with a maximum operating pressure of 2000 PSI. Steering design will permit a maximum of 5.6 turns from stop to stop. Steering system components will be mounted in accordance with the manufacturer's instructions.

Steering wheel will be vinyl padded, minimum 18" diameter, with a center hub mounted horn button.

There will be a self-canceling, directional signal lever and a traffic hazard switch on the steering column.

The high beam activator will be controlled by pulling the directional signal lever toward the driver.

The steering column will have tilting and telescoping capability.

ROAD SAFETY KIT

A road safety kit will be furnished with the following equipment:

1 - 2 1/2 lb. B-C fire extinguisher
3 - triangle safety reflectors
1 - wheel lug wrench

CHASSIS/BODY ELECTRICAL & ACCESSORIES:

CHASSIS ELECTRICAL SYSTEM

All electrical wiring in the chassis will be SXL cross link insulated type.

Wiring is to be color coded and include function codes every three (3) inches on both sides.

Wiring harnesses will be routed in protective, heat resistant loom, securely and neatly installed.

Two (2) 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.

WIRING HARNESS DESCRIPTION

The wiring harness contained on the chassis is 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. Wiring is 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).

The covering of harnesses is moisture resistant loom with a minimum rating of 289 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 manufacturers instructions. No connections within the harness utilize wire nut, insulation displacement, or insulation piercing.

All circuits conform to SAEJ1292. 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.

DIRECT GROUNDING STRAPS

Direct grounding straps will be mounted to the following areas; frame to cab, frame to body and frame to pump enclosure.

All exposed electrical connections will be coated with "Z-Guard 8000" to prevent corrosion.

12 VOLT ELECTRICAL SYSTEM TESTING

The apparatus low voltage electrical system will be tested and certified. The certification will be provided with the apparatus. All tests will be performed with air temperature between 0 and 100 degrees F.

The following three (3) tests will be performed in order. Before each test, the batteries will be fully charged.

TEST #1-RESERVE CAPACITY TEST

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

TEST #2-ALTERNATOR PERFORMANCE TEST AT IDLE

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

TEST #3-ALTERNATOR PERFORMANCE TEST AT FULL LOAD

The total continuous electrical load will be activated with the engine running up to the engine manufacturers governed speed. The test duration will be a minimum of 2 hours. Activation of the load management system will be permitted during this test. However, an alarm sounded by excessive battery discharge, as detected by the system, or a system voltage of less than 11.7 volts dc for a 12 volt system, for more than 120 seconds, will be considered a test failure.

LOW VOLTAGE ALARM TEST

Following completion of the preceding tests, the engine will be shut off. The total continuous electrical load will be activated and will continue to be applied until the excessive battery discharge alarm activated.

The battery voltage will be measured at the battery terminals. With the load still applied, a reading of less than 11.7 volts will be considered a test failure. The battery system will then be able to restart the engine.

At time of delivery, documentation will be provided with the following information:

- Documentation of the electrical system performance test
- A written load analysis
- Nameplate rating of the alternator
- Alternator rating at idle while meeting the minimum continuous electrical load
- Each component load comprising the minimum continuous electrical load.
- Additional loads that, when added to the minimum continuous load, determine the total connected load
- Each individual intermittent load.

ELECTRICAL MANAGEMENT SYSTEM

The Class 1 ES-Key Electrical Management System will be utilized on the chassis for all functions applicable. The system will consist of the following components

A Display will be mounted in the center cab dashboard panel that will serve as an informational, status and diagnostic view panel of the vehicles electrical system.

A Modem with a RS232 computer interface and standard telephone jack used to not only program the multiplex system but also serve as a factory direct gateway into the vehicle from any Class 1 multiplex authorized service facility.

A Universal System Manager (USM), which is the main controlling component of the multiplexing system will be provided and factory programmed to DOT, NFPA, SAE, the apparatus manufacturer's and customer specifications by the apparatus manufacturer's engineering department. The ES-Key system installation will comply with SAE J551 requirements regarding Electromagnetic and Radio Frequency interference (EMI, RFI), as well as utilize components and wiring practices that insure the system is protected against corrosion, excessive temperatures, water, excessive physical, and vibration damage by any equipment contained with the vehicle at the time of delivery.

A Vocation Module, which is the interface between the multiplexing system and the pump system. This module will serve as the interface between the operator, engine, transmission and pumping system. The module will be installed under the drivers dash in a sealed enclosure that will possess green indicating LEDs that will indicate to service personnel the interlock state of the apparatus. Keeping with manufacturer's dedication to providing a reliable pumping system, the vocation module will be “backed-up” by a simple relay system; in the same enclosure; that in the event of a multiplexing error involving pump operation can be activated to ensure reliable pumping operations at ALL times. In addition to controlling pump function, this vocation module will be able to provide automatic and/or manual activation of engine “Fast Idle” activation to maintain adequate alternator output and thus, chassis voltage.

Multiplexing Input/Output Modules, which are the multiplexing method of reducing the amount of wiring and components used on non-multiplexed apparatus. These modules will vary in I/O configuration, be waterproof allowing installation outside of enclosed areas and will possess individual output internal circuit protection. The modules will also have three status indicators visible from a service persons vantage point that will indicate the status of the module. In the event a load requires more than the 7.5A of operating current, the module with activate a simple relay circuit integral to any of the 3 dillblox assemblies installed in the cab.

ALTERNATOR

The alternator will be Leece Neville Model 4890JB, 320 amp, serpentine belt driven alternator. The installation will include a brush less design with an integral self-diagonstic regulator and rectifier for compact installation.

The alternator installation will be designed to provide maximum output at engine idle speed to meet the minimum continuous electrical load of the apparatus as required.

BATTERY SYSTEM

Six (6) Group 31, maintenance free batteries will be provided.

Each battery is rated at 925 CCA at 0 degrees F. Reserve capacity will be 180 minutes.

BATTERY STORAGE

Batteries will be securely mounted and fully enclosed in fixed, stainless steel, ventilated battery boxes, located on each side of the chassis frame.

Complete access will be provided when the cab is fully tilted. Batteries will be mounted on non-corrosive matting material.

BATTERY BOX TREAD PLATE

The battery box will be overlaid with an "L" shaped polished aluminum tread plate cover. This cover will protect the batteries from road spray, snow and road debris. The cover of this box will be easily removable for inspection, testing and maintenance of the batteries.

BATTERY DISCONNECT SWITCH

The chassis batteries will be wired in parallel to a single 12 volt electrical system, controlled through a heavy duty, "Guest" brand rotary type, master disconnect switch.

The master disconnect switch will be located within easy access by the driver upon entering or exiting the cab.

All electrical circuits will be disconnected when the switch is in the "OFF" position.

BATTERY JUMPER STUDS

A set of Cole Hersee battery jumper, model #46210-02 (red) and #46210-03 (black) studs will be provided to allow the battery system to be jumped from an external source. The studs will be located on the left side of the chassis and will be equipped with rubber protector caps.

110 VOLT SHORELINE CONNECTION - "SUPER" AUTO EJECT

One (1) Kussmaul "Super" Auto Eject model 091-55-20-120, automatic, 110 volt, 20 amp shoreline disconnect will be provided for the on board, 110 volt battery charging systems. The disconnect will be equipped with a NEMA #5-20P male receptacle, which will automatically eject the shoreline when the vehicle starter is energized. A label will be provided indicating voltage and amperage ratings.

The Kussmaul auto-eject connection will be equipped with a Yellow weatherproof cover.

The shoreline receptacle will be located in the area directly adjacent to the driver's side cab door.

BATTERY CHARGER / AIR COMPRESSOR SYSTEM

A Kussmaul model #091-9-1200, high output battery charger / air compressor system will be provided for maintaining both the vehicle battery and air pressure for the vehicle brake system.

A Kussmaul model #091-53-12-REMOTE, "Auto Charge 1200" high output, fully automatic battery charger will be provided for maintaining the vehicle's single battery system. Unique electronic sensing circuits sense the true battery voltage while eliminating the need for external sense wires. Output current will be 40 amperes @ 12 volt DC.

A LED bar graph display will be located near the shoreline connection to monitor the battery status.

A Kussmaul model #091-9B-1 Auto-Pump 120 volt air compressor will be provided to maintain the air pressure in the chassis air brake system while the vehicle in not in use.

The air compressor will have a rated input at 120 volts AC @ 4.2 amps, and output of 0.76 scfm open flow @ 100 psi maximum.

LIGHTING - CAB INTERIOR

Four (4) combination red/white dome lights will be furnished in the cab, two (2) in the forward section and two (2) in the rear section.

The lights will be Weldon model #8086-6978-68 with euro style switch.

Each dome light will have an integral selector switch.

Each dome light will also activate when the respective, adjacent cab door is opened.

A shielded light will be provided in each side opening, cab door step well. These lights will activate with the respective door jamb switch.

CAB MAP LIGHT

A high intensity, goose neck map light will be furnished and located at the right side of the cab dash.

CIGARETTE STYLE D.C. RECEPTACLES

Two (2) 12 volt cigarette lighter style accessory outlet(s) will be installed in the cab of the truck for the fire departments accessory devices.

The power connections will be located as directed near the officer's seating position for devices such as cellular phones, laptops, etc.

HAND HELD SPOTLIGHT

An Optronics #KB-4001 hand-held spotlight shall be provided on a bracket mounted on the side of the engine tunnel next to the officer.

It shall have a coil-cord, a momentary switch and a 400,000 candle power lamp.

CAB MARKER LIGHTS AND REFLECTORS

Front marker/clearance lights will be mounted, one (1) on each side on top of the cab. Three (3) identification lights will be mounted, horizontally spaced between 6" and 12" apart facing forward, centered on the front of the platform.

The lights will be amber in color.

Side facing reflectors will also be installed, one (1) on each side of the body, as far forward and low as practical.

The reflectors will be amber in color.

One (1) amber directional light will be mounted on each side of the cab above the front wheel well area.

BODY MARKER LIGHTS AND REFLECTORS

Rear marker lights will be mounted, one (1) on each side of the body, as far back and high as practical. The lights will be red in color.

Side facing reflectors will also be installed, one (1) on each side of the body, as far back as practical. The reflectors will be red in color.

Rear clearance lights will be mounted, one (1) each side at the rear of the vehicle, as high as practical. Rear facing reflectors will also be installed, one (1) each side at the rear of the vehicle.

Three (3) identification lights will be mounted, horizontally spaced between 6" and 12" apart facing rearward.

The reflectors and identification lights will be recessed mounted in the vertical surface of the rear step for protection from breakage. All of the clearance lights, identification lights, and reflectors will be red in color.

Intermediate side marker lights / turn signals will be provided, one (1) each side of the body, in an area forward of the rear axle. The lights will be amber in color. Intermediate, side facing reflectors will also be installed, one (1) on each side of the body, in an area forward of the rear axle. The reflectors will be amber in color.

One (1) halogen style license plate light will be provided above the mounting position of the license plate. The light will be clear in color.

All lights will be LED style, Truck-Lite brand.

CUSTOM CAB HEADLIGHTS

Two (2) dual, rectangular, halogen headlight modules in a cast aluminum bezel will be furnished on the front of the cab.

Each side head light module will incorporate an individual low beam and a high beam headlight.

High beam actuation will be controlled on the turn signal lever.

DAYTIME RUNNING LIGHTS

The chassis head lights will have integrated circuitry to actuate the low beam head lights at a maximum of 80 percent of capacity whenever the chassis engine is running.

SECONDARY DUAL LIGHT MODULE

Two (2) amber, arrow outlined, turn signals will be provided, one (1) in each side dual light module, above the headlights, in matching chrome plated bezels.

The NFPA required, Zone "A" lower warning lights will be incorporated into each side dual light module noted above.

EMERGENCY SWITCHES

A switch control console will be provided in the center dash panel between the driver's and officer's position. This console will separate the emergency / auxiliary electrical functions from the regular chassis functions.

Programmable touch pad type switches with integral indicator lights will be provided.

A master switch will be provided, which will allow pre-setting of emergency light switch and will have a red integral indicator light. A primary emergency lighting switch will be provided, next to the master switch, along with a total of seven (7) load manageable emergency switches. The last remaining switch will be a ground light switch. All switches, (other than the master switch), will have switch function labeling and an amber integral indicator light.

****** BODY ELECTRICAL SYSTEM ******
12 VOLT BODY ELECTRICAL SYSTEM

All electrical lines in the body will be protected by automatic circuit breakers, conveniently located to permit ease of service. Flashers, heavy-duty solenoids and other major electrical controls will be located in a central area near the circuit breakers.

All lines will be color and function coded every 3", easy to identify, oversized for the intended loads and installed in accordance with a detailed diagram. A complete wiring diagram will be supplied with the apparatus.

Wiring will be carefully protected from weather elements and snagging. Heavy duty loom will be used for the entire length. Grommets will be utilized where wiring passes through panels.

In order to minimize the risk of heat damage, wires run in the engine compartment area will be carefully installed and suitably protected by the installation of heat resistant shielded loom.

All electrical equipment will be installed to conform to the latest federal standards as outlined in **NFPA-1901.**

BODY ELECTRICAL JUNCTION COMPARTMENT

A weathertight electric junction compartment will be provided in the left side lower front compartment. This compartment will be recessed through the inside rear wall of the compartment to provide an easily accessible enclosure to house all of the body wiring junction points, terminal strips, solenoids, etc. The design of this compartment will not decrease the storage capacity area of the compartment in which it is located. A removable panel will be provided for access to this compartment.

AERIAL ELECTRICAL JUNCTION COMPARTMENT

An electric junction compartment will be provided on the rear of the aerial body. This compartment will be recessed through the rear wall of the body to provide an easily accessible enclosure to house all of the **aerial device** wiring junction points, terminal strips, solenoids, etc. All wiring for the aerial device including outrigger, diverter valve, and swivel circuits will be enclosed in this compartment. The design of this compartment will not decrease the storage capacity area of the body in which it is located.

TAIL, STOP, TURN AND BACK-UP LIGHTS

Two (2) Whelen 600 series model #60R00XRR, 4-1/8" x 6-1/2", LED red combination tail and stop lights, will be mounted one each side at the rear of the body with a chrome mounting flange.

Two (2) Whelen 600 series model #60A00TAR, 4-1/8" x 6-1/2", LED amber arrow turn signal lights, will be mounted one each side, on a vertical plane with the tail/stop lights with a chrome mounting flange.

Two (2) Whelen 600 series, 4-1/8" x 6-1/2", white halogen backup lights, will be mounted with a chrome mounting flange, one each side on a vertical plane with the turn/tail/stop signals. These lights will activate when the transmission is placed in reverse gear.

COMPARTMENT LIGHTS

Each exterior compartment will have one (1) Whelen #PSCACCCR, LED strip light.

Each light will come on automatically when the respective door is opened and the master battery switch is on.

Ten (10) additional LED compartment light(s) will be provided, to ensure proper compartment illumination, at each of the following locations:

STEP LIGHTS

Chrome plated LED, shielded chassis and body step lights will be provided and controlled with marker light actuation. Step lights will be located to properly illuminate all body and chassis access steps and walkway areas.

HOSEBED LIGHTS

Two (2) 6" Unity model AG chrome plated deck lights will be mounted on each side of the hosebed.

The light will illuminate the hosebed area.

Control switches will be provided on the light heads.

12 VOLT SCENE LIGHTS - SIDES OF CAB

Two (2) Weldon, model #3812-0000-33, angled scene light will be provided, one on each side of the cab, directly behind the front cab entrance door.

The scene lights will be controlled by a rocker switch in the master warning light switch console as well as there being an automatic control when the cab doors on the same side of the cab area opened and closed.

All scene lights will be wired through the load management system.

UNDER CAB GROUND LIGHTS

One (1) LED ground light will be provided under each side cab door entrance step, four (4) total.

The ground lights will turn on automatically with each respective door jamb switch and also by a master ground light switch in the warning light switch console.

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

UNDER BODY GROUND LIGHTS

One (1) LED ground light will be provided under each front rescue body corner, two (2) total. The ground lights will be activated by a master ground light switch in the cab and will be wired through the load management system.

One (1) LED ground light will be provided under each rear body corner, two (2)total. The ground lights will be activated by a master ground light switch in the cab and will be wired through the load management system.

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

"DO NOT MOVE APPARATUS" WARNING LIGHT WITH AUDIBLE ALARM

A red flashing warning light **with an integral audible alarm**, will be functionally located in the cab to signal when an unsafe condition is present such as an open cab door or body compartment door, an extended ladder rack, a deployed stabilizer, an extended light tower or any other device which is opened, extended or deployed which may cause damage to the apparatus if it is moved.

This light will be activated through the parking brake switch to signal only when the parking brake is released. This light will be labeled "DO NOT MOVE APPARATUS WHEN LIGHT IS ON".

PUMP COMPARTMENT WORK LIGHTING

LED Work lighting will be provided inside the pump enclosure providing a minimum of 20 candlepower illumination.

ENGINE COMPARTMENT WORK LIGHTING

Work lighting will be provided inside the engine enclosure providing a minimum of 20 candlepower illumination.

SIGTRONICS MODEL #US-67S INTERCOM SYSTEM

A Sigtronics model # US-67S intercom system will be provided at the forward cab area. The system will be equipped with single radio interface capabilities. The master station will be capable of accepting up to six positions (plus exterior positions), and utilize a 12 volt nominal power supply.

Six (6) # SE-8 single-plug, behind the head, radio transmit headsets will be furnished. The head-sets will have adjustable volume, noise-canceling electric microphone, adjustable head strap, and a reversible, flex-style boom which rotates for left or right dress.

A total of six (6) # 800120 head set jacks will be provided at the required seating positions in the cab.

One (1) # 800121 exterior head set jack will be provided for remote mounting at a location to be determined.

A head set mounting hook will be provided, adjacent to each interior head set jack location.

Three (3) # 800122radio transmit switches will be provided at the required locations in the cab or at the exterior area of the unit.

The system as specified will be completely installed during the manufacturing process, to properly conceal accessories of the intercom system.

WARNING LIGHTS & ACCESSORIES:

NFPA LIGHTING PACKAGE

The following warning light package includes all of the minimum warning light and actuation requirements for the 2003 revision of the NFPA 1901 Fire Apparatus Standard.

The following lighting as specified will meet the requirements for both "Clearing Right of Way" and "Blocking Right of Way" as noted.

LIGHT PACKAGE ACTUATION CONTROLS

The entire warning light package will be actuated with a single warning light switch in the cab switch panel. The wiring for the warning light package will engage all of the lights required for "Clearing Right of Way" mode when the vehicle parking brake is not engaged.

An automatic control system will be provided to switch the warning lights to the "Blocking Right of Way" mode when the vehicle parking brake is engaged.

ZONE A (FRONT - UPPER)
DUAL CAB ROOF LIGHT BARS

Two (2) Whelen model FNMINI, 24", cab roof warning light bars will be furnished and rigidly mounted, one (1) at each side on top of the cab roof.

Each light bar will be equipped with two (2) front corner red linear 12 LEDs, one (1) white front linear 8's, and one (1) end red linear 8 LEDs.

The white lights of each light bar will be disabled automatically for the "Blocking Right of Way" mode.

ZONE A (FRONT - LOWER)
HEAD LIGHT MOUNTED WARNING LIGHTS

Two (2) headlight mounted Whelen 60R00FRR LED flashing light heads will be provided and will be mounted one (1) in each headlight cluster housing.

Red lenses will be provided on the halogen flashing light heads.

ZONE C (REAR - UPPER)
REAR WARNING LIGHTS

Two (2) Whelen RB6 rotating halogen beacon lights will be mounted one (1) each side on the upper rear of the body.

A red lens (RB6PRP) will be provided on the left side and an amber lens (RB6PAP) will be provided on the right side.

ZONE C (REAR - LOWER)
REAR WARNING LIGHTS

Two (2) surface mounted Whelen 70R00FRR LED flashing light heads will be furnished and will be mounted one (1) each side on the lower rear of the body.

The lower rear flashing light heads will be equipped with red lenses and a chrome plated flange (7EFLANGE).

ZONE B & D (SIDE FRONT - UPPER)

The lighting requirement for this area is covered by the light bar noted in Zone "A" - Upper.

ZONE B & D (SIDE REAR - UPPER)

The lighting requirement for this area is covered by the light noted in Zone "C" - Upper.

ZONE B & D (SIDE FRONT - LOWER)
SIDE INTERSECTION WARNING LIGHTS

Two (2) surface mounted Whelen 70R00FRR LED flashing light heads will be furnished and will be mounted one (1) each side of the front bumper extension.

The side intersection flashing light heads will be equipped with red lenses and a chrome plated flange (7EFLANGE).

ZONE B & D (SIDE CENTER - LOWER)
SIDE CENTER WARNING LIGHTS

Two (2) surface mounted Whelen 70R00FRR LED flashing light heads will be furnished and will be mounted one (1) each side centered as closely as possible between the front and rear lower warning lights.

The side center flashing light heads will be equipped with red lenses and a chrome plated flange (7EFLANGE).

ZONE B & D (SIDE REAR - LOWER)
SIDE REAR WARNING LIGHTS

Two (2) surface mounted Whelen 70R00FRR LED flashing light heads will be furnished and will be mounted one (1) each side on the rear body fender or as close to the rear of the unit as practical and will face to each side of the unit.

The side rear flashing light heads will be equipped with red lenses and a chrome plated flange (7EFLANGE).

WARNING LIGHT SYSTEM CERTIFICATION

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

This warning light system will be certified by the light system manufacturer, to meet all of the requirements as noted in chapter 13 of the 2003 revision of the NFPA 1901 Fire Apparatus Standard.

AUXILIARY WARNING LIGHTS

Two (2) surface mounted Whelen 70R00FRR LED flashing light heads will be furnished and will be mounted as directed by the fire department. The light heads will be equipped with red lenses and a chrome plated flange (7EFLANGE).

The lights specified above will be provided in addition to the NFPA required Optical Warning Light Package and will be switched independently from the light package. Additionally, wiring for the independently switched lights specified, will be run through the Load Management System to ensure that the electrical system is not overloaded by the additional amperage draw requirements.

TRAFFIC ADVISER WARNING LIGHT

One (1) Whelen "Traffic Advisor", model TA837A, rear directional light will be recessed into the rear "A" frame step deck.

The directional light will be activated by a control module, which will only operate when the "master" light switch is turned on.

The control module will be conveniently located near the driver's position.

The rear directional light will be wired through the load management system of the unit.

SAFETY VISION CAMERA SYSTEM

A Safety Vision #**SV-CLCD65** rear vision camera system with audio will be provided to allow the driver to visually see and hear at the rear of the apparatus while in the cab.

The system will include a flat screen 6.8" color monitor, color camera with microphone and LED Illuminators, that will be mounted at the rear of the vehicle.

Camera: Color SV-610 rear vision camera with microphone. 1/3 CCD imager, 4.3Mm Lens, 290,000 pixels, electronic shutter, LED illuminators, waterproof threaded pigtail.

Monitor: Color SV-LCD68 rear vision monitor. 6.8 LCD screen, speaker, audio and video adjustment controls, mirror/normal image switch, automatic-on in reverse, free voltage 10VCD-26VDC. The system will also include a **SV-LCDCB** control box. Included cabling is the improved waterproof threaded metallic connector with rubber o-ring seal. Monitor only. 50 video cable, includes waterproof threaded connector at camera end.

******* AUDIBLE WARNING EQUIPMENT *******
ELECTRIC HORN

A single electric horn activated by the steering wheel horn button will be furnished and installed in a functional location below the cab windshield.

BACK-UP ALARM

A solid state back-up alarm will be provided and installed at the rear of the apparatus under the tailboard. The back-up alarm will activate automatically when the transmission is placed in reverse gear and the ignition is "on".

EMERGENCY AIR HORNS

Two (2) Grover Stuttertone, chrome plated air horns will be at the front of the vehicle. The air horns will be mounted in full compliance with NFPA-1901.

A 3/8" minimum air line "teed" with equal distance from each horn shall be installed.

The air horns will measure 24" in length.

Both air horns will be recessed in the front bumper with one (1) to each side..

The air horn/s will be controlled by a push button located on the dash, on the officer's side and the steering horn button for the driver.

An air horn/standard horn selector switch will be furnished on the dash for the drivers steering horn button.

ELECTRONIC SIREN

One (1) Whelen # 295HF100 electronic siren will be provided featuring: bottom mount control head in cab, "Si-Test" self diagnostic feature, six (2) function siren, radio repeat and public address.

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

Two (2) Whelen, model # SA314A polished aluminum siren speakers will be provided, recessed in the front bumper and wired to the electronic siren.

FEDERAL Q2B MECHANICAL SIREN

One (1) Federal Model #Q2B mechanical siren will be provided to provide audible warning.

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

The Q2-B siren will be pedestal mounted on top of the extended bumper on the driver's side. The siren will be equipped with a Federal model #P, chrome housing and pedestal.

Two (2) floor mounted foot switches will be provided, one (1) for the officer and one (1) for the driver.

Activation switches will only be provided power when the park brake is released.

A siren brake button will be provided near the driver's position.

PUMP AND PLUMBING SYSTEM:

PUMP TYPE

- HALE QMAX-150

- 1500 G.P.M.

- Single Stage

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

100% of rated capacity at 150 P.S.I. net pump pressure
100% of rated capacity at 165 P.S.I. net pump pressure
70% of rated capacity at 200 P.S.I. net pump pressure
50% of rated capacity at 250 P.S.I. net pump pressure

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

PUMP ASSEMBLY

The pump will be of a size and design to mount on the chassis rails of commercial and custom truck chassis, and have the capacity of 1500 gallons per minute (U.S. GPM), NFPA-1901 rated performance.

PUMP CONSTRUCTION

The entire pump will be cast, manufactured and tested at the pump manufacturer's factory.

The pump will be driven by a drive line from the truck transmission. The engine will provide sufficient horsepower and RPM to enable the pump to meet and exceed its rated performance.

The entire pump, both suction and discharge passages, will be hydrostatically tested to a pressure of 600 PSI. The pump will be fully tested at the pump manufacturer's factory to performance specs as outlined by the latest NFPA-1901. Pump will be free from objectionable pulsation and vibration.

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

Pump body shall be horizontally split, on a single plane in two sections for easy removal of entire impeller assembly including wear rings and bearings from beneath the pump without disturbing piping or the mounting of the pump in chassis.

PUMP SHAFT

Pump shaft to be rigidly supported by three bearings for minimum deflection. One high lead bronze sleeve bearing to be located immediately adjacent to the impeller (on side opposite the gearbox). The sleeve bearing is to be lubricated by a force fed, automatic oil lubricated design, pressure balanced to exclude foreign material.

The pump shaft will be heat-treated, electric furnace, corrosion resistant stainless steel to be super-finished under packing with galvanic corrosion (zinc foil separators in packing) protection for longer shaft life. Pump shaft must be sealed with double-lip oil seal to keep road dirt and water out of gearbox.

MECHANICAL SHAFT SEAL

The midship pump will be equipped with a high quality, spring loaded, self-adjusting mechanical seal capable of providing a positive seal to atmosphere under all pumping conditions. This positive seal to atmosphere must be achievable under vacuum conditions up to 26 Hg (draft) or positive suction pressures up to 250 PSI.

The mechanical seal assembly will be 2 inches in diameter and consists of a carbon sealing ring, stainless steel coil spring, Viton rubber boot, and a tungsten carbide seat with a Teflon backup seal provided.

PUMP IMPELLER

The pump will have one double suction impeller. The pump body will have two opposed discharge volute cutwaters to eliminate radial unbalance. (No exceptions)

Pump impeller will be hard, fine grain bronze of the mixed flow design; accurately machined and individually balanced. The vanes of the impeller intake eyes will be of sufficient size and design to provide ample reserve capacity utilizing minimum horsepower.

Impeller clearance rings will be bronze, easily renewable without replacing impeller or pump volute body, and of wrap-around double labyrinth design for maximum efficiency. (No exceptions.)

PUMP DRIVE UNIT

The drive unit will be cast and completely manufactured and tested at the pump manufacturer's factory.

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

The gearbox drive shafts will be of heat treated chrome nickel steel and at least 2-3/4 inches in diameter on both the input and output drive shafts. They will withstand the full torque of the engine in both road and pump operating conditions.

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

PUMP RATIO

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

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

PUMP SHIFT CONTROL

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

EMERGENCY PUMP SHIFT

An emergency manual pump shift control will be furnished on the left side pump panel which may be utilized if the air shift control does not operate.

A transmission, manual lock-up switch will be furnished in the cab to ensure positive lock-up of the transmission.

PUMP SHIFT INDICATOR LIGHTS

For automatic transmissions, three (3) green warning lights will be provided to indicate to the operator(s) when the pump has completed the shift for Road to Pump position. Two (2) green lights to be located in the truck driving compartment and one (1) green light on pump operator's panel adjacent to the throttle control.

All lights to have appropriate identification/instruction plates.

PUMPING INTERLOCK

An interlock system will be provided to ensure that the pump drive system components are engaged in the pumping mode of operation so that the pumping system can be operated from the pump operator's position.

PUMP PRESSURE CONTROL SYSTEM

The apparatus will be equipped with a Fire Research "PRO" pressure governor in place of a standard pressure relief valve. The pressure will include an integral control head which will display either pressure or engine RPM as selected. The control head will also include "Preset" and "Idle" buttons.

When operating in "pressure" mode, the governor will maintain a constant pump discharge pressure. The discharge pressure is monitored and compared to the selected pressure setting, the engine RPM is varies to keep the discharge pressure at the selected setting.

When operating in "rpm" mode, the governor maintains a constant engine rpm. The pump discharge pressure is monitored, it can vary but will be limited to an increase of 30 psi. If the discharge pressure increases 30 psi, the pressure governor will automatically lower the engine rpm to reduce the discharge pressure.

ELKHART SUCTION RELIEF VALVE

An Elkhart Model 40 intake relief valve system will be plumbed on the suction side of the pump to comply fully with NFPA-1901 requirements. Excess pressures will be discharged to the right side running board with a 2 1/2" NST adapter to route discharged water away from the pump operator's station.

PRIMING PUMP - OIL LUBRICATED

The priming pump will be a **Hale** positive displacement vane type primer, electrically driven.

One priming control will open the priming valve and start the priming motor.

The primer system will have a translucent oil reservoir mounted on the inside of the PASSENGER side pump panel area

A vertical viewing slot will be provided in the pump panel for checking the fluid level in the reservoir.

The **Hale** primer will be activated by a manual valve located on the pump operator's panel. The valve will activate the primer motor, which will create a vacuum. Valve actuation may be accomplished while the main pump is operational, if necessary to assure complete prime.

ANODE BLOCKS

Two (2) **Hale** anode blocks will be provided in the pump manifold to protect the pump from corrosion. A bolt in anode block will be provided in the suction and discharge side of the pump manifold.

PUMP MOUNTS

Extra heavy duty pump mounting brackets will be furnished. These will be bolted to the frame rails in such a position to perfectly align the pump so that the angular velocity of the drive line joints will be the same on each end of the drive shaft. This will assure full capacity performance with a minimum of vibration. Mounting hardware will utilize Grade 8 bolts.

PUMP MODULE

The pump module will be a self-supported structure mounted independently from the body and chassis cab.

The design must allow normal frame deflection without imposing stress on the pump module structure or side running boards.

The pump module will be a welded frame work utilizing structural steel components properly braced to withstand the rigors of chassis frame flex.

The pump module will be bolted to the frame rails at four (4) points.

APPARATUS VALVES

All 2" or larger in-line suction and discharge valves will be full flow, drop-out style, to simplify servicing.

Valves will be Akron Brass series #8800 chrome brass ball series with "Tork-Lok" feature.

All 1-1/2" valves and smaller will be Akron #7800 series valves.

All 3" or larger discharge valves will be **Akron** valves equipped with a "**Slow CLOZ"** option which decelerates the opening and closing of the valve to comply with NFPA-1901 requirements (Unless otherwise specified).

3" LDH DISCHARGE VALVE CONTROL

The 3" Akron ball valve on the PASSENGER side 3" discharge will be equipped with an Akron #9303, "Navigator " electric valve control at the operator's panel.

The control will be of current limiting design, requiring no clutches in the motor.

Two (2) momentary open and close booted switches will be provided in a sealed control case made of brass material.

The controller will have individual red, yellow and green long life LED with light pipes for maximum visibility.

The valve control must be provided with a five year warranty.

PIPING (STAINLESS STEEL)

All piping will be heavy duty, 10 gauge 304, stainless steel pipe with N.P.T. threads, victaulic groove or weld connections. Also, in order to minimize friction loss, only sweep type elbows will be used. Where vibration or chassis flexing may damage or loosen piping, all plumbing exiting the pump enclosure area will be equipped with victaulic or rubber couplings as necessary.

Wherever threaded joints are used, the sealing compound will be of the non-hardening type to insure ease of removal for repair or replacement of couplings.

All piping will be subjected to hydrostatic test consisting of pressurizing the entire pump and valves, including suction lines. Following the pressure test, a vacuum test will be applied to the entire pump and valves. This test consists of developing 24 inches of vacuum and holding that vacuum for 10 minutes while not losing in excess of 10 inches of vacuum.

MASTER DRAIN VALVE

A rotary type, 12 port master drain valve will be provided and controlled at the lower portion of the side pump panel. The valve will be located in pump compartment lower than the main body and connected in such a manner as to allow complete water drainage of the pump body and all required accessories. Water will be drained below the apparatus body and away from the pump operator.

INDIVIDUAL BLEEDERS AND DRAINS

All lines will drain through either the master drain valve or will be equipped with individual drain valves, easily accessible and labeled.

One (1) individual "CLASS ONE" quarter turn drain valve will be furnished for each 1-1/2" or larger discharge port and each 2-1/2" gated auxiliary suction.

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

All drains and bleeders will discharge below the running boards.

SUCTION INLETS:

PRIMARY INLETS

Two (2) 6" N.S.T. suction inlets will be provided, one on the left pump panel and one on the right pump panel.

A removable strainer and a chrome plated long handle cap will be installed on each.

2-1/2" AUXILIARY SIDE SUCTIONS

All 2-1/2" auxiliary suction valves will have a removable strainer, chrome plated, 2-1/2" NST female swivel, with a chrome plated plug and retaining chain.

All side 2-1/2" gated inlet valves will be recess mounted behind the side pump panels or body panels.

2-1/2" auxiliary **SUCTIONS** will be located as follows:

- One (1) left side pump panel, to the rear of the main inlet and controlled at the valve.

TANK TO PUMP

One (1) 3" tank to pump line will be, piped through the front bulkhead of the tank with a 90 degree elbow down into the tank sump.

This line will be plumbed directly into the rear of the pump suction manifold for maximum efficiency.

A 3" full flow in-line ball valve and a check valve will be provided to prevent accidental pressurization of the water tank through the pump connection.

Connection from the valve to the tank will be made by using a non-collapsible flexible rubber hose.

A control handle will be located on the operator's panel with function plate.

DISCHARGES:

TANK FILL

One (1) 2" gated full flow pump to tank refill line controlled at the pump panel will be provided. A deflector shield inside the tank will be furnished.

Tank fill plumbing will utilize 2" Aeroquip hose for tank connection to accommodate flexing between components.

PRIMARY DISCHARGES

Two and one-half (2-1/2") inch or larger discharge outlets will be provided to discharge the rated capacity of the pump in accordance with NFPA-1901.

Each discharge will be controlled from the operator's panel.

The main pump side discharges will be plumbed directly from the pump discharge manifold utilizing direct connect discharge valve flanges.

The valves will be equipped with integral, 30 degree, chrome plated "droop snoot" male outlets.

All discharges will have chrome plated caps and retaining chains.

- Two (2) 2-1/2" at the left side pump panel.

- One (1) 3" at the right side pump panel.

- One (1) 2-1/2" at the right side pump panel.

FRONT BUMPER DISCHARGE

One (1) 2-1/2" NST discharge will be plumbed to the **left** side of front bumper extension with 2-1/2" piping and valve, which will be controlled from the pump operator's panel.

Flexible, high pressure hose will be utilized to plumb the discharge from the valve to the hard piping located at the front bumper.

The discharge will terminate with a 2-1/2" NST, 360 degree swivel located on top of the extended front bumper apron.

Automatic discharge drains will be provided at all low points in the plumbing.

AERIAL WATERWAY DISCHARGE

The 5" aerial waterway discharge will be gated at the pump by a 4" full flow ball valve.

The Akron ball valve will be equipped with an Akron #9303, "Navigator " electric valve control at the operator's panel. The control will be of current limiting design, requiring no clutches in the motor. Two (2) momentary open and close booted switches will be provided in a sealed control case made of brass material. The controller will have individual red, yellow and green long life LED with light pipes for maximum visibility.

The valve control must be provided with a five year warranty.

The piping from the pump to the rear of the vehicle will be 5" minimum 10 gauge stainless steel pipe.

The pipe will connect to the turntable waterway swivel and will also extend through the rear panel of the vehicle and terminate in (NST) thread with a long handle chrome plated cap above the rear tailboard. This connection will serve as the rear waterway inlet. The piping will be a minimum of heavy duty, schedule 10 piping which will incorporate a minimum of two (2) victaulic clamps for easy removal.

HORIZONTAL CROSSLAYS - TWO (2) 2" & ONE (1) 3"

The crosslay hose bed will be transverse, in three (3) sections and will be located above the pump enclosure for quick attack deployment.

The crosslay hose bed flooring will be removable slatted aluminum decking with a stainless steel scuff plate provided horizontally on each end.

The preconnected hose storage area will have a minimum total capacity of 3.5 cubic feet as required by NFPA-1901 to accommodate a minimum of 200 feet of 1 3/4" fire hose in each of the two (2) 1-3/4" crosslays and a minimum of 200 feet of 2-1/2" fire hose in the 3" crosslay.

Each 2" crosslay will be plumbed with 2" piping and equipped with a 2" valve and a 1-1/2" NST bronze hose swivel.

The 2-1/2" crosslay will be plumbed with 3" piping and equipped with an inline 3" valve and a 2-1/2" NST bronze hose swivel.

Each crosslay hose bed floor will be slotted to allow the swivel to extend up through, allowing the pre-connected hose to be pulled off either side of the apparatus without kinking the hose at the coupling connection.

An individual control and gauge will be provided at the operator's panel for each pre-connected hose storage area.

CROSSLAY HOSE BED COVER

A vinyl crosslay cover will be provided. It will be securely fastened at the front with snaps and velcro at the rear.

Weighted end flaps will be provided at each side of the crosslay.

The color of the cover will be red.

PUMP PANEL:

SIDE MOUNT LOCATION

The pump operator's control panel will be located on the driver side of the apparatus. The pump enclosure side panels will be completely removable and designed for easy access and servicing.

VALVE CONTROLS

All 1" or larger in-line valves will be controlled by chrome plated locking "T" handles connected with brass linkages to ½" Stainless Steel rods.

Control assemblies will be designed to permit easy operation and minimal distortion when opening or closing a valve.

Primary valve controls will be horizontal swing arm type unless otherwise noted.

PUMP PANEL MATERIAL

The left side operator's panel, gauge panel, right side pump panel and right side access door will be fabricated from 14 gauge 304L stainless steel with a #4, (150/180 grit), standard polished finish.

HINGED GAUGE PANEL

A full width hinged gauge access panel will be provided at the operator's position.

Chrome plated positive locks will be provided along with chain holders to prevent the front of the gauge panel from coming in contact with other panels when open.

HINGED PUMP ACCESS DOOR

A 16" high by a minimum of 30" wide pump enclosure access door will be provided above the right side pump panel.

This door will have a "D" ring, two-point latch mechanism and two (2) gas shock stay arms for ease of access.

PUMP ACCESS PANELS

Two (2) removable pump access panels will be furnished at the forward area of the pump enclosure accessed from the front when the cab is tilted.

Each access panel will be fabricated from 1/8" aluminum tread plate, bolted on to be removed for ease of access.

PANEL FASTENERS

Stainless steel machine screws and lock washers will be used to hold these panels in position. The panels will be easily removable to provide complete access to the pump for major service.

SIDE MOUNT OPERATOR'S PANEL LIGHTING

The operator's panel will be illuminated by using a minimum of four (4) Weldon LED clear lens lights under a polished stainless steel light shield.

The right side pump panel will be illuminated by using a minimum of four (4) Weldon LED clear lens lights under a polished stainless steel light shield.

The shields will be full width of control panel, and will be positioned to cover the lights and prevent glare.

One (1) light under the operator's panel light shield will be actuated when fire pump is engaged in addition to the pump engaged light.

PUMP PANEL TRIM PLATES

A brushed finish **stainless steel** trim plate will be provided around each discharge port and suction inlet opening to allow accessibility to the respective valve for service and repairs.

IDENTIFICATION PLATES

Identification plates will be provided for all gauges, controls, connections, switches, inlets and outlets.

Plates will be engraved and color coded polymer material for durability and accurate identification of controls.

PUMP OPERATOR'S PANEL

Particular attention is to be given to functionally arranging all controls. The pump operator's panel will accommodate the following:

Hinged gauge panel
Water tank fill valve
Auxiliary suction valve control
All discharge valve controls
Auxiliary engine cooler controls
Water tank suction control valve
Pump primer valve
Engine throttle control
Master compound vacuum gauge
Master pressure gauge
Individual discharge gauges
Pump shift engaged indicator light
Water tank water level indicator
Engine tachometer
Engine oil pressure gauge with audible alarm
Engine water temperature gauge with audible alarm
Low voltage light and audible alarm
Pump panel light switch
Vacuum & pressure test plugs (Underwriters)

Speed counter (Underwriters)
Pump performance plate (Underwriters)
Pump serial No. plate
Master pump drain valve
Individual drains
Voltmeter
Air inlet/outlet at lower left hand panel
Fuel Gauge
Aerial Waterflow Meter
Aerial Communication System
Fire Research "Fire Pro" pressure governor control

PRESSURE & COMPOUND GAUGES

All pressure and compound gauges to be **"No Shok"**, silicone filled.

The gauge faces will be white with black numerals.

MASTER GAUGES

One (1) 6" diameter pressure gauge 30"-0-600 P.S.I. (labeled: "PRESSURE") and one (1) 6" diameter compound vacuum gauge 30"-0-600 P.S.I. (labeled: "INTAKE") will be provided.

INDIVIDUAL PRESSURE GAUGES

Each 1-1/2" or larger discharge will be equipped with an individual, 3-1/2" diameter 30"-0-600 P.S.I. pressure gauge.

FLOWMETERS

The apparatus will be equipped with Two (2) Fire Research Flow and Pressure Meter "FP-4000" which will give the operator or engineer an indication of actual volume of water (in gallons) being discharged through the specified line(s). The display will also be capable of showing discharge pressure without the need of pushing any buttons.

A 4 1/2" analog/digital display mounted on the pump panel in place of a standard pressure gauge. The display case will be constructed on non-glare black anodized aluminum, with bright red LCD digits to indicate flow, and a bright analog pointer to indicate pressure. A calibration slot will be provided on the rear face of the display to make field calibration easy.

A flow sensor paddle wheel will be installed on the discharge piping with a machined housing or clamp.

A pressure transmitter (transducer) mounted in the discharge piping. The pressure transducer will be installed downstream from the discharge valve to indicate pressure only when the valve is open.

A Fire Research Digital FlowMaster will be provided on the following discharge(s) in place of discharge pressure gauge(s):

- Aerial waterway discharge
- Right Side LDH Discharge.

ENGINE COOLER

An auxiliary cooler or heat exchanger will be installed in the engine compartment between the engine and the chassis radiator. The cooler will permit the use of water from the pump for cooling system. The cooling will be done without mixing engine and pump water.

ENGINE INFORMATION/WARNING SYSTEM

The pump operator's panel will be equipped with a **Fire Research TachPRO** to monitor engine functions.

The TachPRO will display RPM, Battery Voltage, Engine Oil Pressure, Engine Coolant Temperature and Pump Hours.

The TachPRO will provide audible warnings for Low Voltage, Low Engine Oil Pressure and High Engine Coolant Temperature.

TANK LEVEL GAUGE

An Innovative Controls model 1400MW water level monitor will be provided. It will contain fourteen (14) high intensity LED's on the display in an inverted "V" pattern allowing the full, 3/4, 1/2, 1/4 and refill levels to be easily distinguished at a glance. It will be maintenance free and field adjustable.

OPERATOR'S PLATFORM

A slide-out platform will be located below the **left** side running board step.

The platform will be constructed from 2" aluminum tubing with Grip-Strut material inserts.

The step will have a minimum weight rating of 500 pounds.

The step will slide on stainless steel pins fitted in a machined frame which will mount to the pump house frame.

BOOSTER TANK:

TANK CAPACITY

The booster tank will have a capacity of **300** gallons, constructed from UPF PolyIIE.

WARRANTY

The UPF PolyIIE water tank will be furnished with a lifetime warranty upon delivery.

CONSTRUCTION

The UPF PolyIIE water tank will be constructed from 1/2" thick PT2E polypropylene sheet stock. This material will be a non corrosive stress relieved thermo-plastic, natural in color, and U.V. stabilized for maximum protection.

The water and foam tank/s will be of a specific configuration and are also designed to be completely independent of the body and compartments. All joints and seams will be nitrogen welded and tested for maximum strength and integrity. The top of the booster 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" PT2E polypropylene (natural in color) and extend from approximately 4" off the floor to just under the cover. The longitudinal swash partitions will be constructed of 3/8" PT2E polypropylene (natural in color) 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 water between compartments. The partitions will be designed to provide maximum water flow. All swash partitions interlock with one another and are welded to each other as well as to the walls of the tank.

TANK LID

The tank cover will be constructed of 1/2" thick PT2E polypropylene, natural in color, and U.V. stabilized, to incorporate a multi three-piece design which allows for individual removal and inspection if necessary. The tank cover will be recessed 3/8" from the top of the tank and will be welded to both sides and longitudinal partitions for maximum integrity. Each one of the covers will have hold downs consisting of 2" polypropylene dowels spaced a maximum of 30" apart. These dowels will extend through the covers and become welded to the transverse partitions. This will assist in keeping the cover rigid under fast filling conditions. A minimum of two lifting dowels will be drilled and tapped 1/2" of 13" to accommodate the lifting eyes.

TANK FILL TOWER

The tank will have a combination vent and manual fill tower. The fill tower will be constructed of 1/2" PT2 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 unless otherwise specified be the purchaser in Special Provisions. The tower will have a 1/4" thick removable polypropylene screen and a PT2 polypropylene hinged type cover.

OVERFLOW AND VENT PIPE

The fill tower will be fitted with an integral 4" I.D. schedule 40 P.V.C. combination overflow/vent pipe running from the fill tower through the tank to a 4" coupling flush mounted into the bottom of the tank to allow water to overflow below the aerial body.

TANK SUMP AND CONNECTIONS

There will be one (1) sump standard per tank. The sump is a minimum of 8" wide, 8" long and 7" deep with a 3/4" bottom and is located in the center front bottom of the tank, unless specified otherwise in special provisions. The sump will have a minimum of 3" threaded plug located at the bottom for a tank drain. An anti-swirl plate will be mounted inside the sump approximately 1" off the floor of the sump.

OUTLETS

There will be two (2) standard tank outlets; one for tank-to-pump suction line which will be a minimum of a 3" coupling and one for a tank fill line which will be a minimum of a 2" N.P.T. coupling. All tank fill couplings will be backed with flow deflectors to break up the stream of water entering the tank.

TANK MOUNTING

The tank will rest on the body crossmembers spaced a maximum of 22" apart, and will be insulated from these crossmembers with a minimum of 3/8" nylon webbing or 1/2" rubber, 2-1/2" wide. The tank will sit cradle-mounted using four (4) corner angles of 6 x 6 x 4 x .250 welded directly to the body crossmembers. The angles will keep the tank from shifting left to right or front to rear. The tank is designed on the free-floating suspension principle and will not require the use of hold downs. The tank will be completely removable without disturbing or dismantling the apparatus body structure. A tread plate enclosure on top of the tank the will secure the tank in the mounts.

BODY AND COMPARTMENT SPECIFICATIONS:

GENERAL

It is the intention of the fire department to purchase a completely modular body consisting of independent body modules or subassemblies bolted to an independent heavy duty support framework.

The following body portions of these specifications outline the minimum standards of construction required by the fire department to meet this need.

To ensure the customer of soul source manufacturing, the body must be built by the same manufacturer of the entire chassis and aerial device.

COMPARTMENT FABRICATION - 1/8" ALUMINUM

All compartment panels and body side sheets will be entirely 1/8" aluminum (Grade 5052-H32).

Each side compartment assembly will be both plug welded and stitch welded to ensure proper weld penetration on all panels while avoiding the warpage caused by a full seam weld. The side compartments will be welded on a fixture to ensure true body dimensions and squareness of all door openings. All compartments must be modular design with sweep-out style floors.

To further ensure maximum strength and durability, each compartment box will be formed primarily from a single piece of material, broken at all four corners, with the top, bottom and door sill plates being the only welded portions of the compartment module. The side compartments and body side panels are then set into a body squaring fixture where the super structure is installed and the entire body is aligned to be completely symmetrical.

Each compartment will be bolted to the subframe using minimum 1/4" stainless steel bolts and ESNA type reusable self-locking nuts, or equal.

Each compartment will be easily removable by unbolting with the use of hand tools in order to keep maintenance costs to a minimum and ensure easy, fast replacement of worn or damaged body parts.

The bottoms of each running board compartment will be adequately braced to provide maximum loading without undue deflection.

All seams will be caulked prior to finish paint to ensure proper compartment seal.

Due to the ladder storage area and sweep out floors, the running board compartments of this style vehicle are of a split height, split depth, full width configuration. The referenced compartment sizes approximate the extreme outside compartment dimensions without deductions for the floor material thicknesses, flanges or ladder storage compartment headers.

When hinged beveled overlapping doors are utilized, a 1/2" outward return break will be provided around the entire compartment door opening to form integral drip protection and a permanent installation channel for the rubber door seal gasket material.

To assure proper vehicle weight distribution, the compartment dimensions may change in width with the final body shift and wheelbase.

SUBFRAME

Due to the greater weld strength and endurance limits of steel, the apparatus body will be supported by means of a steel subframe.

It will be constructed using structural 3/16" x 3" channel, 1/4" x 2" angles, and /or tubing and be adequate in strength to support the compartments and running boards without undue deflection or flexing.

The center ladder storage area framework will also be constructed using structural channels, angles, and/or tubing. This framework will be supported by the aerial device torque box and chassis frame rails.

The subframe will extend the full length of the body.

The entire subframe assembly will be properly cleaned and coated with an epoxy base zinc rich primer to seal the steel and prevent rusting or galvanic corrosion of the frame.

HARDWARE

All exterior hardware used for holding panels or tread plate will be stainless steel. All fasteners will be equipped with a lock-nut or lock washer and will also be coated with "Lock-Tight" material.

NOTE: The use of aluminum pop rivets or self tapping screws as a trim fastener will not be acceptable.

LOCKER COMPARTMENT

A locker compartment will be provided, one (1) each side to the rear of the cab, measuring 14" wide x 54" high x 16" deep with a door opening of 10" wide x 50" high.

The compartment will be mounted to the chassis frame rails at the front and rear of the compartment.

Each compartment will be equipped with an access panel located on the rear wall to provided access to the area behind the locker compartment.

DRIVER SIDE COMPARTMENTATION

One (1) vertically hinged door, full height runningboard compartment ahead of rear wheels, measuring 32" Wide x 70.5/29.5" High x 27/14" Deep, with a door opening of 28" Wide x 67.5" High.

One (1) vertically hinged door, runningboard compartment behind rear wheels, ahead of the rear outrigger, measuring 31" Wide x 34.5/16" High x 24/11" Deep, with a door opening of 27" Wide x 32.5" High.

One (1) runningboard compartment behind the rear outrigger measuring 24" Wide x 34.5/29.5" High x 27/14" Deep, with door opening of 20" Wide x 32.5" High.

One (1) horizontally hinged, high side compartments above the rear wheels, measuring 65.375" Wide x 33" High x 14" Deep, with a door openings of 61.375" Wide x 30" High.

One (1) horizontally hinged, high side compartments above the front outrigger, measuring 29.375" Wide x 33" High x 14" Deep, with a door openings of 25.375" Wide x 30" High.

Two (2) horizontally hinged, auxiliary compartments below the turntable and over the rear outrigger measuring 63.875" Wide x 17" High. Depth will vary between 11" and 14" as the compartment will be fitted around the torquebox pedestal base structure. The compartments will be equipped with a door opening measuring 58.875" Wide x 14" High. (When a hose chute is required for the driver side, the chute will discharge through the top half of the compartment).

OFFICER SIDE COMPARTMENTATION

One (1) vertically hinged door, full height runningboard compartment ahead of rear wheels, measuring 32" Wide x 70.5/29.5" High x 27/14" Deep, with a door opening of 28" Wide x 67.5" High.

One (1) vertically hinged door, runningboard compartment behind rear wheels, ahead of the rear outrigger, measuring 31" Wide x 34.5/16" High x 24/11" Deep, with a door opening of 27" Wide x 32.5" High.

One (1) runningboard compartment behind the rear outrigger measuring 24" Wide x 34.5/29.5" High x 27/14" Deep, with door opening of 20" Wide x 32.5" High.

One (1) horizontally hinged, high side compartments above the rear wheels, measuring 34.375" Wide x 33" High x 14" Deep, with a door openings of 30.375" Wide x 30" High.

One (1) horizontally hinged, high side compartments above the front outrigger, measuring 29.375" Wide x 33" High x 14" Deep, with a door openings of 25.375" Wide x 30" High.

Two (2) horizontally hinged, auxiliary compartments below the turntable and over the rear outrigger measuring 63.875" Wide x 17" High. Depth will vary between 11" and 14" as the compartment will be fitted around the torquebox pedestal base structure. The compartments will be equipped with a door opening measuring 58.875" Wide x 14" High. (When a hose chute is required for the officer side, the chute will discharge through the top half of the compartment).

HINGED COMPARTMENT DOORS

The compartment doors will be beveled overlapping type doors.

The outer door the skin will be fabricated from 3/16" thickness (Grade 5052 -H32) aluminum, which will be beveled 30 degrees on all four (4) side to add structural integrity to the door.

The door frame will be constructed from 2" x 1" x 1/4" "C" channel on all running board compartments and 1" x 5" x 1/8" channel for air pack or high side compartment doors. The channel will be cut with a miter at each corner to assure squareness and a clean inner door edge.

The door skin will be stitch welded internally leaving a clean edge around the door frame. Prior to paint, each door will be processed through a flat sanding machine to remove all high areas or imperfection on the door skin, this process will assure a smooth outer door surface and maximum paint adhesion.

Each inner pan will constructed from 1/8" aluminum material, which will be provided with a "Brushed" finish.

The brushed finish will allow the fire department to remove scratches from the inner door pan with sand paper or scuff pad.

Each inner door pan will be fastened to the door frame channels to provide a smooth, snag-free inner door surface.

The inner door pan on running board compartments (2") will enclose the latch and reinforcements completely, the pan be easily removable to access the enclosed latch mechanism.

HINGES

Hinges will be full length polished stainless steel piano type. The hinges will be mounted with stainless steel hardware.

DOOR SEALS

All enclosed storage compartment will be fully gasketed around the perimeter of the compartment edge with heat resistant, "closed cell neoprene sponge" weather stripping, to insure a water tight seal.

DOOR LATCHES

Door latches will be Eberhard #206 automotive type mechanism or equal. Latches will be stainless steel "D" ring style handles for ease of operation even with gloves on.

The blank door in a double door configuration will be provided with an internal two point slam paddle latch.

Dissimilar metals insulating gaskets will be placed between the door handles and outer door panels to prevent any electrolytic reaction between dissimilar metals to protect paint.

STAY ARMS

Eberhard gas shock type door hold open devices will be provided for each vertically and horizontally hinged door.

INNER DOOR PANELS

The inner door panels of each compartment door will be equipped with 1/8" brushed finished aluminum. Each panel will be fitted to the compartment door framework and will be equipped with adjustment slots for door hardware.

COMPARTMENT FLOORS

The compartment floors will be flush with door opening to provide a sweep-out design, also to provide an unobstructed door opening and permit easy cleaning of each compartment.

Compartments designed to set on running boards or with a lip at bottom of door opening, will not be acceptable.

COMPARTMENT TOPS

Compartment tops will be covered with 1/8" polished aluminum tread plate on both sides of the body.

The aluminum tread plate will have a flange downward, over the top of compartments to serve as a drip rail above the compartment doors.

ACCESS PANELS

Removable access panels will be provided in the lower running board compartments to access hydraulic components, electrical harnesses and the rear body mounts.

All access panels will be equipped with the same finish the compartment interiors will be required to have.

COMPARTMENT LOUVERS

Machine stamped ventilating louvers will be furnished in each compartment, and so located that water cannot normally enter the compartment.

A formed hat section will be bolted over each louver on the inside body wall to further prevent moisture from entering through the louver.

DRIP MOLDING

Compartment tops over all side compartments will be equipped with a flanged edge to provide protection against water run-off.

A secondary polished extruded aluminum drip molding will be provided between lower compartments and auxiliary high side compartments.

BODY TRIM

The body will be protected and covered with bright finished polished aluminum treadplate. The treadplate will be fastened with stainless steel hardware and will be coated with rubber type undercoating between the body panel and tread plate to protect from moisture. All edges will be sealed with silver, rubber caulking.

Polished aluminum tread plate will be provided at the following areas:

- All surfaces over the compartments or on top of body that will be necessary for personnel to walk or mount equipment
- Entire rear of body
- Entire front of body
- Below aerial turntable decking
- Top of the pump enclosure (optional)
- Cover over the water tank (optional)
- Cover over hydraulic tank
- Top of mid-ship compartment (optional)

REAR BODY PANEL

The entire rear of the body will be overlaid with 1/8" polished aluminum tread plate, which will extend the full width between body side compartments. This panel will be full height from the bottom of the body to the turntable. The rear panel will have two (2) openings to access the ground ladder storage area. Each opening will equipped with roll-up or hinged doors as specified in the ground ladder storage section.

OUTRIGGER COVER PANELS

Each outrigger opening will be covered by a panel mounted to the outrigger beam.

The panels will be fabricated from 14 gauge #8 finished stainless steel material.

Each panel will be adjustable up and down to help match the panel to the body lines.

The outrigger covers will be fabricated only as wide as the outrigger beam, to allow positioning of the outriggers between parked cars or in tight areas.

RUB RAILS

A 1" x 1" solid polished extruded aluminum rub rails will be bolted below each runningboard compartment.

The rub rails will be designed to bolt to the body from the bottom side of the compartment area, so as not to damage the body side panels on initial impact, also to provide ease of replacement.

To keep road debris build-up to a minimum and for ease in cleaning, the rub rails will be spaced away from the body with nylon spacers.

RUNNING BOARDS STEPS

The driver and officer running board steps will be fabricated of 3/16" polished aluminum tread plate.

The outside edge on each step will be fabricated with a double break, return flange.

The steps will be rigidly reinforced with a heavy duty support structure.

The running boards will not form any part of the compartment design, and will be bolted into place with a minimum 1/2" clearance gap between any panel to facilitate water runoff.

Grip-Strut anti-slip material insert will be installed in the driver side running board.

REAR TAILBOARD

Rear tailboard will be minimum of eighteen (18) inches deep.

The step will be fabricated from 3/16" polished aluminum tread plate, which will be reinforced by a structural frame bolted to the rear of the body.

The rear step will support the rear "A" frame turntable access ladder. The rear edge of the step will be designed to accommodate the rear clearance lights, recessed for protection in the step reinforcement channel.

REAR "A" FRAME LADDER

Two (2) turntable access ladders, one on each side, will be provided at the rear of the apparatus in an A-frame configuration.

The access ladders will be bolted to the rear body panel and the rear tailboard step, providing a sacrificial and completely replaceable rear body module.

The framework for the steps will be fabricated from 1/8" polished aluminum tread plate, providing a mounted surface for the rear light cluster and the outrigger controls.

A minimum of three (3) steps will be provided and will be fabricated from "Grip-Strut" anti-slip material with an extruded aluminum bullnoze welded on the front edge of each step, providing a non-slip surface on each step.

The steps will provide unobstructed access or egress to and from the aerial device turntable for safety of fire fighting personnel.

REAR DROP DOWN STEP

A drop down step will be provided at the bottom of each access ladder to keep stepping area to a minimum when the vehicle's outriggers are in operation.

The step will swing down into position and will be fabricated from "Grip-Strut" anti-slip material, which will be welded to framework fabricated from 1/2" aluminum.

A safety pin will be provided to secure the step in the stowed position.

Step will be alarmed thru the “Do Not Move Apparatus” alarm system.

HANDRAILS

All non aerial device handrails are to be 1-1/4" diameter ribbed aluminum extruded tubing or stainless steel, with chrome plated end brackets.

Locations will be as follows:

- One pair of grab handles on each corner of the turntable walking deck to assist climbing to the turntable.

- One full length rubber covered rail attached to the rear edge of each A-frame turntable access ladder. The rail will form a continuous loop at the top of each access ladder to assist climbing personnel as far as possible. The rear handrails are to be designed so they do not obstruct the ladder when operating over the rear of the vehicle at low angles of elevation.

- Three rubber covered turntable railings a minimum of 42" high as stated in the turntable section.

REAR WHEEL WELL LINERS

Fully removable, bolt-in, aluminum fender liners will be provided, the wheel well liners will extend from the outer wheel well body panel, into the truck frame.

Removable vertical splash shields, inward of the wheels, will be provided to give access to the hydraulic components.

The completely washable fender liners will be designed to protect the front and rear compartments and main body supports from road salts, dirt accumulation and corrosion.

REAR FENDERETTES

The tandem rear fenders will be equipped with easily replaceable, polished stainless steel fenderettes.

The fenderettes will be equipped with a rubber gasket molding between the body panel and the fender.

Integral welded crown type liners will not be acceptable.

AIR BOTTLE STORAGE COMPARTMENTS

A total of seven (7) SCBA air bottle storage compartments (8" high x 8" wide x 24" deep) will be inserted into the body fender area on a 5 degree pitch.

The compartments will be located with three (3) on the left side and four (4) on the right side of the rear body fender panels.

The lower portion of the compartments will be sprayed with Speedliner material to absorb shock and help secure the bottle.

Each storage compartment will be equipped with a polished stainless steel door.

MUD FLAPS

Heavy duty mud flaps will be provided behind the rear wheels.

REAR TOW EYES

Two (2) **chrome plated** tow eyes will be furnished on the rear of the vehicle. The tow eyes will be made from plate steel and will be bolted directly to the chassis frame rails with grade 8 bolts.

The tow eyes will be smooth and free from sharp edges, also will have a minimum eyelet hole of 2-1/2".

PRIMARY HOSEBED

A hosebed will be provided in the upper section of the body forward of the turntable. All surfaces of the hosebed will be free from all sharp objects such as bolts, nuts, etc., to avoid damage to fire hose.

PRIMARY HOSEBED FLOORING

Flooring to be constructed from extruded aluminum and be properly spaced for ventilation. The flooring will be smooth and free from sharp edges to avoid hose damage.

The hosebed floor will be removable to provide access to inner body framework.

SUPPLY HOSE CHUTE

The hose will be removed through a stainless steel hose chute located at the rear of the vehicle.

The hose chute will discharge through the top portion of the compartments below the turntable on the right side of the vehicle.

The chute will be deigned with a slide-out extension which will extend through the rear access ladder to allow the hose to cleanly discharge away from the rear of the vehicle.

The hose chute design will accommodate 5" hose and couplings.

PRIMARY HOSEBED COVER

A custom made heavy duty Hypalon hosebed cover will be provided and secured to the top body flanges by quarter turn snaps on the forward edge and Velcro material on the sides and rear of the cover.

The color of the cover will be red.

****** COMPARTMENT ACCESSORIES ******
ADJUSTABLE SHELVING

Compartment shelving will consist of 3/16" brush finished aluminum, with a 2" lip on all four (4) sides. Shelves will be vertically adjustable by mounting in heavy duty aluminum unistrut "C" channel tracking material, securely fastened to the compartment wall.

Adjustable shelves will be located as follows:

- Five (5) adjustable shelves will be provided and mounted as directed by the fire department.

250 POUND FLOOR MOUNTED ROLL OUT TRAYS

Floor mounted roll trays will consist of heavy duty Grant roller bearing, floor mounted, slide tracks with a minimum combined rating of 250 pounds, securely fastened to the compartment floor with 3/16" aluminum mounting angles. The tray will be fabricated from 3/16" brushed aluminum with a minimum 2" high flange on each of the four sides to assist in retaining the equipment stored on each tray.

Each tray will have the capacity of a 250 pound evenly distributed equipment load.

The 250 pound floor mounted roll out trays will be located as follows:

- Four (4) roll out trays will be provided and mounted as directed by the fire department.

ADJUSTABLE ROLL-OUT TRAY

Roll-out trays will consist of 3/16" brushed finish aluminum, with a minimum 2" lip on all four (4) sides. Trays will be mounted with roller bearing, locking, slide tracks to heavy duty angles attached to vertically adjustable aluminum uni-strut "C" channel tracking material, that will securely fastened to the transverse compartment walls.

The adjustable roll-out trays will be located as follows:

- Four (4) adjustable rollout trays will be provided and mounted as directed by the fire department.

DRI-DECKING

Dri-Deck brand floor material will be installed on all compartment floors. The Dri-Deck will be custom installed to provide a full floor coverage.

Flooring matting material will be provided on all specified shelves and roll-out trays.

The compartment flooring color will be black.

******* GROUND LADDER AND PIKE POLE STORAGE *******
GROUND LADDER STORAGE AREA

All ground ladders (except as noted) will be stored in the center of the aerial body.

One (1) bank of ladders will be stored on each side of the turntable pedestal center support, inside the center section of the body.

A horizontally hinged, beveled aluminum tread plate door will be provided for each bank of ladders at the rear of the vehicle.

The doors will be constructed from 3/16" aluminum tread plate with a 3/16" full length stainless steel hinge.

Two (2) Eberhard gas shock door holders will be provided on each door.

The doors will latch with an Eberhard #206 "D" ring handle.

PIKE POLE STORAGE AREA

Six (6) pike tubes will be provided.

They will be individual tube type holders, mounted in the ladder storage area (if space allows).

Each holder will be equipped with a spring type holder and will be accessible from the rear of the apparatus.

Each pike pole holder will be labeled to indicate the tube length.

110/220 VOLT A.C. ELECTRICAL AND GENERATOR SECTION:

110 VOLT ELECTRICAL SYSTEM TESTING

All line voltage wiring and permanently connected devices and equipment will be subjected to a dielectric voltage withstand test of 900 volts for one minute. The test will be conducted between live parts and the neutral conductor and between live parts and the vehicle frame with any switches in the circuits closed. The test will be conducted after all body work has been completed. The dielectric tester will have a minimum 500 VA transformer with a sinusoidal output voltage that can be verified.

Electrical polarity verification will be made of all permanently wired equipment and receptacles to determine that connections have been properly made.

OPERATIONAL TESTING

The apparatus manufacturer will perform the following operation test and will certify that the power source and any devices that are attached to the line voltage electrical system are properly connected and in working order.

The generator will be started from a cold start condition and the line voltage electrical system loaded to 100 percent of the nameplate voltage rating.

The following items will be monitored and documented every 15 minutes.

1. The cranking time until the generator starts and runs.
2. The voltage, frequency, and amperes at continuous full rated load.
3. The generator oil pressure, water temperature, transmission temperature, hydraulic temperature, and the battery rate charge, as applicable.
4. The ambient temperature and altitude.

The generator will operate at 100 percent of its nameplate wattage for a minimum of two (2) hours.

HYDRAULIC DRIVEN GENERATOR

The generator system will be an Onan model CMHG 15000 GenSet, PTO/Hydraulic, rated at 15,000 watts, 50/25 amps @120/240 VAC, single phase generator and will require a two pole 70 amp main breaker to be installed in the load center. The generator will maintain a 60Hz frequency between 850 and 3000 rpm.

The generator will consist of hydraulic motor, alternator, cooling fan and a heat exchanger in a stainless steel housing. The reservoir will be a 3 gallon hydraulic tank with an integral filter, gauge, temperature switch, breather and fill port.

The Onan display will be by FRC and will display Hz, voltage, amperage, oil temperature and hours.

The Onan limited warranty covers virtually everything except routine maintenance for the first five (5) years or the first 1000 hours of operation.

WIRING

The generator output conductors will be 4 gauge and the output conductors will be routed through non-metallic conduit 1" in diameter.

GENERATOR PTO

A hot shift PTO will be provided on the transmission for the Onan generator. The PTO will be controlled from the cab, which will include a PTO engagement switch and a PTO engaged indicator light.

GENERATOR LOCATION

The generator will be mounted above the pump enclosure on the right side.

Locating the generator greater than 144" from the main breaker panel may require the installation of an additional power disconnecting means.

LOAD CENTER

The generator output line conductors will be wired from the generator output connections to a Square D, model #QO120L125G breaker panel.

The breaker panel will be equipped with a properly sized main breaker using two (2) of the twenty (20) spaces which leaves a total of eighteen (18) available spaces.

The generator output conductors will be sized to 115% of the main breaker rating and shall be installed as indicated in the wiring section.

Eighteen (18) appropriately sized, 120 volt, circuit breakers will be provided.

The breaker panel will be located on the rear wall of the left upper compartment.

WIRING METHODS

Wiring/conduit will not be attached to any chassis suspension components, water or fuel lines, air or air brake lines, fire pump piping, hydraulic lines, exhaust system components or low voltage wiring.

All wiring will be installed at a minimum of 12 inches away from any exhaust piping and a minimum of 6 inches from any fuel lines.

All wiring will be securely clamped within 6 inches of any junction box and at a minimum of every 24 inches of run. All supports will be of nonmetallic material or corrosion protected metal. All supports will not cut or abrade conduit or cable and will be mechanically fastened to the vehicle.

All power supply assembly conductors, including neutral and grounding conductors, shall have an equivalent amperage rating and shall be sized to carry not less than 115% of the main breaker rating.

All Type SO or Type SEO cable not installed in a compartment will be installed in wire loom. Where Type SO or Type SEO cable penetrates a metal surface, a rubber or plastic grommet or bushing will be provided.

The installation of all 120/240 wiring will meet the current NFPA-1901 Standards.

WIRING IDENTIFICATION

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

GROUNDING

The neutral conductor of the power source will be bonded to the vehicle fame only at the power source.

The grounded current carrying conductor (neutral) will be insulated from the equipment grounding conductors and from the equipment enclosures and other grounded parts. The neutral conductor will be colored white or gray.

In addition to the bonding required for the lower voltage return current, each body and driving/crew compartment enclosure will be bonded to the vehicle frame by a copper conductor. The conductor will have a minimum amperage rating of 115 percent of the name plate current rating of the power source specification label.

CIRCUIT BREAKER/RECEPTACLE INSTALLATION

The system shall be installed by highly qualified electrical technicians to assure the required level of safety and protection to the fire apparatus operators. When multiple circuit are required, the circuits will be wired to the breaker panel in a staggered configuration to minimize electrical loads on each breaker or generator (leg) circuit. The wiring, electrical fixtures and components shall be to the highest industry quality standards available on the domestic market. The equipment shall be the type as designed for mobile type installations subject to vibration, moisture and severe continuous usage.

RECEPTACLE INSTALLATIONS

Any receptacle installed in a wet location must be a minimum of 24 inches above the ground and provided with an approved wet location cover. Wet receptacles may not be mounted at more than 45 degrees from vertical, nor can they be mounted in a face-up position.

- One (1) 110 volt, NEMA L5-20, 20 amp, Single twist-lock receptacle with weatherproof cover will be installed at each side of the of the rear wheel well panels. (Total of two (2))

  Both receptacles will require one (1) 20 amp, 110 volt circuit breaker to be installed in the load center.

- One (1) 110 volt, NEMA L5-20, 20 amp, Single twist-lock receptacle with weatherproof cover will be installed at each side of the of the rear body panel. (Total of two (2))

Both receptacles will require one (1) 20 amp, 110 volt circuit breaker to be installed in the load center.

ELECTRIC CABLE REELS – TWO (2)

Two (2) Hannay Model #ECR-1618-17-18, 110 volt, electric rewind cord reels will be provided and wired to the breaker panel.

The reels will be securely mounted and equipped with a rewind control adjacent to the reel.

CORD REEL LOCATIONS

One (1) electric rewind cord reel will be mounted above the pump enclosure on the DRIVER side one (1) will be mounted above the pump enclosure on the PASSENGER side.

Cord from each reel will spool thru a rectangular opening in the vertical side walls of the dunnage area with rollers provided at each opening for ease of cord control.

ELECTRIC CORD REEL ACCESSORIES

The circuit breaker used to protect any device attached to the cord reel will be sized to the smallest electrical connection used.

Two hundred (200) feet of Type SO yellow 10/3 heavy duty electric cable will be provided on each of the reels.

Two (2) NEMA L5-20R, 20 amp, three prong twist-lock receptacle(s) will be provided on the end of the cable.

ELECTRIC REEL ROLLERS

Two (2) four (4) roller assemblies will be provided at the horizontal opening in the dunnage area side wall areas. to result in unobstructed deployment and rewinding of the cable onto each reel.

Two (2) cable ball stop(s) will be installed on the cable to keep the cable end from passing through the roller assembly.

LIGHTING (Telescoping)

Two (2) Fire Research FOCUS, model #FC510 top mounted, pull up scene light, deployable in a full 360 degree rotation. The entire assembly shall be UL listed as Scenelight for Fire Service Use, manufactured by Fire Research. The tightening mechanism shall be of a twist lock (concentric ring) design, the use of a knob or latch to release the pole in order to raise and lower the telescoping portion of the pole will not be accepted.

The lights will be mounted above the pump operator's panel in the pump enclosure, one (1) each side.

Wiring used for the lighting shall be a minimum of 16 gauge three (3) wire cable that is properly supported and protected from damage.

Two (2) model S50, 500 watt light heads will require one (1) 120 V, 15 amp circuit breaker.

Each Fire Research light will be equipped with a 500 watt model S50, FOCUS™ lamphead. The small, low-profile lamphead shall be no larger than 3.5" high and shall actively direct 50 percent of the light from a quartz bulb onto the action area while still providing 50% illumination in the working area. The bulb shall be easily accessible through the front glass and frame. Changing the bulb should be easily done from the front of the lamphead. The glass and frame must be removable, held onto the lamp assembly by no more than four front screws.

PORTABLE QUARTZ LIGHTS - THREE (3)

Three (3) Fire Research FOCUS, model #FC700-S50, 500 watt portable quartz lights will be provided and mounted as directed by the fire department.

The lights will be equipped with a quick release type mount and an appropriate 120 volt L5-20 male plug and a weatherproof "on-off" switch on the light head.

One (1) 120 V, L5-20 20 amp receptacle will be provided and installed near the mounting position of each portable light fixture for a total of three (3) receptacles.

Each of the receptacles will require one (1) 20 amp, 120 V circuit breaker to be installed in the load center.

LIGHTING (Non-Telescoping)

Two (2) Fire Research FOCUS, model #FC570 top mounted, non telescoping with full 400+ turning ability (which can rotate horizontally 1 1/4 full turns) to eliminate blind spots and positive stop which will not allow wires to bind. The entire assembly shall be UL listed as Scenelight for Fire Service Use. The base will incorporate a self-adjusting friction brake so the light does not spin in transit and will be leak proof so as not to allow water to enter the compartment below its installation.

The lights will be mounted on top of the body as directed by the fire department, one (1) each side.

Wiring used for the lighting shall be a minimum of 16 gauge three (3) wire cable that is properly supported and protected from damage.

Each Fire Research light will be equipped with a 500 watt model S50, FOCUS™ lamphead. The small, low-profile lamphead shall be no larger than 3.5" high and shall actively direct 50 percent of the light from a quartz bulb onto the action area while still providing 50% illumination in the working area. The bulb shall be easily accessible through the front glass and frame. Changing the bulb should be easily done from the front of the lamphead. The glass and frame must be removable, held onto the lamp assembly by no more than four front screws.

Two (2) model S50, 500 watt light heads will require one (1) 120 V, 15 amp circuit breaker.

QUARTZ LIGHTS ABOVE PUMP SWITCHING

The quartz lights above the pump will be wired through the circuit breaker panel and switched from the breaker panel via the circuit breakers.

The control switches will be wired through low voltage relays to maintain 12 volt circuits on the pump panel.

FIXED QUARTZ LIGHTS SWITCHING

The fixed quartz lights will be wired through the circuit breaker panel and switched at the pump operator's control panel.

The control switches will be wired through low voltage relays to maintain 12 volt circuits on the pump panel.

PORTABLE QUARTZ LIGHTS SWITCHING

The portable quartz lights will be wired through the circuit breaker panel and switched at the cab dash or overhead.

The control switches will be wired through low voltage relays to maintain 12 volt circuits in the cab.

PAINT, PREPARATION AND FINISH:

The PPG Delta, Low V.O.C., polyurethane finishing system, or equal, will be utilized.

All exposed welds will be ground smooth for final finishing of areas to be painted. The compartments and doors are totally degreased and phosphatized. After final body work is completed, grinding (36 and 80 grit), and finish sanding will be used in preparation for priming.

Priming will be a two (2) stage process. First stage will be a coating with a two part component, self etching, corrosion resistant primer to chemically bond the surface of the metal for increased adhesion. Second stage will be multiple coats of a catalyzed, two component polyurethane, primer applied for leveling of small imperfections and top coat sealing.

All removable items, such as brackets, compartment doors, etc. will be painted separately to insure finish paint behind mounted items. All compartment unwelded seams exposed to high moisture environments will be sealed using permanent pliable caulking prior to finish paint.

The inside and underside of the complete body assembly will be painted job color prior to installation of the body on the chassis.

The interior of the compartments will be finish painted with **Zolatone # 20-63 Marble Stone** scuff resistant paint to provide a protective application over all of the compartment interior surfaces.

A clear coat protective coating will be applied to each compartment interior to provide maximum protection to the Zolatone finish.

The chassis frame rails, running gear, pump and plumbing will be painted with Polyurethane paint to match the body color codes prior to the installation of any air lines or electrical system to ensure serviceability.

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

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

The cab exterior will be finish painted by the chassis manufacturer to match the customer requested color.

A "Clear Coat" paint finish will be supplied to provide greater protection to the quality of the exterior paint finish.

The chassis wheels, (except polished aluminum wheels) will be painted job color with silver trim around the perimeter.

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

PAINT CODE/S

The paint shall match customer furnished paint code/s and layout. The paint code/s will be as indicated below:

PAINT TYPE

SINGLE COLOR: RED PAINT CODE #75381

PAINT TYPE:

TWO/TONE COLOR: WHITE PAINT CODE #2185

PAINT FINISH WARRANTY

The finish paint on the unit will be provided with a seven (7) year paint finish guarantee which will cover the finish for the following items:

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

Cracking or checking.

Loss of gloss caused by defective PPG Fleet Finishes which are covered by this guarantee.

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

RUSTPROOFING

The entire unit will be thoroughly rustproofed utilizing rustproof and sound deadening materials developed and field tested and applied to all of the manufacturer recommended application procedures.

Rustproofing will be applied during the assembly process and upon completion to insure proper coverage in all critical areas on the unit.

The following areas on the unit will be thoroughly rustproofed as a minimum:

A. The entire underside area of the cab
B. Internal areas of the cab support structure
C. Internal areas of cab sheet metal reinforcements
D. Internal areas of cab doors
E. Entire underside of firebody
F. All internal body areas which are not finished painted
G. Between overlaid dissimilar metals
H. Special attention to internal body and cab fender areas
I. Underside of rear step and side running boards

****** LETTERING AND STRIPING ******
GOLD LEAF LETTERING

The lettering and striping will be computer generated, **"Sign Gold"** genuine gold leaf, acrylic vinyl applique with a single black drop shadow.

Computer generated lettering and striping configuration have been developed to ensure symmetrical layout design and durability, which exceeds current hand applied gold leaf standards and provides economical replacement costs.

All lettering and striping will be clear coated with an acrylic enamel clear coat.

GOLD LEAF LETTERING SIZE AND QUANTITY

A maximum of forty-five (45) 3" letters / numbers with black shading / outline to be provided.

A maximum of forty-one (41) 10" letters / numbers with black shading / outline to be provided.

SCOTCHLITE STRIPE

A six (6") inch high "ScotchLite" stripe will be provided. The stripe will be applied on a minimum of 60 percent of each side of the unit, 60 percent on the rear of the unit and 40 percent on the front of the unit.

The ScotchLite stripe layout will be determined by the fire department.

Two (2) 1" ScotchLite stripes will be incorporated into the ScotchLite scheme to border the primary ScotchLite stripe on the top and bottom edges. Final layout of this configuration will be determined by the customer.

A custom designed fold effect will be incorporated into the ScotchLite scheme on the body. Final layout of this configuration will be determined by the customer.

The Scotchlite will be white in color.

REFLECTIVE LETTERING

Retroreflective scotchlite lettering will be provided in the following quantities on the apparatus with final layout to be determined at pre-build meeting:

Forty-four (44) 5" high reflective numbers / letters

Five (5) 12" high reflective numbers / letters

CUSTOM GOLD LEAF DECALS

Two (2) customized corner scrolls will be provided on forward cab door areas with Fire Department providing digital pictures of scrolls.

F. D. DOOR DECALS INSTALLED

Two (2) Fire Department supplied decals will be installed on cab doors in agreed upon locations.

STAY BACK 500 FEET SIGN

A reflective **"Stay Back 500 Feet"** sign with four (4) inch high letters will be mounted on the rear of the vehicle as directed by the fire department.

AERIAL LETTERING PANELS

Painted aluminum panels will be furnished on each side of the aerial device base section. The panels will be approximately 14" high X 144" long, which will be painted to match the aerial ladder paint color.

Scotch-Lite lettering will be furnished on the lettering panels mounted on the aerial base section.

The lettering will be approximately 12" high and will match the fire department lettering layout requirements.

MISCELLANEOUS EQUIPMENT:

LOOSE EQUIPMENT

The following items will be provided and shipped loose with the completed apparatus at the time of delivery:

RECHARGEABLE HANDLIGHTS

Four (4) Streamlight "LiteBox" rechargeable hand light(s) and 12 volt charger will be installed as directed by the purchaser. Charger will be wired to the chassis battery system.

WHEEL CHOCKS

Four (4) Zico model #SAC-44 folding wheel chocks will be provided and mounted as directed by the fire department.

GROUND LADDERS

The following **Alco-Lite** ground ladder compliment will be provided:

2 - Alco-Lite 35' two (2) Section PEL-35
1 - Alco-Lite 28' two (2) Section PEL-28
1 - Alco-Lite 20' Roof with Hooks PRL-20
1 - Alco-Lite 16' Roof with Hooks PRL-16
1 - Alco-Lite 14' Roof with Hooks PRL-14 (mounted in aerial)
1 - Alco-Lite 10' Folding FL-10
1 - Alco-Lite 14' Attic AEL-14 (mounted on compartment cap)

PIKE POLES

Six (6) pike poles will be provided in the following configuration:

2 - Six (6) foot pike poles with fiberglass handles
2 - Eight (8) foot pike poles with fiberglass handles
2 - Twelve (12) foot pike poles with fiberglass handles

SALES REPRESENTATIVE'S SUPPLIED ITEMS INCLUDED IN CONTRACT

TO: **KME FIRE APPARATUS OPERATIONS**

FROM: **SALES CONTRACT NO. _____** **DATED: _____**

This is to certify that the following items included in this Sales Contract are to be delivered direct by your Sales Representative, **JACK L. SLAGLE'S FIRE EQUIPMENT AND SUPPLY CO. INC.** that they have been in accordance with the contract.

QUANTITY	DESCRIPTION
One (1)	Pre-construction trip to the manufacturer including the salesman and three (3) customer representatives. This is Approximately 60-90 days after the contract is signed. Trip is to include airline tickets, food and lodging.
One (1)	80% inspection trip to the manufacturer including the salesman and three (3) customer representatives when the apparatus is being wired and tread plate is being installed. This is approximately three to four (3-4) weeks before the truck will be finished. Trip is to include airline tickets, food and lodging.
One (1)	Final inspection trip to the manufacturer including the salesman and three (3) customer representatives when the apparatus is finished. Trip is to include airline tickets, food and lodging.
One (1)	Delivery to Service Center of the completed apparatus. The customer will pick up the vehicle from the service center. The Dealer will instruct the customer on the proper operation of the vehicle.
One (1)	Dealer Preparation on Aerial Tower.
One (1)	Final clean up and detail on an aerial tower beofre delivery.
One (1)	Akron 6 lb. flat head axe with fiberglass handle
One (1)	Ziamatic #ZC-SQB-300-C 30" Quic-bar, chrome plated finish
One (1)	Zico or equal Irons Strap
Two (2)	1-3/4" x 72" double jacket fire hoses with 1-1/2" NST male x female light weight couplings
One (1)	2-1/2" x 72" double jacket fire hose with 2-1/2" NST light weight couplings
One (1)	Kochek piston intake valve, 5" locking storz x 6" NST female swivel, long handle, piston intake relief valve, aluminum construction
One (1)	"Warranty Value Package" for a Custom chassis with a aerial tower to include a In-Station Warranty Program on all fire apparatus provided by the Dealer. This warranty includes:

(1) In-Station Warranty repairs on all warranted items*
(2) Travel Time and Mileage is paid for by the Dealer
(3) One (1) In-Station "Preventative Maintenance" check to be performed mid-point of the 1st year warranty period.

* Items such as as the engine, Allison transmission, axles, alternator, brakes may have to be taken by the fire department to an Approved Warranty Repair Service Center to be repaired under warranty. The dealer will work with the department to coordinate the appointment with the warranty center.

One (1) Installation of all items marked with an (**)

NOTE: THE ONLY MOUNTING BRACKETS THAT WILL BE FURNISHED ARE THE ONES THAT ARE SPECIFIED IN THIS PROPOSAL.

FIRE DEPARTMENT: _____

SIGNATURE: _____

DATE: _____

102' AERIAL LADDER/PLATFORM DEVICE:

GENERAL INFORMATION

The aerial ladder/platform assembly will be a three (3)section telescoping steel ladder, aluminum platform, pre-piped waterway, steel turntable, torque box and outriggers.

INTENT OF AERIAL SPECIFICATIONS

The intent of these specifications is to describe a telescoping elevating ladder. It will consist of the true ladder type. It will consist of an aluminum **1000** pound capacity platform, three (3) steel ladder sections, a steel turntable, torque box and four outriggers.

The height of the unit will be **102'** and the horizontal reach will be **92'**.

DESIGN STANDARDS

The design criteria of the unit will be to create a structure and system that emphasizes safety, product reliability, and ease of operation. These criteria will be:

1. The hydraulic system will be designed so that if a failure of any component or assembly within the system occurs, a single point failure of the entire system will not occur.

2. The minimum ultimate design condition at the ladder base will be **11.1** million inch pounds.

3. All structure load supporting elements of the aerial ladder that are made of a ductile material, will have a design stress of not more than 50 % of the minimum yield strength of the material based on the combination of the live load and the dead load. This 2:1 structural safety factor meets the American National Standards Institute (ANSI) and the current National Fire Protection Association (NFPA) 1901 standard.

4. The aerial device will be capable of sustaining a static load one and one-half times it's rated platform capacity (live load), in every position in which the aerial device can be placed when the vehicle is on a firm and level surface.

5. The aerial device will be capable of sustaining a static load one and one-third times it's rated platform capacity (live load) in every position in which the aerial devices can be placed when the vehicle is on a slope of five degrees downward in the direction most likely to cause overturning.

6. All material and welds will have a fatigue life structural safety factor of 2:1. This will be derived from a fracture mechanics analysis for crack initiation and propagation of the material and welds for all operating temperature ranges and will take into account structure weight, payload, wind load, ice load, nozzle reactions, and dynamics. Since modern engineering technology accepts the fact that a large welded structure whose failure can lead to injury should be analyzed using this procedure.

7. All welds in the aerial device will be designed per the static and fatigue criteria of the American Welding Society No. D1.1-97. All aluminum welds will be designed per the static and fatigue criteria of the American Welding Society Standard No. D1.2-97.

8. Ladder deflections - The ladder will not deflect downward more than nine (9) inches with a rated platform load when the ladder is fully extended at 0 degrees elevation.

9. The aerial device will be capable of operating with a rated platform load in either of two of the following conditions:

   a. Conditions of high wind up to 50 mph
   b. Conditions of icing, up to a coating of .25" over the entire aerial structure.

   All of the design criteria must be supported by the following test data:

   1. Strain gauge testing of the complete aerial device.
   2. Analysis of deflection data taken while the aerial device was under test load.
   3. Accelerometer test to determine dynamic response during ladder operation.
   4. Accelerometer test to determine dynamic response during road travel.
   5. Material fracture mechanics testing.
   6. Weld fracture mechanics testing.
   7. Hydraulic component operating and burst strength testing.

AERIAL LADDER MOUNTING

The elevating aerial ladder turntable will be rear mounted thus providing the following vehicle benefits:

1. Improved mobility vs. Midship mounted units.
2. Greater positionability of the turntable for optimum reach at fire ground operations.
3. Increased compartmentation, hose load, water capacity in body, resulting from ladder being raised to clear the cab.
4. Shorter vehicle wheelbase.
5. Shorter overall length of vehicle.

HEIGHT AND REACH

The height of the unit will be a minimum of **102'** as measured by NFPA-1901 requirements, Section 20-7.2, which states, "The rated vertical height of the elevating platform assembly will be measured in a vertical plane from the top surface of the platform handrail to the ground, with the platform raised to its position of maximum elevation." The bidder will state the height of the unit as measured by NFPA-1901 standards.

The horizontal reach of the unit will be a minimum of **92'** as measured by NFPA-1901 requirements, Section 20-7.3, which states, "The rated horizontal reach of the elevating platform will be measured in a horizontal plane from the centerline of the turntable rotation to the outer edge of the platform handrail, with the elevating platform extended to its maximum horizontal reach." The bidder will state the height of the unit as measured by NFPA-1901 standards.

WELDMENT FIXTURES

To ensure exact tolerances between parts and part interchangeability, all weldments will be manufactured in fixtures. To further insure weld integrity in all weldments, the fixtures must be able to rotate to enable the weldment to be welded in the number 1 flat welding position resulting in maximum weld penetration in the welded material.

LASER BEAM

Prior to final welding, a **laser beam** will be utilized to assist in alignment of device components secured in the weldment fixtures. The laser will provide an exact line between components to ensure exact alignment of components before and after the final welding process.

MATERIAL STANDARD

The following standards for materials are to be used in the design of the aerial device. Materials are to be certified by the mill that manufactured the material. Materials that are certified or recertified by vendors other than the mill, will not be acceptable. Material testing that is performed after the mill test will be only for verification and not with the intent of "paper changing" the material classification.

HYDRAULIC SYSTEM

The hydraulic system will provide power to the entire aerial device as efficient as possible without the use of a hydraulic cooler.

A pressure compensated hydraulic axial piston pump will be provided which will be capable of operating under any rated platform load condition and aerial device position at normal engine idle or governor controlled fast idle. The hydraulic pump will be capable of generating sufficient flows to allow multiple aerial functions without significant loss of speed.

A hydraulic system relief valve as well as individual circuit relief valves will be provided to prevent damage to any function or circuit. The relief valve will have a stainless steel relief spring to ensure proper function and product reliability.

HYDRAULIC OIL RESERVOIR

A 67 gallon hydraulic oil reservoir will be provided to supply the needs of the hydraulic system.

A 2" gated suction line will be provided between the oil reservoir and the hydraulic pump.

The tank fill will be provided with a strainer screen and vent cap. Located near the fill cap will be a dip-stick for checking fluid levels.

The tank will be mounted in the top, front portion of the body.

The tank will be constructed from 10 gauge steel, which will be welded at all interior and exterior seams.

Before adding fluid the tank must be cleaned and free from all contaminants.

Suction and return ports are designed to SAE Straight Thread O-ring Specifications. These ports incorporate an o-ring seal rather than pipe threads.

HYDRAULIC HOSE, TUBING AND FITTINGS

All hydraulic steel tubing, hydraulic rubber covered wire braided hoses, and hydraulic fittings/adapters will have a minimum burst pressure rating of four times the operating pressure. Hoses and tubing will be properly sized to minimize heat build up during extended periods of operation. Hoses and tubing will be properly sized to minimize flow restrictions.

All hydraulic hose will have a tube and cover constructed of Nitrile elastomers and will have a braided/spiral wire reinforcement capable of maintaining a 4:1 safety factor in all areas of the hydraulic system. The hose will meet the appropriate SAE performance specifications: 100R2 or 100R12.

The manufacturer will implement the most efficient, leak-free, fluid connector design in the industry. The manufacturers entire aerial line has been certified as a Parker Genuine Parts design.

The connector system has been jointly designed by engineers from both the manufacturer and **Parker Hannifin** and incorporate the following design upgrades and advantages to the customer:

1. All hydraulic ports (manifolds, pumps, tank, etc) to elastomeric sealing technology;

    A. No pipe threads in the hydraulic system
    B. Sealing is done by O-rings with the mechanical holding power of straight threads.

2. All tube and hose connections to Parker Seal-Lok, O-ring face seal technology.

3. Sealing is done by o-ring with the mechanical holding power of straight thread.

4. Fittings are rated up to 6000 psi.

5. Drop-in design of Seal-Lok connectors allows for easier maintenance and assembly.

6. Fitting resist 200% over torque, with optimum vibration resistance.

7. Shaped fittings are machined from forged bodies for compact design and strength.

8. Fittings meet/exceed the performance and dimensional requirements of SAE J1453.

9. Minimized unnecessary fittings and adapters, streamlining the system.

10. Increased connector accessibility, making assembly and maintenance easier.

11. Standardized the connector system on the Aerialcat unit.

12. Incorporated pressure diagnostic system with Parker PD diagnostic test points into the connector design.

PARKER FACTORY TRAINING

All fluid connector assemblers are to be trained and certified in Dry Technology.

Training includes: proper handling, installation, torque requirements, troubleshooting, and quality control procedures of the fluid connector products.

LEAK-FREE GUARANTEE

An exclusive three-year leak free guarantee warrants the Seal-Lok, O-ring face seal connections to be leak-free for a period of three (3) year. See Parker Genuine Parts warranty booklet for more information.

DIVERTER VALVE

There will be an automatic electric over hydraulic three (3) position diverter valve located at the center rear of the apparatus. This diverter valve will divert hydraulic fluid to either the aerial ladder controls or the outrigger controls.

To prevent accidental operation of the ladder prior to the outrigger being set properly, the diverter valve will only allow hydraulic fluid to the outrigger controls until the outriggers are set properly.

To prevent accidental operation of the outrigger system during the aerial ladder operation the diverter valve will only allow hydraulic fluid to the ladder controls, when the aerial device is raised from the aerial travel support.

In the event of electrical failure the operator will be able to move the diverter valve to the ladder or outrigger position for continuous uninterrupted operation.

OUTRIGGER SYSTEM HYDRAULIC CONTROL VALVES

The outrigger cylinder system will be controlled by a **pressure compensated, proportional control valve** that is designed for parallel hydraulic circuit operations. The valve must be proportional type to provide the smoothest, precise operation of the outriggers.

This valve will be modular in design so that individual sections can be replaced in the field, rather than complete valve assemblies, thus reducing maintenance costs.

The valve housings will be made of high tensile cast iron for durability and the individual spools will be hard, chrome plated for long life and resistance to corrosion.

Each valve will be equipped with a heavy-duty electric solenoid for electric control of the outrigger from the remote operator's station and mechanical handles of ease in override operations.

The mechanical handles will be equipped with large knobs with integral labels inside each knob indicating the function of the handle.

The outrigger valves will be controlled by the IQAN control system.

Adjustments and troubleshooting will be accessible from the MDM display at the turntable control station.

LIFT, EXTENSION AND ROTATION HYDRAULIC CONTROL VALVE

The lift, extension, and rotation systems will be controlled by a **pressure compensated, proportional control valve**.

This valve will be of a modular construction that simplifies troubleshooting, minimizes downtime, and simplifies field service.

The main control valve will be positioned at the turntable control console for direct manual control of each aerial function.

Adjustments and troubleshooting will be accessible from the MDM display at the turntable control station.

Use of electrical controls at the main turntable control console will not be acceptable.

PRESSURE FILTER

The pressure filter shall be made of a micro glass medium, which has the highest capture efficiency, dirt holding capacity and life expectancy over other media such as cellulose and synthetic. The pressure filter will have a bypass circuit protected by a check valve, which will be installed around the pressure filter. The pressure line filter will be required even if a suction line filter is provided in the reservoir due to the suction line filter's inability to trap contaminates entering the system.

The pressure filter will have an absolute rating of ten (10) microns.

RETURN FILTER

The return filter shall be made of a micro glass medium, which has the highest capture efficiency, dirt holding capacity and life expectancy over other media such as cellulose and synthetic. The return filter will have a bypass circuit protected by a check valve, which will be installed around the return filter. The return filter will have a bypass circuit protected by a check valve, which will be installed around the return filter.

The pressure filter will have an absolute rating of ten (10) microns.

I-QAN MOTION CONTROL SYSTEM

The ladder, outrigger system and interlock systems will be controlled with the IQAN hydraulic motion control system. The IQAN system will provide state of the art controls for the ladder, outriggers, auto-level and interlock systems. IQAN is an electro-hydraulic management system that monitors operator inputs from the control stations and converts this data to a usable electronic signal that controls hydraulic valve functions.

The turntable and platform control station will be equipped with a Master Display Module (MDM), which has programmed parameters for each aerial device function, which provide for proper machine operation and reduce the possibility of abusive operation. The number of wires required to connect the MDM module and control hardware is kept to a minimum through the use of IQAN serial CAN-bus data transmission technology. The CAN-bus modules are attached to each other using just two communication wires.

Each component of the IQAN system shall be proven, off the shelf components, which are available throughout the world. Proprietary hardware designs will not be acceptable due to the lack of parts availability and support.

The MDM module is also capable of monitoring engine and transmission J-1939 parameters and warns the operator if there are any conditions of the motion control system out of the set ranges. The MDM display has built-in troubleshooting and will allow troubleshooting and function history monitoring for the entire motion control system. The memory function allows a service technician to identify if these warnings were ignored or overridden. The overall maintenance and repair of the machine is simplified.

The IQAN system will receive rotation information from an absolute encoder located on the rotation swivel. The encoder will provide absolute position of the turntable at any given position from 0° to 360°.

A MDM information center shall be provided at each aerial control station. The MDM display will allow the system to be diagnosed and calibrated without the need for separate controllers or computers.

The turntable and platform MDM displays will indicate the following information from four on-demand screens:

- Elevation Angle of the ladder
- Continuous Platform height from the ground to the top of the platform handrails. (Per NFPA requirements)
- Continuous Platform horizontal reach from centerline of rotation to the front edge of the platform floor. (Per NFPA requirement)
- Degree of rotation from centerline of vehicle
- E-Zone™ Cab avoidance warning
- E-Zone™ Body avoidance warning
- E-Zone™ Short jack warning
- Cradle alignment
- Rung Alignment
- Breathing air level monitoring
- Platform moment load monitoring

The turntable and platform MDM displays will indicate the following from automated warning/message screens:

- Cab and Body E-Zone™ Avoidance - "Reverse rotation or raise ladder"
- "Moment Load Exceeded"
- Short Jack E-Zone™ Left Side - "Reverse Rotation"
- Short Jack E-Zone™ Right Side - "Reverse Rotation"
- Ramp Down ladder control
- Pressure Filter Status - "Warning - Pressure Filter In By-Pass Mode"
- Return Filter Status - "Warning - Return Filter In By-Pass Mode"
- Breathing Air Level - "Below 50% Air Level"
- Breathing Air Level - "Below 35% Air Level", Amber indicator light displayed
- Breathing Air Level - "Warning - Below 20% Air Level", Red indicator light displayed with audible alarm
- Breathing Air Level - "Warning - 0% Air Level", Red Amber indicator light displayed with audible alarm

EMERGENCY HYDRAULIC PUMP SYSTEM

In the event of failure of the main hydraulic pump or vehicle engine, the unit will be equipped with two (2) emergency hydraulic pumps which will be parallel plumbed into the hydraulic system and be electrically driven from the chassis batteries.

The emergency pump system will be capable of limited functions of the ladder and outriggers to stow the unit.

The pumps will be controlled from both the right and left outriggers and turntable control stations with spring loaded momentary contact switches.

Each pump will have a separate hydraulic oil supply line, from the main supply line attached directly to the hydraulic oil reservoir.

A shutoff valve for each line will be provided and check valves will be incorporated on the pressure side of both pumps to ensure that one will continue to operate the ladder in the event the other fails.

Each pump will have high tensile steel shafts and gears with the shafts supported by needle bearings.

The cylinder plate and gears will be ground as a set to ensure exacting tolerances. Clearance will be maintained by a Mylar shim.

POWER TAKE OFF (PTO) 12 VOLT SWITCH

The apparatus will be equipped with a power shift PTO driven by the chassis transmission.

An indicator light will be located in the cab next to the PTO switch to show when the PTO is engaged.

The PTO will only engage with the parking brake applied and the transmission in neutral. If the unit is equipped with a pump, the PTO will be active if the transmission is in "Drive", only if the fire pump is engaged.

The PTO will be a heavy duty pressure lubricated and cooled unit for extended operations.

A master 12 volt "Ladder Power" switch will be provided adjacent to the PTO switch for control of all ladder 12 volt power, except the emergency pump circuit.

HOUR METER

An aerial hour meter will be installed in the cab adjacent to the ladder power and PTO control switches.

The hourmeter will be wired to the aerial PTO circuit to record hours of operation for the aerial.

The hour meter will aid in scheduling preventative maintenance as outlined in the operator's manual.

ENGINE FAST IDLE ACTUATOR

The fast idle actuator will be used to raise the engine RPM to a preset level for proper aerial operation. The fast idle switches will be located at the main outrigger control station and the aerial control station/s.

For the safety of personnel and equipment, the fast idle system will not activate unless the transmission is in neutral.

TORQUE BOX

A torque box will be provided to transfer all aerial loads and torque into the four outriggers, thus preventing the loads from being transferred through the chassis.

The torque box will consist of two (2) outrigger housing weldments connected by four 12" "C" channels with 3/4" reinforcing plates welded to the bottom of the channels and 3/8" reinforcing plates welded to the top of the channels, thus forming a single structural weldment for aerial load distribution among all the outriggers.

The unit will have a section modulus of 344 cubic inches, a torsional resistance of 1780 quadric inches and a 1688 quadric inches resistance to bending moment (RBM).

An open base will be designed to accommodate the storage of ground ladders as specified in the body portion of these specifications.

The torque box will be bolted to the chassis frame rails with forty two (42), 3/4" SAE grade 8 bolts and nuts.

This type of construction will be required for the following reasons:

1. Replacement of the chassis in the event of vehicle damage to this chassis.
2. Replacement of the chassis due to age.

OUTRIGGERS

Four (4) double box beam type out and down outriggers will be provided. The side to side spread of the outriggers will be 18' from centerline of the vertical jack beams. The outrigger system will be capable of leveling the vehicle, fore/aft and side to side.

The extension of the horizontal outrigger beam will be accomplished by a hydraulic cylinder which will have a 3" bore and 2" rod and 62" stroke. This cylinder will have cushion porting to reduce shocks in stopping the cylinder at full extension and retraction.

The horizontal outrigger beam will be fabricated from 1/2" steel side plates and 1" steel top and bottom plates.

For ease in maintenance, outrigger extension cylinder will be equipped with end connection, which do not require removal of body panels to remove pins or the extension cylinders.

Each outrigger assembly will have 2 Nylatron slide pads with a total square area of 24 sq. in. to provide smooth operation and to extend the life of the outrigger.

Each jack cylinder will have a 5" bore with a 3-3/4" rod and a 24" stroke. The jack cylinders will be equipped with integral (on the cylinder) holding valves, which will hold the jack cylinder in either the stowed position or the deployed position should a hydraulic line be severed at any point within the hydraulic system.

Each jack cylinder will also have a thermal relief system that will prevent the cylinder fluid pressure from rising due to fluid temperature increase.

The vertical jack cylinder rods will be fully enclosed by a telescopic inner steel jack box that will do the following:

1. Protect the cylinder rods against damage which may occur while on the fire ground.
2. Add lateral stability to the outrigger structure.
3. Provide a structure for installing safety pins.

Each vertical jack box will be equipped with a five position mechanical safety pin.

The safety pins will be a minimum of 1" in diameter and secured by a heavy duty chain to the outrigger beam.

JACK FOOT PADS

A permanently attached self-centering steel foot pad, 1/2" x 13.5" x 15.5" (209 sq. in.) will be provided on each vertical jack beam. Each foot pad will swivel longitudinal and require no adjustment during outrigger set-up.

The outrigger pad will be attached without the use of a bearing type swivel due to maintenance required on this design.

Four (4) auxiliary outrigger pads will be provided for additional load distribution, measuring 1/2" x 24" x 24" (576 sq. in.).

Each auxiliary pad will be fabricated of 6061-T6 high strength aluminum alloy and have a handle for easy use.

The auxiliary pad will be secured in mounts located below the body compartments.

OUTRIGGER/LADDER INTERLOCK SYSTEM

An interlock system will be provided between the outriggers and ladder that prevents the operation of the ladder until the operator places all jacks in the load supporting configuration.

Each outrigger will be equipped with a pressure sensitive switch that closes only when the jack is firmly in contact with the ground. Until all jack switches close, electrical power will not be transmitted to the turntable (hence preventing ladder operation).

A key controlled override switch will be provided at the central outrigger control station for emergency override of the interlock system.

A green indicator light will be provided on the outrigger control panel to indicate the position of the foot pad. Illumination of the indicator light indicates firm ground contact.

OUTRIGGER DEPLOYMENT WARNING ALARM

An outrigger deployment warning device will be provided to warn personnel in the vicinity of the apparatus that the outriggers are in motion. Whenever an outrigger control is utilized, the device will produce a pulsing tone, separate and distinctive from that of other audible warning systems provided on the apparatus. When the outrigger control is released to its neutral position, the signal will cease.

OUTRIGGER LIGHTING

Each outrigger will be equipped with the following light package:

1. One (1) double faced, 7" diameter, red flashing light mounted on the inside surface of the rear outriggers.

2. One (1) adjustable work light mounted under body to illuminate each outrigger foot pad area.

Both the flashing lights and the foot pad illumination lights will be energized by the ladder power circuit.

OUTRIGGER WARNING LIGHTS

One (1) Whelen model 60R00FRR-LED, 4-1/8" x 6-1/2" red flashing LED light will be mounted on each of the outrigger cover panels, for a total of four (4).

The light will be equipped with a chrome plated flange (6EFLANGE).

The outrigger warning lights will be energized by the ladder power circuit.

OUTRIGGER SCOTCHLITE

Yellow ScotchLite material will be furnished on both sides of the horizontal and vertical beams of the rear outriggers.

Decals reading **"PULL PINS"** will be provided on the rear of the outriggers beams to help the operator stow the outriggers.

OUTRIGGER CONTROLS

Two (2) illuminated electronic outrigger control stations will be provided on the rear of the apparatus, one on each side of the "A" frame ladder.

The control switches will be enclosed in a casted aluminum housing with an aluminum door, to protect each control from damage or accidental movement.

The controls will be located such that the operator can see the outrigger he is operating.

Out and down outrigger control functions for each outrigger will be operated independently, so that vehicle may be set up in restricted areas or on uneven terrain. The diverter valve override control will be mounted at the center rear hydraulic area behind the hinged outrigger control panel.

A hinged stainless steel, central outrigger control panel will be provided at the rear center of the body, which will incorporate a formed polished stainless steel light shield. The rear panel will be equipped with a stainless steel hinged, which will allow the operator to access the diverter valve manual override control, outrigger manual override controls, the electrical system back-up switch, and the rotation safety system reset button.

The central outrigger control station will incorporate the following:

-Eight (8) outrigger set indicator lights
-One (1) ladder power indicator lights
-Rotation safety system override
-Fast idle switch
-Emergency pump control button with red indicator light
-Override key control with indicator light
-Panel light switch
-Warning decals
-Hydraulic test ports
-Computerized Automatic Leveling Control System Controls

E-CUSH™ COMPUTERIZED OUTRIGGER LEVELING SYSTEM

The outrigger control system will incorporate E-Cush™ technology to provide **Computerized Self Leveling System**, in addition to standard outrigger controls. **The E-Cush™ auto-level system will be controlled by the IQAN motion control system.**

The computerized system will assure full outrigger extension, proper jack penetration for safe operation of the aerial device.

A control panel for the auto level will be located centered above the main outrigger control panel at the rear of the vehicle. The control panel will include the following:

- "Automatic/Manual" selector switch
- "Extend Outriggers" control switch
- "Outriggers Extended" indicator light
- "Level Truck" control switch
- "Truck Level" indicator light
- "Lower Truck" control switch
- "Ladder Operation" indicator light
- "Stow" control button
- "Emergency Stop" control switch
- Four (4) individual "Automatic/Manual" selector switches

Operation of the system will be in the following sequence:

1. Select "Automatic" mode on the Automatic/Manual selector switch.

2. Activate the "Extend Outriggers" button and pause until the "Outriggers Extended" light is illuminated. (Be sure the area around the outriggers is clear of personnel or obstructions)

3. Place the outrigger auxiliary foot pads into position.

4. With the jack clear of obstruction activate the "Level Truck" button which will extend the jack beam to full stroke and level the truck in a few seconds. When the truck is level, the "Truck Level" and the "Ladder Operation" indicator lights will illuminate.

5. Once the truck is level, activate the "Lower Truck" button until the truck is at t he desired height.

6. Install outrigger safety pin in each jack and proceed with aerial operations.

The system will automatically stow the outriggers if desired by the operator.

To activate the "Stow" function, the ladder will need to be in the cradle and the outrigger safety pins must be pulled from the jacks. When the operator activates the "Stow" button, the outriggers will lower the truck to the ground (retracting the jacks), the system will pause for ten (10) second, then retract the outriggers to their full nested position.

OUTRIGGER LEVEL

A bubble type leveling device will be provided at the rear of the apparatus to assist in the aerial device setup.

This device will be mounted in the center of the rear body panel and will be at eye level to the operator.

The leveling device will be color coded indicating the following conditions:

Green-----safe operating zone.
Yellow----caution operating zone.

Since use of this leveling device is of a critical nature, it will have a serialized number from it's manufacturer to indicate documented quality control.

In addition to the side to side level, a bubble type leveling device will be provided at the rear of the apparatus to assist in fore and aft leveling of the device. This device will be mounted on the side of the left "A" frame ladder step at the rear of the body and will be at eye level to the operator.

TURNTABLE/TURNTABLE DECK

The turntable will be a fabricated steel weldment designed for the rotation and elevation of the ladder sections and platform. It will consist of the following:

- A 50-1/2" x 61" x 1" steel bearing plate and matching top plate that will be machined to insure proper fit to the rotation bearing. Manufacturers that do not mill both bearing surfaces will not be acceptable.

- A 94" W x 104" L octagonal, aluminum tread plate deck that will cover the entire turntable frame, providing a large walking surface around the ladder. It will have a 1.5" downward flange on all four (4) sides.

- An aluminum tread plate access step mounted near the heel of the ladder to provide easy access to the ladder from the turntable deck..

- Turntable safety handrails mounted at the rear and sides of the turntable. The handrails will be 1.25" diameter polished finish grade 304 stainless steel tubing with an extruded finned rubber grip covering and the joining fittings will be polished chrome plated tees and ells. All rails will be a minimum of 42" high, no exceptions.

The turntable deck will be a free from obstructions as possible, due to the importance of this area when the vehicle is in a rescue mode. The turntable deck will allow easy access to the turntable even when the ladder is being operated over the rear of the vehicle.

Turntables with the drive motor or breathing air bottles mounted in any walking areas (front or rear) of the turntable will not be acceptable.

FAIL SAFE TURNTABLE RETENTION BOLTS

The turntable weldment will be designed to incorporate two (2) retention bolts. The bolts will be 1.25" diameter and will be constructed of heat treated high strength steel which meets military standard number 5000.

These bolts are required as a safety feature to support the ladder in the unlikely event of a weld failure on the turntable.

CRADLE ALIGNMENT INDICATOR ARROWS

Stainless steel arrows will be provided on the turntable surface in view of the operator when standing at the turntable control station. The arrows will assist the operator in indicating the alignment of the aerial ladder with the ladder travel cradle.

The indicators will be overlaid with white ScotchLite material and suitably illuminated for nighttime operation.

TURNTABLE MANSAVER BARS

Two (2) Fire Research model #MS11A- 34, "ManSaver" safety bars will be provided at the turntable handrail opening at the rear of the turntable.

The "ManSaver" bars will be padded with yellow vinyl covers that will open in two (2) directions, in and up to provided additional safety at the turntable walking areas.

The safety bars will be mounted to the turntable handrails with MS22 mounting brackets.

HYDRAULIC, ELECTRIC AND WATER SWIVEL

Hydraulic power to the turntable hydraulic circuits will be provided through a three port, high pressure, hydraulic swivel that permits 360° of continuous turntable rotation.

Electrical power to the turntable electric circuits will be provided by a collector ring assembly. The collector rings will be used for electrical ground, ladder control functions, and a 110 volt AC system during 360° of continuous turntable rotation. The collector ring assembly will have a minimum of **32** circuits.

Water will be transferred to the aerial waterway by means of a five (5) inch water swivel enabling 360° continuous rotation of the turntable.

ENCODER

The swivel will be designed with an integral absolute encoder to provide a continuous output indicating the position off the turntable at any given time.

The encoder will be designed to indicate position of the turntable even if power interruption occurs.

LADDER SECTION CONSTRUCTION

The elevating platform will consist of three (3) steel ladder sections referred to as the base section, mid section and fly section.

The design and construction criteria for these ladder sections will be:

1. Each section will be fabricated using high strength steel, welded together to form a structural unit.

2. All welding will be done by welders that have been certified in accordance with the American Welding Society Standard specifications.

3. Each ladder section will be constructed in an assembly fixture to ensure uniformity and interchangeability.

4. K-bracing at each rung will be utilized to minimize side deflection of the ladder.

5. All rungs will be 1-1/2" in diameter, spaced at 14" centers and be covered with serrated, replaceable rubber sheaths held in place with contact cement and metal clips for ease of replacement.

6. All rungs, K-braces, and diagonals will be positioned so that they are continuously welded to the ladder section.

7. All side rails will be protected from interior corrosion by coating the interior of the rail with a corrosion preventative film that meets military specifications number MIL-C-16173D.

Each rung will be equipped with a heavy duty serrated, replaceable rubber sheath to provide an anti-slip surface for fire fighting personnel. For additional safety, the covers will be construct from a soft rubber to allow ice buildup to easily break off when the rung is stepped on by fire fighting personnel. This will be an added safety feature during water tower operation in cold weather conditions.

Ladder designs that do not utilize rubber covers will not be acceptable due the high cost and difficulty to replace the anti-slip surface and the inability to provide a safe surface during icing conditions.

Ladder handrails and diagonal material are to be constructed from square or rectangular tubing, which provide a larger square inch welding surface were the materials are attached to each other. Use of round material is not desired due to less square inches of welding area associated with round materials.

BASE SECTION

Due to forces created by elevation and rotation, torsional or "twisting" movement is present in all aerial device designs.

To minimize the effect of this movement, the base section will have a box truss system underneath and in conjunction with the rungs. This will be accomplished by mounting 1" square tubing below and parallel to each base section rung and flush with the bottom of the side rails forming a space of 6" between the rungs and the tubing.

Additionally, two K-braces will be positioned side by side in a vertical position between the 1" square tubing and the bottom of the rung. This will be done a minimum of every fourth rung on the base section.

Each base rail for the base section will be formed structure to provide a full length integral channel for the mid ladder section to interlock to the base section.

The use of wear blocks or angles to interlock the ladder sections will not be acceptable.

To provide maximum overlap strength between the base and mid sections, a series of outer side wall reinforcements **(Force Distribution Members)** will be incorporated along the outer wall of the base section side rails on both sides.

A minimum of seven force distribution members will be provided. These member will serve to strengthen the side rail overlap area to prevent overlap failure. They will be equally spaced beginning at 81" from the end of the base section. Each member will be a minimum of 1/2" wide and will extend from the midpoint of the side rail to a point over the top inside edge of the side rail where it will join a formed channel welded on edge to the top inside edge of the base section side rail. All seven (7) members will be permanently welded on both sides of the members, to the base section side rail, the base section top edge and the top edge reinforcement channel.

The top edge reinforcement will have a minimum wall thickness of 1/4" and be a minimum of 4" tall.

Internal stress reinforcements will not be allowed because they cannot be welded continuously to the interior of the base side rail components and the welds cannot be visually inspected after the ladder section is placed into service.

MID FLY SECTION

Each base rail for the mid section will be formed structure to provide a full length integral channel for the fly ladder section to interlock to the mid ladder section.

The mid section will be designed with sufficient internal clearances to house the extension cylinders. This will allow the extension cylinder rods to be 100% enclosed and protected at all times from damage from icing, road dirt, water spray or fire fighting personnel from stepping on the cylinders when climbing the ladder.

This design will also keep the extension cylinder from obstructing the underside of the ladder.

FLY SECTION

The fly section will be designed specifically for the purpose of supporting the platform. This cradle support will be in the form of a solid and integral weldment designed to support the platform from underneath in the center. The cradle support will be designed to structurally support the platform, platform movements, and loads in aerial operation and in over the road travel. The cradle supports will be designed to be the only component to touch the fire building or ground depending on ladder position.

This design will also minimize the forces applied to the platform structure and the platform leveling system.

LADDER SECTION DIMENSIONS

All bidders will state in the space provided below their dimensions on the unit proposed. Dimensions proposed must equal or exceed those specified.

	Side Rail Dimensions [L x W x H]	**Side Rail Wall Inside**	**Outside Thickness**	**Handrail Height**	**Handrail Width**
Base Section	426" x 3" x 16"	0.188"	0.125"	35"	38"
Mid Section	396" x 5" x 9"	0.188"	0.125"	29"	31"
Fly Section	425" x 2" x 4"	0.188"	0.188"	25"	26"

OVERLAP SURFACES BETWEEN SECTIONS

Base to Mid Section	104"
Mid to Fly Section	80"

PIKE POLE MOUNTED IN FLY SECTION

There will be a 10' pike pole furnished and mounted in the ladder fly section. The mounts shall include an aluminum tube for the pole and a mechanical pin to secure the hook end of the pole.

ROOF LADDER MOUNT

There will be a mount furnished in the fly section of the ladder for a fourteen foot (14') roof ladder. The mounts will include an aluminum receptacle box for the heel end of the ladder and a mechanical pin lock for the roof hook end of the ladder.

RESCUE STRETCHER MOUNT

A rescue stretcher mount will be provided on the base section for mounting a rescue stretcher. The mounts will be constructed from aluminum and will be easily accessible from the inside the ladder section or from the top of the body.

AERIAL TRAVEL SUPPORT

A heavy duty rest will be provided to support the aerial in the travel position. Stainless steel bedding plates will be attached to the aerial base section to protect the aerial when the unit is in the travel position.

CRADLE ILLUMINATION LIGHTS

Two (2) 12 volt lights will be mounted near the ladder travel support to illuminate this area during night time operation. The lights will be wired and activated by the ladder power circuit.

ELEVATION SYSTEM

Two (2) double acting lift cylinders will be attached between the turntable and the base section near the midpoint of the base section thus creating a better lifting geometry resulting in lower hydraulic operating pressures and improved load distribution on the base ladder section. The cylinders will function only to elevate the aerial device, and not as a structural member to stabilize the ladder sideways. The lift cylinder rods will be attached to the base section with self aligning swivel bearings which prevent side loading on the lift cylinders resulting in longer cylinder seal life. They will provide smooth precise elevation from **-5°** below horizontal to **+80°** above horizontal. The lift cylinders will have a 7" internal bore, a 3-3/4" diameter rod and 71-3/4" stroke.

The lift cylinders will be equipped with integral (on the cylinder) holding valves which prevents the ladder from lowering should a hydraulic line be ruptured at any point within the hydraulic system. They will also have a manifolding line with velocity fuses between the cylinders to prevent uneven cylinder lift and they will have both rod and piston hydraulic cushions. These cushions will decelerate the cylinder near the end of its stroke creating a smooth stop at full stroke.

LADDER INTERLOCK SYSTEM

A limit switch at the aerial travel support will be provided to prevent operation of the outriggers once the aerial has been elevated from the nested position. This system prevents operation of the outriggers once the ladder has been elevated from the nested position.

LOAD METER

The IQAN system shall incorporate an integral load meter, which will display load level on the aerial ladder and platform proportionate to the maximum-rated low elevation load of the device. The load meter will calculate the current load and displays it on the MDM displays located at the turntable and the platform control console. The display instantly adjusts to changes in ladder angles, extension or live load.

The load meter system shall include:

- A pressure transducer installed in the hydraulic system. The pressure transducer is to have an accuracy of ± 1%.
- Bar Graph indicating moment load range.
- Actual percentage of moment load range.
- An audible horn mounted near the display.

ROTATION SYSTEM

A minimum 48.25" internal tooth monorace bearing will be provided for smooth 360 degree continuous rotation and sufficient strength. The upper inside half of the bearing will be bolted to the open base support plate with sixty-four (64) 7/8" diameter grade 8 bolts, and with conical compression high strength washers to insure that the bolt is locked into the threaded hole. (Bolts designated as 8.2012 L-9 are not acceptable).

Both upper and lower bearing surfaces will be milled to ensure a true mounting surface for the rotation bearing. Units that weld the bearing to their mounting plates will not be acceptable due to the tremendous cost and down time involved in replacing a damaged or defective bearing.

A planetary drive speed reduction gear box powered by a hydraulic motor will provide precision rotation control throughout 360 degrees of rotation. An automatic spring applied hydraulically released disc type brake will be incorporated into the gear box to provide positive braking and holding the turntable/ladder against reactionary forces such as water and gravity. The driver motor will be positioned on the turntable so it will not obstruct any walking area or stepping surface on the turntable deck.

E-SPEED™ SAFETY SYSTEM

The rotation system will be controlled from the platform utilizing E-Speed™ technology, which will automatically control platform rotation speed, proportional to the extension and elevation of the ladder.

The E-Speed™ safety system will automatically maintain the rotation angular speed regardless of the degrees of elevation or extension of the ladder, providing safer low angle operation and precise positioning control.

The E-Speed™ safety system will be controlled by the IQAN control system.

E-ZONE™ ROTATION SAFETY SYSTEM

The E-Zone™ Rotation Safety System has been designed to aid the aerial device operator who has primary operational responsibility in preventing the rotation of the aerial device into an over turning mode.

Controlled by the IQAN system, the E-Zone™ Rotation Safety System senses outrigger extension and outrigger jack positioning in conjunction with the aerial device movement.

If the aerial device operator attempts to move the aerial device off vehicle center, and the outriggers are not fully extended on the direction of the rotation side, and all jacks in firm ground contact, the E-Zone™ Rotation Safety System will sense this fault and will audibly and visually warn the operator to return the aerial device to the center line position. If the operator continues rotation into the short-jacked zone, the aerial device rotation will stop. When rotation is stopped, the E-Zone™ Rotation Safety System will allow the operator to only rotate back to the fully jacked side of the vehicle.

NOTE: Should a command decision be made by the officer in charge to utilize the aerial device without the outriggers fully extended and jacks in place (short jacked), a series of manual override procedures can be instituted, which requires two (2) people to fully override the E-Zone™ Rotation Safety System.

NOTE: If this system is overridden, the Fire Department will assume all responsibilities for aerial safety and operation.

E-ZONE™ CAB PROXIMITY SYSTEM

Controlled by the IQAN system, a cab proximity system will be provided utilizing E-Zone™ technology on the rotation and elevation systems to alert the aerial device operator when rotating left or right at low angles and or lowering the ladder, toward the vehicle cab. The E-Zone™ system will also automatically stop rotation or lowering functions when the device is in the defined zone regardless of the ladder rotation degree or elevation degree. When the E-Zone™ system stops rotation towards the cab,

the operator will only be capable of rotating in the opposite direction or elevate the ladder above the defined zone. If the E-Zone™ system stops the lowering function when the ladder is in the defined zone over the cab, the operator will only be capable of raising or rotating the ladder away from the cab.

The E-Zone™ system will sound an audible alarm and display a warning message in the MDM display located at the control stations. The audible and visual warning message will stay activated until the operator moves the device from the defined zone.

E-ZONE™ BODY PROXIMITY SYSTEM

Controlled by the IQAN system, a body proximity system will be provided utilizing E-Zone™ technology on the rotation and elevation systems to alert the aerial device operator when rotating left or right at low angles and or lowering the ladder, toward the body.

The E-Zone™ system will also automatically stop rotation or lowering functions when the device is in the defined zone regardless of the ladder rotation degree or elevation degree. When the E-Zone™ system stops rotation towards the body, the operator will only be capable of rotating in the opposite direction or elevate the ladder above the defined zone. If the E-Zone™ system stops the lowering function when the ladder is in the defined zone over the body, the operator will only be capable of raising or rotating the ladder away from the body. The E-Zone™ system will sound an audible alarm and display a warning message in the MDM display located at the control stations. The audible and visual warning message will stay activated until the operator moves the device from the defined zone.

EXTENSION/RETRACTION SYSTEM

A dual system of hydraulic cylinders and cables will provide full power operation of the extension and retraction modes.

Each system will be capable of supporting the ladder in the event of failure of one of the systems.

The cylinders will be used to extend and retract the mid-fly section and the cable system will be used to extend and retract the fly section.

The cylinders will have a 3-1/2" internal bore, 2-1/2" hollow rod and a stroke of approximately 309".

Both cylinders will be equipped with two integral holding valves to protect both extension and retraction movement during water tower operations or in the event of a severed hydraulic line.

The cylinder barrels containing the hydraulic fluid must be anchored in the base section to keep the transfer of weight at full extension to a minimum. To keep maintenance at a minimum, both cylinders will be completely enclosed and protected inside the mid-section side rail beams. This will ensure that the cylinder rods will never be exposed to the elements even at full extension. To minimize down time, both cylinders will be easily removable from the rear of the vehicle by unbolting and sliding out the rear of the vehicle.

Both cylinders will be completely independent of the cable extension/retraction system for the fly section, thus eliminating the need to disturb the cable system or waterway system should cylinder maintenance be required.

The dual cable system will utilize two (2) 3/4" extensions and two (2) 1/2" retraction cables routed via two (2) pulley sets located on the forward and rear ends of the mid section from the front end of the base section to the rear end of the fly section.

The cables will have a certified safety factor based on breaking strength of 8:1.

A stroke multiplier cable system is undesirable because:

1. It multiples the forces in the extension cylinders which can lead to shorter cylinder life.
2. During retraction, the extension cylinders are put under compression loads which will create the possibility of unrestrained bending or buckling in the cylinder rods.
3. An extra set of cables are required which increases the chances of cable failure.
4. There are more components which require increased maintenance and service.
5. More components obstruct the underside of the base section of the ladder.
6. The extension cylinder are exposed to icing, road dirt, heat, hand tool damage or fire fighter stepping on the cylinder.

E-CUSH™ EXTENSION/RETRACTION FEATHERING

Controlled by the IQAN system, extension/retraction system will be designed utilizing E-Cush™ technology to provide feathering cushion for the extension and retraction at the end of cylinder stroke when controlled from the platform.

The E-Cush™ system will automatically feather the movement of the ladder when the ladder approaches full extension or full retraction, regardless of the input speed from the operator.

GREASELESS LADDER SLIDE MECHANISM

Greaseless Nylatron slide pads with a sliding coefficient of friction of .15 will be used between the telescoping ladder sections. The slides are required because of greater surface area for load transfer between the telescoping sections. Slide pads will also be used to control side play between the ladder sections.

Ultra-high molecular weight material is not acceptable due to:

1. Load bearing characteristics are poor.
2. Resistance to tearing is poor.
3. Recovery to original shape is poor.
4. It will not maintain a low coefficient of friction which will cause unsmooth ladder operation.

Each ladder base rung rail and Nylatron pad will be treated will Teflon material to provide the lower possible friction between ladder section.

LADDER EXTENSION NUMBERS

ScotchLite numerals will be furnished on the inside of the ladder base section handrail, each side, to help the operator determine the distance the ladder is extended.

The numbers will read in five foot increments.

ELECTRIC AIR AND HYDRAULIC ROUTING SYSTEM

All lines to the platform will be enclosed and protected from the turntable to the platform.

All lines will be routed through the base section side rails and then through flexible aluminum conduits that travel under and over the mid section and end at the base of the fly section.

This system is required to reduce the maintenance problems associated with slip tubes and take-up pulleys.

Ladder designs which electrical lines, air lines and hydraulic line are exposed on the interiors of the ladder handrails will not be acceptable.

PLATFORM CONSTRUCTION

The platform will be constructed of five assembly groups:

Platform framework, floor, handrails, corner gates, and access gate/access ladder.

PLATFORM FRAMEWORK

The support structure framework of the platform will be constructed of extruded square aluminum tubing.

The floor of the platform will be constructed of extruded aluminum I-beam extrusions.

An aluminum structure will be provided below the platform floor structure to provide a structural attachment point for the platform to the ladder section.

PLATFORM HANDRAIL ASSEMBLY

A continuous, unbroken handrail will be provided on all four sides of the platform. The handrail will enclose an area of the floor 37.5" long x 68.75" wide (16.7 square feet). The handrails on the front corners will be mounted on the same angle as the platform floor for a uniform front and side step area.

A 4" kick plate will be provided around the floor and perimeter of the handrail assembly.

PLATFORM ACCESS GATES

Two (2) self-closing access gates will be provided for entry into the platform. They will be provided at the front corners of the platform and will not interrupt the top safety rail. Both gates will be hinged at the rear and will swing inward.

Each gate will include **automotive type** safety latches. Each gate will be designed utilizing 2" X"2" tubing, which will incorporate an integral handrail in the top section of the door.

The integral handrail will be constructed from 1 ¼" round aluminum tubing that will be covered with a "glow-in-the-dark" anti-slip material.

The gate hinges will be a two-point type hinge to eliminate binding associated with a piano type hinge.

PLATFORM ACCESS LADDER AND HANDRAILS

Continuous ladder contact between the platform and the ladder fly section will be maintained by attaching a sliding auxiliary ladder section to the platform that will follow the platform as it moves away from the ladder during elevation.

Handrails will be provided between the ladder fly section and the platform that automatically position themselves for maximum protection for transfer to or from the platform no matter what the ladder's angle of elevation.

The main entrance between the ladder and platform will be located at the rear. The rear gate will be 2.25" diameter round tubing, mounted to a two position spring loaded hinged, which will give the gate the capabilities of being lifted up 90° or up and in 90° into the platform. When the rear gate is in the closed position it will rest in a socket type receptacle located on the rear main handrail structure of the platform. The rear gate will be equipped with a mechanical pin to secure the gate in a fixed position.

PLATFORM FLOOR

The floor of the platform will be constructed of extruded aluminum tubing covered with antislip aluminum treadplate.

The floor assembly will be one piece and will extend out past the handrail assembly 8.75" on each side and 10.625" out the front, making transfer of personnel in and out of the platform easier. The floor size will be a minimum of 55" x 88", for approximately 29.5 ft^2 of floor area.

The platform floor and the outside platform step will be on the same level. All corners of the floor will be beveled at 45 degrees to facilitate close maneuvering to buildings.

There will be a heavy duty extruded rubber bumper on the outside edge of the platform floor.

The bumper will be the same thickness as the floor material and will be equipped with molded end caps to ensure an uniform edges.

The underside of the platform will be protected by the solid aluminum treadplate with the exception of the four (4) drain holes.

By having a floor with solid construction, protection against direct contact with heat radiation will be provided.

Platform floors that are not constructed from solid material will not be acceptable.

PLATFORM MOUNTING

The platform will be suspended from the tip of the fly section by an integral "cradle" shaped assembly that supports the platform beneath the center axis of the floor, also the cradle design will transfer all platform loads directly to the ladder structure. The "cradle" platform mount will also insure that forces will not be transferred through the platform structure when the platform is positioned on the ground or on a building roof. This support assembly will not hang below the top of the windshield and will not obstruct the driver's view.

The support structure must be designed to withstand the forces created by the vehicle when it encounters road irregularities. Hydraulic cushioning in the platform leveling system is not acceptable because fluids locked inside the cylinders by the holding valves will not allow adequate dampening.

Two (2) heavy duty rubber bumpers will be provided on the platform cradle supports, one (1) each side.

The rubber bumper will be positioned so it is the **only** component touching the building or ground depending on ladder position.

PLATFORM LEVELING SYSTEM

A platform leveling system will be provided and so designed that the platform together with its rated payload can be supported and maintained level in relation to the turntable regardless of the elevation of the ladder.

The leveling of the platform will be accomplished by the following two systems working together:

1. **Master/Slave Cylinders** - A dual master/slave hydraulic cylinder system will be provided with each side capable of maintaining the platform level. Two (2) master cylinders will be mounted between the turntable and base ladder section and two (2) slave cylinders will be mounted between the fly section and the platform. As the ladder is raised or lowered, hydraulic fluid will be transferred between the master and slave cylinders thus maintaining the platform level. Steel tubing and heat resistant flexible hydraulic lines will be provided between the master and slave cylinders. The slave cylinder seals will prevent oil leakage that allows the platform to unlevel itself during prolonged periods of inactivity of the aerial device.

2. **Auto Leveling** - An automatic pendulum level sensing device located in the platform will also be provided to further ensure the platform is maintained level regardless of the elevation of the ladder or vehicle position.

The following safety features will be provided in the leveling system:

1. The 2" basket pivot will be mounted under the center of the basket. This will provide lower operating pressure in the leveling system. **Rear mount pivots are not acceptable.**

2. The slave cylinders will be mounted outside of the platform for maximum platform space utilization and safety for personnel from moving cylinders.

3. Holding valves will be provided on the slave cylinders to prevent the platform from tipping should any hydraulic leveling line be severed.

4. Heat resistant flexible hydraulic lines and steel tubing will be provided between the master and slave cylinders.

5. The platform and platform loads will be directly supported by the ladder section.

6. The leveling cylinder system will not be required to support the platform or platform loads when in aerial operation or travel position.

7. Due to the platform being supported by the ladder section, the leveling system will operate at much lower pressures providing smoother leveling and less general maintenance to the system.

PLATFORM FLOOR HEAT SHIELD

The underside of the platform floor will be covered with 0.090" polished aluminum treadplate.

The heat shield will be designed to enclose the platform waterway pipes, electrical junction boxes and any hoses or wires.

The heat shields will also provide mounting surfaces for quartz lights and warning lights.

The center section of the heat shield will be hinged to allow easy access to the components mounted under the platform floor.

PLATFORM COVERING

The front, sides and doors of the platform will be covered with 0.090" painted aluminum.

The color of the heat shield will match the ladder job color paint.

POMPIER SAFETY BELT LOOPS

Four (4) stainless steel pompier safety belt loops will be provided in the platform.

The loops will be located as follows; one (1) near the platform operator's station, one on the left side of the platform and two (2) will be located on the front of the platform.

LIFTING RINGS

Two (2) 3" diameter lifting rings will be provided under the platform, which will be attached directly to the platform support arms.

This design will ensure the loads implied on the lifting eyes will be directly supported by the ladder structure and not transferred to the platform framework or the platform leveling system.

******* PLATFORM 120 VOLT ELECTRICAL SYSTEM & ACCESSORIES *******
PLATFORM 120 VOLT SYSTEM

Two (2) 120 volt 20 amp electrical circuits utilizing 12 gauge five strand electrical cable will be provided to the platform. Circuits will be wired from the platform to the turntable through the collector ring assembly.

PLATFORM 120 VOLT RECEPTACLES

Two (2) 120 volt, NEMA L5-20R, 20 amp, twist lock type receptacle with weatherproof covers will be provided.

They will be installed one (1) on each side near the rear of the platform on the vertical supports.

Both receptacles will require one (1) 20 amp, 120 volt circuit breaker to be installed in the load center.

PLATFORM QUARTZ LIGHTS

Two (2) Fire Research "Focus" model #FC540-S75, 750 watt, 120 volt telescoping quartz lights will be mounted on the rear of the platform.

Each light will be provided with telescoping poles and will be switched at the lighthead.

Two (2) model S75, 750 watt light heads will require one (1) 120 V, 15 amp circuit breaker.

One (1) switch will be provided at the turntable control console for the rear telescoping quartz lights. The switch will be wired to the light circuit to give the operator the capability to shut down the quartz lights from the turntable if the switch on the light heads are in the on position.

PLATFORM RECESSED QUARTZ LIGHTS

Two (2) 750 watt Fire Research "Focus" model #FC-200-S75, 750 watt, 120 volt quartz lights will be recessed, one (1) on the front center of the of the platform and one (1) on the center bottom of the platform. These light will be adjusted to illuminate the underside and sides of the platform without blinding the operator.

Two (2) model S75, 750 watt light heads will require one (1) 120 V, 15 amp circuit breaker and will be switched from the platform console.

One (1) switch will be provided at the turntable control console for the bottom recessed quartz lights.

The switch will be wired to the light circuit to give the operator the capability to shut down the quartz lights from the turntable if the switch on the platform is in the on position.

******* PLATFORM 12 VOLT ELECTRICAL SYSTEM & ACCESSORIES *******
PLATFORM 12 VOLT CIRCUIT

All 12 volt electrical lines to the platform will be enclosed and protected from the turntable to the platform. All 12 volt electrical lines will be routed through the base section rails and then through flexible aluminum conduits the travel under and over the mid section(s) and end at the base of the fly section.

Platform designs where electrical, air, or hydraulic lines are exposed on the interiors of the ladder handrails will not be acceptable.

Two (2) 4" shielded work lights will be installed at the base of the ladder in the turntable heel pin step.

MARKER LIGHTS

Five (5) amber LED marker lights will be mounted on the front of the platform.

Two (2) Unity spotlights will be mounted at the rear of the base ladder section, one on each handrail.

The lights will be equipped with a swivel base and an on/off switch on the light head itself.

One (1) Unity spotlight and one (1) Unity flood light will be mounted on the front of the platform handrail, one on each side.

The lights will be equipped with a swivel base and an on/off switch on the light head itself.

AERIAL ILLUMINATION LIGHTS

The ladder sections will be equipped with blue lights that will be staggered to illuminate the ladder rungs for night time operations.

The lights will be wired to the ladder power circuit with a disabling switch at the turntable control console.

The lights will be equipped with blue lenses.

PLATFORM WARNING LIGHTS

Four (4) Whelen 70R00FRR LED flashing lights will be provided on the platform in addition to the NFPA-1901 warning light package.

Two (2) of the lights will be located on the front face of the platform floor structure and two (2) lights will be located on the side of the platform, one (1) each side.

Each light will be equipped with a red lens. The lights will be activated with the ladder power circuit.

PLATFORM HOSE STORAGE COMPARTMENT (LH SIDE)

A hose storage compartment will be provided on the left side of the platform.

The compartment will be fabricated from 1/8" aluminum treadplate and will be mounted on the outside of the platform.

The compartment will be capable of holding a minimum of 100' of 1 3/4" light weight hose.

A hinged aluminum treadplate cover will be provided for the hose storage compartment on the platform.

PLATFORM AXE MOUNT

A 6 lb. pickhead axe will be provided and mounted in the platform. The axe location will be in the left rear of the platform within the framework of the platform structure.

The axe will in no way obstruct the interior of the platform.

HALLIGAN BAR MOUNT

A halligan bar will be provided and mounted in the platform. The bar location will be in the left rear of the platform within the framework of the platform structure.

The halligan bar will in no way obstruct the interior of the platform.

PLATFORM RESCUE BASKET HOLDER

Two (2) detachable "Y" shaped rescue stretcher basket holders will be furnished for the platform.

The basket holders will be constructed from heavy wall aluminum tubing, which will be capable of being removed from receivers located in the main platform structure on the front of the platform.

Heavy duty mechanical pins will be provided to secure the holder in the platform receivers.

The minimum rated capacity of each arm will be 250 lbs.

Each arm will be tested and certified by the manufacturer third party testing firm.

A heavy duty seat belt type strap will be provided on each holder.

PLATFORM 3-IN-1 BRACKETS

Brackets shall be provided for use at the front of the platform basket to increase the safety of firefighters during firefighting and rescue operations.

The brackets will be constructed from aluminum and capable of holding a roof ladder securely in place.

The ladder shall be secured through its beams and one (1) rung, by a bar capable of being latched in place.

The mount will be designed to withstand a minimum of a 500 pound load while maintaining a minimum of a two to one (2:1) safety factor.

The complete system shall maintain and exceed this criteria as well.

There shall also be a latching pawl to keep the ladder in a vertical position at all times and shall latch on a rung, at least two (2) rungs below the primary attachment point.

The bracket furnished in the platform will make it possible to raise or lower items from the platform.

The lifting arms will be constructed from heavy wall aluminum tubing, which will be capable of being removed from receivers located in the main platform structure on the front of the platform.

Heavy duty mechanical pins will be provided to secure the lifting arms in the platform receivers.

The minimum rated capacity of each arm will be 250 lbs. Each arm will be tested and certified by the manufacturer third party testing firm.

The bracket furnished for the platform will be capable of holding a stokes basket.

The basket holders will be constructed from heavy wall aluminum tubing, which will be capable of being removed from receivers located in the main platform structure on the front of the platform.

Heavy duty mechanical pins will be provided to secure the holder in the platform receivers. The minimum rated capacity of each arm will be 250 lbs.

Each arm will be tested and certified by the manufacturer third party testing firm.

A heavy duty seat belt type strap will be provided.

CONTROL STATIONS

There will be two (2) control stations.

One will be known as the platform control station and the other will be known as the turntable control station.

All elevation, extension and rotation operational controls will operate from both of these positions.

These controls will be arranged to permit the operator to regulate the speed of these operations within the safe limits as determined by the manufacturer.

The control devices will be grouped in an identical manner at both stations for similarity of operation and to meet NFPA-1901.

Platform load instruction plates will be located at both control stations to indicate the recommended safe load of the platform.

The control devices will be clearly marked and suitably lighted.

The controls will be so designed to allow the turntable control station to override the platform controls even if the ladder is being operated by the platform controls.

The turntable control station will be located on the **left** side of the turntable such that the operator can easily observe the platform while operating the controls.

TURNTABLE CONTROL STATION

The lower part of the console will be angled away from the operator, to provide as much foot room as possible for the operator.

An access door will be provided on the front of the console to provide complete access to the electrical and hydraulic components mounted inside the console.

The console will be illuminated for night operations, and will have the following controls/indicators:

The following items will be clearly marked:

-IQAN, MDM display

-Three (3) manual direct ladder/platform control levers.

-A foot operated **"dead man switch"** that electrically opens the aerial control valve will protect against accidental movement of the control handles.

-Master electrical power switch with emergency shutdown capabilities.

-Rung alignment indicator light for ladder climbing operations.

-Cradle alignment indicator light.

-Engine fast idle control switch.

-Emergency pump power switch.

-Keyed platform leveling switch.

-5,000 psi hydraulic oil pressure gauge (Liquid filled).

-Intercom controls

-Illuminated load chart on front of console.

-Hinged aluminum tread plate console cover over controls

-"Waterway Charged" indicator light

- Control switch for the rear telescoping platform quartz lights

- Control switch for the bottom recessed platform quartz lights

PLATFORM LADDER CONTROLLERS

Three (3) ladder directional controllers will be mounted on the platform control console. They will control extend/retract, rotation, and elevation.

These controllers are part of the IQAN motion control system allowing safe operation of the ladder from the platform.

The controllers will incorporate ICB; J-1939 can bus signaling**,** transmitted through two (2) J-1939 communication wires to reduce the chance of electrical failures since fewer wires and terminals will be utilized. Additionally, voltage sensitivity is eliminated thus providing superior motion control. Joystick controllers that utilize potentiometers or mechanical switches to control motion will not be acceptable.

PLATFORM CONTROL CONSOLE

The platform control console will be located at the right side rear of the platform to provide maximum room on the platform and to allow the operator to see around the platform and the ladder sections at the same time.

An access door will be provided on the front of the console to provide complete access to the electrical and air system components mounted inside the console.

The following controls will be located on or near the illuminated console.

-IQAN, MDM display

-A foot operated **"dead man switch"**. That electrically opens the aerial control valve will protect against accidental movement of the control handles.

-Extend/Retract Control Lever

-Elevation Control Lever

-Left/Right Control Lever

-Ladder speed control switch

-Cradle Alignment Indicator Light

-Fast Idle Control Switch

-Rung Alignment Indicator

-Panel Light/Power Switch

-Illuminated Load Chart

-Hinged Aluminum Tread plate Console Cover

COMMUNICATION SYSTEM

An Atkinson communication system will be furnished between the pump operators panel, platform and the turntable operator's position.

The communication speaker in the platform will require no operator attention to transmit or receive.

The transmitting receiving volume controls will be located at the pump panel and the turntable operator's position.

BREATHING AIR SYSTEM

A breathing air system will be furnished which will include two (2) 5000 psi, ASME air cylinders which will be mounted in accordance with federal DOT practices.

The cylinders will be on the opposite side from the turntable control console.

The breathing air system will be "prepiped" from the turntable to the platform using a Kevlar reinforced synthetic air hose.

Air from the cylinders will be routed through the lower regulator to be reduced from cylinder pressure to airline pressure and then travels up and through the ladder sections to the platform control console.

The air is then routed through an inline air filter and regulator located in the platform.

Four (4) quick disconnects with plugs and retaining chains will be located in the platform. The air couplings will be matched to the type required by the fire department.

There will be a quick coupling at the turntable console for easy refilling of the breathing air system without disturbing the air bottles.

A fifty foot (50') refill hose will be provided as loose equipment with this system for recharging the air cylinder.

The breathing air couplings will be **Schrader** type coupling to match the fire department's air system.

Two (2) MSA breathing air masks will be provided for the breathing air system.

TURNTABLE AIR MASK STORAGE

One (1) aluminum treadplate air mask storage box with positive latching hinged lid shall be provided in the area of the turntable console.

The box shall be large enough to store two (2) air masks with extension hoses.

BREATHING AIR ALARM SYSTEM

The IQAN system will monitor the breathing air level and display a massage indicating air level on the MDM displays.

A low breathing air alarm will be provided in the air line downstream from the high pressure regulator, which will activate a 95 DB fast pulse alarm mounted at the turntable and platform control stations if the breathing air pressure falls to or below the set percentages of the system capacity.

AERIAL WATER SYSTEM

The aerial waterway system will be capable of being supplied by both a midship mounted pump and an external water source with the inlet on the rear of the apparatus.

The piping from the aerial discharge valve and the rear inlet to the turntable swivel will be **5" stainless steel pipe**. A 5" tee will join the pump discharge line and the rear inlet line. A 5" water swivel will be located in the riser pipe from the tee permitting 360 degree continuous rotation of the ladder.

A 5" double swivel piped waterway with 5" flex tube connection between the ladder waterway and the turntable swivel permitting water tower operations from -5 to +80 degrees.

An anodized aluminum telescopic waterway will be mounted beneath the center of the aerial ladder.

The waterway will have a 5" base section tube, 4-1/2" mid-fly section tube, and a 4" fly section tube.

The waterway will be secured to the ladder sections with cradle type mounts to provide a minimum of 2" of up and down movement in the waterway. This design will protect the waterway from bending if the ladder comes in contact with a building or a water hammer is imposed to the waterway discharge.

An automatic drain will be provided in aerial water way to automatically drain the system for freezing conditions. This valve will also act as a vacuum relief valve for the waterway when extending the aerial device with the discharges in the closed position.

A 2-1/2" relief valve preset at 225 psi will be located beneath the turntable to protect the water system from excessive pressures.

A 1-1/2" drain valve will be installed and operated from the rear of the apparatus.

REAR INLET ADAPTER

The rear aerial inlet will be equipped with a 5" NST adapter with long handle cap.

A 5" NSTF X 5" Storz adapter with cap will be provided for the rear inlet.

NOTE: A 2.5" pressure gauge will be provided at the rear outrigger control panel of the vehicle to indicate waterway pressure.

PLATFORM WATER SYSTEM (DUAL MONITORS)

A 4" water swivel located under the platform will connect from fly waterway to the platform waterway. The water swivel will permit full operation at any elevation of the aerial device.

Two (2) 4" pipes will be provided to transfer water from the swivel to the deck guns.

The platform waterway pipes will be formed tubing to reduce friction loss in the waterway, designs that include cut and welded pipes will not be acceptable.

All platform waterway piping will be completely removable for service or replacement. Platform designs in which the waterway is welded or utilized for structural integrity of the platform will not be acceptable.

A handwheel operated 4" butterfly valve will be provided toward the front of the platform beneath each deck gun, enabling the deck guns to be shutdown for use of the preconnects.

SHOWER NOZZLE

One (1) 100 GPM shower nozzle will be located beneath the platform for heat protection for platform personnel. A direct linkage control will be provided inside the platform.

PLATFORM DISCHARGES

- One (1) gated 2-1/2" preconnect with cap and chain

- Two (2) non-gated 2-1/2" preconnect with cap and chain

LEFT PLATFORM MONITOR AND NOZZLE

An Akron model #3578 "StreamMaster" electrically controlled monitor will be installed on the left side front of the platform.

The monitor relay box will be located on the platform, adjacent to the monitor, and will be easily accessible for service.

The monitor will be equipped with a 3-1/2" outlet and a 4" inlet.

The monitor will have a vertical sweep of 135°, and a horizontal sweep of 348°.

An Akron model #5077 "Akronmatic" electrically controlled master stream nozzle will be installed on the end of the left monitor. The model #5077 will allow a maximum flow rate of 1250 gpm @ 80 psi.

The monitor and nozzle functions will be controlled from the tip of the fly section and from each of the aerial control consoles.

The monitor and nozzle controls at the tip, turntable, and (optional pump panel) station will consist of three (3) individual spring-loaded, self-centering, weather resistant toggle switches.

The monitor and nozzle control functions will be as follows:

- UP / DOWN

- LEFT / RIGHT

- STRAIGHT STREAM / FOG

The monitor will be equipped with an "Auto Stow" feature that will automatically deploy the monitor and will also place the monitor into its stowed position when actuated by a toggle switch.

RIGHT PLATFORM MONITOR AND NOZZLE

An Akron model #3578 "StreamMaster" electrically controlled monitor will be installed on the right side front of the platform.

The monitor relay box will be located on the platform, adjacent to the monitor, and will be easily accessible for service.

The monitor will be equipped with a 3-1/2" outlet and a 4" inlet.

The monitor will have a vertical sweep of 135°, and a horizontal sweep of 348°.

An Akron model #5077 "Akronmatic" electrically controlled master stream nozzle will be installed on the end of the right monitor. The model #5077 will allow a maximum flow rate of 1250 gpm @ 80 psi.

The monitor and nozzle functions will be controlled from the tip of the fly section and from each of the aerial control consoles.

The monitor and nozzle controls at the tip, turntable, and (optional pump panel) station will consist of three (3) individual spring-loaded, self-centering, weather resistant toggle switches.

The monitor and nozzle control functions will be as follows:

- UP / DOWN

- LEFT / RIGHT

- STRAIGHT STREAM / FOG

The monitor will be equipped with an "Auto Stow" feature that will automatically deploy the monitor and will also place the monitor into its stowed position when actuated by a toggle switch.

LADDER/PLATFORM CAPACITIES

The following ladder/platform load capacities will be established with the truck level and the outriggers fully extended and lowered to relieve the chassis weight from the axles.

Capacities are based upon full extension and 360 degree rotation.

LADDER/PLATFORM CAPACITIES IN POUNDS
(50 MPH WIND CONDITIONS / UNCHARGED WATERWAY)

DEGREES OF ELEVATION

	-5 to 20	20 to 30	30 to 40	40 to 50	50 to 60	60 to 80
Base Section	250	250	500	500	500	1000
Mid Section	---	250	250	500	500	500
Fly Section	---	---	250	250	500	500
Platform	1000	1000	1000	1000	1000	1000

WATER TOWER OPERATION

The ladder/platform and water system will be designed to permit the following total flows of a single monitor:

1. 1500 GPM at 90 degrees to ladder centerline either side.

2. 1500 GPM parallel to ladder centerline and as far below horizontal as the design allows.

3. 1000 GPM above ladder centerline as far as deck gun design allows.

LADDER/PLATFORM CAPACITIES IN POUNDS
(50 MPH WIND CONDITIONS / CHARGED WATERWAY)

DEGREES OF ELEVATION

	-5 to 20	20 to 40	40 to 60	60 to 80
Base Section	---	250	250	500
Mid Section	---	250	250	500
Fly Section	---	---	250	500
Platform	500	500	500	500

OPERATIONS ON GRADES

The aerial unit can be operated in any plane up to 3.5 degrees out of level at full platform capacities. Operation beyond this limit will be at operator's discretion.

WELDMENT PAINTING

Prior to any painting, all weldments such as the outrigger beams, torque box, turntable, and ladder sections will be sand blasted, cleaned and inspected to insure the removal of any surface imperfections and to insure superior paint adhesion to the metal.

The entire painting system will utilize a single manufacturer's paint for compatibility between primers and finished coats. All painting will be done in atmosphere controlled spray booths. The weldments will then be primed with Ditzler (PPG) Epoxy Primer. All seams between adjoining pieces that are not continuously welded will be caulked to inhibit corrosion.

Before assembly, in preparation for final painting, the aerial unit will be thoroughly cleaned, conforming to good painting practices.

The aerial components will then be sprayed with Ditzler (PPG) Polyurethane primer sealer. Finished paint used on the turntable, lift cylinder, and ladder sections will be painted Ditzler (PPG) Durethane Polyurethane **#2185 white**.

The base rails of the mid-fly and fly section/s of the ladder will be painted with a hardcoat black paint.

The torquebox will be painted to match job color or the base color of the body, allowing easy touch-up after extended use.

The outrigger beams will be painted PPG enamel to match the torquebox job color, allowing easy touch-up after extended use.

LADDER CORROSION INHIBITOR

All internal surfaces of the ladder exposed to the atmosphere, i.e., inside base, mid and fly section side rails will be undercoated prior to ladder assembly using Procyon Corrosion Inhibitor to prevent internal corrosion.

The corrosion inhibitor must meet the Boeing BMS-3-29 specification and meet a 1500-hour salt spray test.

PREVENTATIVE MAINTENANCE & OPERATIONAL FAMILIARIZATION PROGRAM

PROGRAM OUTLINE

An on-site program for familiarization of Fire Department personnel shall be provided. This program shall be designed to assure complete understanding of all aspects of the aerial device in the operating environment.

After the unit has been accepted, a factory qualified Field Service Technician shall be provided for a minimum of three (3) days of familiarization.

The familiarization program shall be designed to instruct the individual who has never utilized an aerial device of this type before. The individual will be thoroughly demonstrated the operating systems of the aerial device, including emergency operation. Introductory service skills utilizing the vehicle shall also be demonstrated.

FAMILIARIZATION PROGRAM

To instruct Fire Department personnel in the operation, preventative maintenance and care of the aerial device, this familiarization program shall be oriented towards a hands-on approach utilizing the new apparatus.

1. Review personnel level and determine specific familiarization requirements.

2. Explain operations of the entire aerial device. Each participant shall actually use the aerial and be shown the necessary steps of safe operation.

3. Troubleshooting will be emphasized and reinforced continually throughout the familiarization period.

4. Preventative maintenance procedures shall be setup and definite schedules developed to assure proper maintenance of the aerial device.

5. Familiarization in the use of tools and how to replace minor assemblies, as applicable. Equally important in this familiarization will be when to call appropriate personnel for assistance.

6. How to order parts through the local service center by utilizing parts manual.

SERVICE

Due to the importance of keeping this vital piece of firefighting apparatus in service with a minimum of downtime, the manufacturer of the aerial device will maintain a network of service centers with factory trained personnel.

The aerial manufacturer will also have a separate facility for service of units so they do not conflict with production units. The service facility will carry an inventory of parts, separate from production parts.

WARNING DECALS

Warning decals will be provided in appropriate locations to alert the operator of potential hazards and operating instructions.

All warning labels will be in general compliance with A.N.S.I. Z34.1 recommendations.

MANUALS

The aerial manufacturer will provide the following manuals pertaining to the aerial device:

1. Two (2) Operator's manuals
2. Two (2) Parts manuals
3. Two (2) Complete Electrical and Hydraulic Diagrams

SPECIAL TOOLS

A steel tool box will be provided with the following special tools for retorquing of specified bolts as recommended by the aerial manufacturer:

-Torque wrench

-4:1 multiplier

-Extensions, adapters and sockets as required

MANUFACTURERS PROOF LOAD TEST PRIOR TO DELIVERY

In addition to all NFPA-1901 testing requirement this test will be conducted to the aerial device prior to delivery.

To ensure structural integrity and increased service life, a proof load test as described below will be conducted on the aerial device prior to delivery of the finished unit. This test is necessary to verify the ladder's ability to withstand the weight, ice and wind loads specified. The test will serve to reduce the effects of long term fatigue on the structure.

First, the ladder will be placed at zero degrees off the rear of the vehicle at full extension, and the distance from the platform to the ground will be verified. With the ladder at zero degrees off the rear of the vehicle, a load representing 68% of the ultimate design condition will be suspended from the base section, mid section, and platform. The exact loading points will be measured in inches from the pivot pin of the base section, they are 150, 430, and 1087.5 inches. The amount of load at each station will be based on the square inch surface area of each ladder section. Since the ultimate design condition has been established at 11,100,000 (11.1 million) inch pounds, the proof load must create a force of 7.6 million inch pounds to equal a 68% overall loading. Using the ratio of square surface area to divide a load that would generate 7.6 million inch pounds at the base the following minimum per station loads are established.

Station #1 Base Section	**1767 pounds**
Station #2 Mid Section	**1468 pounds**
Station #3 Platform	**1442 pounds**

The weight will be applied with the ladder totally unsupported for a period of not less than five minutes. Prior to the removal of the weight, the deflection will be noted and not be more than 24". The weight will be removed and the ladder recalled through a complete retraction and re-extension sequence. The ladder will then be inspected and measured. Evidence of damage or permanent bending will mean immediate rejection of the entire apparatus.

It is the intention of the user to reconduct this proof load test at three (3) year intervals as recommended by modern practices to verify strength. The successful bidder will provide the user with all information and assistance necessary for the user to reconduct the test when necessary.

AERIAL APPARATUS CERTIFICATIONS (TYPE 1)

The aerial device will be tested in compliance with the National Fire Protection Association's Standard #1914 (latest edition).

Ongoing structural and physical property testing during construction will also be done.

The following tests will be conducted by personnel holding a Level II certification to detect defects and improperly secured components:

1. Three (3) random samples of each lot or shipment of raw material (plate, tubing, bar, etc.) and fabricated parts from outside vendors will have a mechanical (tensile, yield, and elongation) and chemical (material content) analysis performed.

2. Magnetic particle inspection will be conducted on all ferrous welds to assure the integrity of the weldments and also detect any flaws or weaknesses. These test will be performed prior to paint or assembly.

3. Die penetrate testing will be conducted on all structural aluminum welds.

4. Ultrasonic inspection will be used to detect any flaws in pins, bolts and other critical mounting components. The bolts will be tested after any torquing to ensure the bolt was not damaged.

5. All extension/retraction cables will be proof load tested, serialized, and certified by the cable vendor. All cable ends will be die penetrate tested to find any cracks, imperfections, etc.

6. Functional tests, load tests, stability tests and visual structural examination will be performed. These tests will determine any unusual deflection, vibration, or instability characteristic of the unit.

7. Hydraulic oil sample test prior to delivery.

Additionally, a waterway pressure test will be performed.

Upon completion of the preceding inspections, the independent testing company will issue a Certificate of Inspection indicating that all specified standards have been satisfied. The Type I certification will be provided by **Underwriters Laboratories Inc. (UL).** Aerial manufacturers not utilizing third party, independent testing companies will not be acceptable.

TESTS

The following test will be conducted to the aerial device prior to delivery, all listed tests will be witnessed and certified by Underwriters Laboratories Inc. (UL) to ensure the device meets all requirements of NFPA-1901.

The manufacturer of the aerial device will provide a written statement signed by the Chief Engineer certifying the aerial's ability to perform the following tests:

1. **1-1/2:1 DYNAMIC STABILITY AND LIFT TEST** - A test of the apparatus will be performed that the ladder sections and platform are so designed and powered to support a load representing 150% of the manufacturer's rated payload capacity at maximum horizontal reach on level ground. Since this is a dynamic test, the load must be raised, lowered and rotated without evidence of instability. Specifically, 1500 pounds in the platform with the ladder fully extended at zero degrees will be rotated 360°.

2. **1-1/3:1 DYNAMIC STABILITY AND LIFT TEST** - A test of the apparatus will be performed that the tip and ladder sections and platform are so designed and powered to support a load representing 133% of the manufacturer's rated payload capacity at maximum horizontal reach on a five (5) degree slope. Since this is a dynamic test, the load must be raised, lowered and rotated without evidence of instability. Specifically, 1333 pounds in the platform with the ladder fully extended at zero degrees will be rotated 360°.

3. **TIME TEST** - A test of the apparatus will be performed to raise the platform from a bedded position extended to full height and rotated through a 90° turn smoothly and without undue vibration in not over 150 seconds.

4. **WATER TOWER TEST #1** - A test of the apparatus will be performed to test it's ability to discharge 1000 gallons per minute parallel to the ladder with the unit at full extension and zero degree elevation and through a 360° rotation. The unit will be capable of performing this test with a payload of 500 pounds at the platform.

5. **WATER TOWER TEST #2** - A test of the apparatus will be performed to test the ability to discharge 1000 gallons per minute, 90° to the ladder with the ladder at full extension, zero degree elevation and through 360° of rotation. The unit will be capable of performing this test with a payload of 500 pounds at the platform.

6. **WATER TEST #3** - A test of the apparatus will be performed to test the ability to discharge 1000 GPM above the ladder centerline and as many degrees above 0° as the deck gun design allows. This test will also be performed with the ladder fully extended at 0° elevation and through 360° of rotation with a platform payload of 500 pounds.

Bidders must state their ability to comply with all of the above tests. Failure to do so will be grounds for rejection of their bid.

WARRANTIES & REQUIRED INFORMATION:

VEHICLE WARRANTY

The proposed vehicle includes a one (1) year new vehicle warranty, upon delivery and acceptance of the vehicle. The warranty will ensure that the vehicle has been manufactured to the proposed contract specifications and will be free from defects in material and workmanship that may appear under normal use and service within the warranty period. The warranty may be subject to different time and mileage limitations for specific components and parts. This warranty is issued to the original purchaser of the vehicle.

The warranty will not apply to tires, batteries, or other parts or components that are warranted directly by their manufacturers. The warranty will not apply to routine maintenance requirements as described in the service and operator's manual. No warranty whether express, implied, statutory or otherwise including, but not limited to any warranty of merchantability or fitness for purpose will be imposed.

COMPONENT WARRANTY INTERVALS

OVERALL UNIT AND CUSTOM CHASSIS

All components and parts of the vehicle are warranted for a period of one (1) year from acceptance of the vehicle, unless excluded elsewhere in this warranty or described as having longer time limitations.

ENGINE WARRANTY

The unit will be equipped with a Fire Service rated engine, which will come furnished with a Five (5) year Engine Manufacturer's warranty. A copy of the manufacturer's warranty will be supplied to define additional details of the warranty provisions.

TRANSMISSION WARRANTY

The proposed Allison transmission will be provided with a five (5) year warranty. A copy of the Allison transmission warranty will be supplied to define additional details of the warranty provisions.

CUSTOM CHASSIS FRAME RAILS

The proposed KME custom chassis frame and crossmembers will be warranted for an unlimited time period. A copy of KME's frame rail warranty will be supplied to define additional details of the warranty provisions.

MERITOR AXLE WARRANTY

The Meritor axle/s will be provided with a five (5) year warranty. A copy of Meritor's warranty will be supplied to define additional details of the warranty provisions.

CAB STRUCTURE

The proposed cab weldment, including sheet metal and primary support structure will be warranted against loss of integrity or failure due to defects in material or workmanship for a period of ten (10) years from the date of acceptance of the unit.

BODY STRUCTURE

The proposed body weldment, including sheet metal and primary support structure will be warranted against loss of integrity or failure due to defects in material or workmanship for a period of ten (10) years from the date of acceptance of the unit.

CORROSION

The proposed cab and body will be warranted against rust-through or perforation, due to corrosion from within, for a period of ten (10) years. Perforation is defined as a condition in which an actual hole occurs in a sheet metal panel due to rust or corrosion from within. Surface rust or corrosion caused by chips or scratches in the paint are not covered by this warranty.

PAINT FINISH WARRANTY

The proposed finish paint on the unit will be provided with a seven (7) year paint finish guarantee which will cover the finish for the following items: Peeling or delamination of the topcoat and/or other layers of paint, cracking or checking and/or loss of gloss caused by defective PPG Fleet Finishes which are covered by this guarantee. A copy of this warranty will be submitted with the proposal.

AERIAL DEVICE STRUCTURE

The proposed aerial device weldment, including outriggers, torque box, turntable and ladder sections will be warranted against loss of integrity or failure due to defects in material or workmanship for a period of five (5) years from the date of acceptance of the unit.

The proposed aerial waterway will be covered by a one (1) year warranty to cover the waterway seals and individual tube assemblies.

WATER TANK (LIFETIME)

The proposed water tank will be warranted by the water tank manufacturer for the "Lifetime" of the unit. A copy of the manufacturer's warranty will be supplied to define additional details of the warranty provisions.

HALE FIRE PUMP (FIVE YEAR)

The proposed Hale fire pump will be warranted by the pump manufacturer for a period of **Five (5) years**. The warranty will cover replacement parts and labor for the warranted components. A copy of the manufacturer's warranty will be supplied to define additional details of the warranty pro-visions.

PROPOSED DESIGN FEATURES & BENEFITS OF THE AERIALCAT DEVICE:

GENERAL

Listed below are just a few design features that are offered that set the proposed KME Aerialcat ladder/platform apart from any other aerial device in the industry. These features yield great benefits that prove the Aerialcat ladder is the most reliable, strongest, most functional, and lowest maintenance aerial device available.

KOVATCH HISTORY

Kovatch brings to the fire and specialty vehicle market over five decades of broad-based experience in vehicle manufacturing, sales and service. The company was founded in 1946 as a car and truck repair business in Nesquehoning. Through the success of the car and truck repair business, various automobile and truck franchises were eventually acquired and continue to this day.

In the mid 1960's, Kovatch won its first rebuild contract for the US military. By the 1970's, the company had a string of successful rebuild and new manufacture contracts for various branches of the Defense Department. To this day, Kovatch is still known as a premier supplier of specialty apparatus to the federal government and is currently working on several contracts.

In the mid 1980's, Kovatch began a commercial fire apparatus division, now known as KME Fire Apparatus. By combining decades of specialty vehicle experience with acquisitions of other manufacturers, Kovatch offers unparalleled products and services. Today, Kovatch manufactures upward of 500 vehicles per year for municipal and private fire and rescue service providers as well as the government. Our apparatus can be found across the country and increasingly around the world.

The Kovatch headquarters complex consists of over one-half million square feet and is a totally integrated manufacturing facility for emergency and specialty vehicles. The facilities include state of the art fabrication, machining, welding, painting and finishing departments. We also have a technical manual publication department for our vast line of products. Our knowledgeable workforce, including marketing, engineering, and manufacturing personnel, work as a team to provide world-class quality. Other factory locations include Ontario, California; Roanoke, Virginia; Massachusetts; and most recently, Guilderland Center, New York (near Albany.)

KME Fire Apparatus has a national distribution network in place for sales and service of fire apparatus, as well as an international representative. Service and warranty matters are handled through our network as well as our locations in Virginia, New York, Massachusetts and California.

Quality is very important to Kovatch. There is an in-house Quality Assurance department that is monitored by the Defense Contract Management Command (DCMC). Kovatch also has UL inspectors on site. For out of house testing, we utilize the US Army's facility at Aberdeen Proving Ground as well as private testing agencies. We offer training at the factory or at the customers' premises.

Kovatch and KME offer a broad line of apparatus known worldwide for their quality and reliability. The line includes commercial fuel transport trucks, aircraft refuelers, snowplows, and fire apparatus consisting of pumpers, rescue trucks, airport crash rescue trucks, rapid intervention vehicles, tankers, elliptical tankers, wildland units, and a full line of aerial devices.

SINGLE-LINE RESPONSIBILITY

In order to protect the Purchaser from divided warranty responsibility between chassis, aerial, device and body manufacturers, KME is proposing a vehicle, which is designed, fabricated, and assembled by KME personnel in KME owned facilities. This will include the cab shell, chassis assembly, aerial device, and complete body structure.

HIGHEST PRODUCT LIABILITY INSURANCE

KME is offering **$25,000,000.00** in Product Liability Insurance for the entire vehicle. This coverage is the highest available in the fire industry, proving KME's product confidence and stability as a fire apparatus manufacturer.

PROOF LOAD TESTING

To ensure structural integrity and reduce weld fatigue, the proposed KME Aerialcat will be put through an extensive proof load test. Prior to delivery, weights ranging from 2250 lbs. to 4877 lbs. (depending on model) will be applied on the aerial structure located at critical points on the structure with the ladder @ 0-degrees of elevation and fully extended. The weight will be applied for a period of ten minutes. Results of this test are reviewed by KME engineering before the device proceeds to NFPA-1901 testing. With each production vehicle tested prior to delivery, we give our customers the capability to witness this test to prove the device they are purchasing is reliable and the strongest offered in the industry.

The KME Aerialcat ladder sets new standards for aerial towers and ladders. At the time of their introduction, little or no hard data existed on aerial design and safety. Since then, the industry has improved design standards, but they still do not address the KME Aerialcat fatigue and dynamic analysis. This is why the KME Aerialcat ladders stand alone as the strongest in the industry with tests to prove it.

Remember; this test is performed above and beyond any required NFPA-1901 testing!

TURNTABLE RETENTION BOLTS

The proposed aerial device turntable is designed with turntable retention bolts as a safety feature to support the ladder in the unlikely event of a weld failure on the turntable. Two (2) 1 3/4" hardened, high strength bolts, which are located adjacent to the ladder heel pin, one (1) each side, extend from the heel pin through the bottom of the main turntable bearing plate. The bolts are designed to withstand high torque and apply compression to the welds throughout the turntable structure, reducing stress and loads on the welded structure during aerial operation. The KME Aerial cat ladder is the only ladder in the industry to offer this added safety feature.

FULL WIDTH HEEL PIN

All Aerialcat ladders and platforms are designed with a full width heel pin at the turntable/ladder pivot point. The full width heel pin will allow for the ladder base section and turntable to be equipped with large pin journals, which reduce wear and distribute loads. This design also increases the stability of the ladder when the dynamics of vertical and lateral full speed starts and stops are experienced.

FULL LENGTH LADDER BASE RAIL/SLIDE JOURNALS

All Aerialcat ladders and platforms are designed with a full-length ladder slide journal. Each rung base rail is formed to provide a full-length integral overlapping design on each ladder section. This design provides larger ladder base rails cross sections and larger wear pads, which distribute the loads placed on each ladder overlap section, resulting in longer wear pad life. The formed design increase the actual overlap area and square inches of material in the base rails, increasing the lateral and vertical strength, setting the KME Aerialcat ladder apart from any other manufacturer.

The full-length formed base rail design also prevents any possibility of the ladder sections from coming apart.

This design allows each lower base section to house the ladder extension cylinders within the section base rail, yielding enclosed extension cylinders.

ENCLOSED EXTENSION CYLINDERS

The extension/retraction system on all Aerialcat ladders and platforms utilize an exclusive system in which the cylinder are independent from the pulleys and cables, operate on a 1:1 ratio and are enclosed inside the base rail of the ladder mid-section. The cylinders being independent from the pulleys and cable, allow the cylinders to be removed or repaired without the need to disassemble the cable or pulleys, decreasing downtime.

The enclosed extension cylinders yield cylinders that do not obstruct the underside of the ladder, cylinder that cannot be expose to heat, road grime, ice or the possibility of damage or bending from a firefighter stepping on the cylinder rod. The cylinder rod is never exposed! Do to the location of the cylinders; they can be removed from the ladder with the removal of 4-bolts and a pin, also without the need to touch the cables. The 1:1 ratio reduces the amount of moving parts and reduces the loads on each component, which is associated with multiplier type system, yielding lower maintenance cost.

1/4" ICE RATING

All KME Aerialcat ladders and platforms are designed to withstand a 1/4" of ice build up on the entire structure, which could be equivalent up to 4600 lbs. of additional weight on the entire device. This rating was developed due to real life operation possibilities associated with an aerial ladder when in water tower operation in cold weather environments. No other aerial device has this calculation built into its design!

50 MPH WIND RATING

All KME Aerialcat ladders and platforms are designed to withstand a 50 MPH wind gust, which add dynamic loads to the aerial structure. This rating was also developed due to real life operation possibilities associated with an aerial ladder when operating in bad weather conditions. No other aerial device has a 50 MPH wind calculation built into its design!

INTERNAL TOOTH ROTATION BEARING

KME utilizes an internal tooth monorace rotation bearing on the turntable. Due to the drive teeth being located on the inside of the bearing, the turntable and torquebox bearing plates are larger in width and length, which allow the actual bearing area to be larger, yielding a greater surface area for the loads to be distributed. The drive gear and bearing teeth are not exposed to foreign objects, ice, road grim, etc.,

which eliminate wear and the possibility of an object getting caught between the drive teeth. The position of the rotation drive is to the inside of the bearing, allowing the turntable deck to be unobstructed by drive motors or gearboxes. The larger bearing surface area and increased distributed loads ultimately reduce wear on the rotation bearing!

PARKER HANNIFIN COMPONENTS & LEAK FREE WARRANTY

The Aerialcats hydraulic system is designed to provide the most efficient, leak-free system in the industry. The KME Fire Apparatus aerial line has been certified as a Parker Genuine Parts design. The connector systems have been jointly designed by engineers from both KME and Parker Hannifin and incorporate the following design upgrades and advantages to the customer:

1. All hydraulic ports (manifolds, pumps, tank, etc) to elastomeric sealing technology;
   A. No pipe threads in the entire hydraulic system
   B. Sealing is done by O-rings with the mechanical holding power of straight threads.
2. All tube and hose connections to Parker Seal-Lok, O-ring face seal technology.
3. Sealing is done by o-ring with the mechanical holding power of straight thread.
4. Fittings are rated up to 6000 psi.
5. Drop-in design of Seal-Lok connectors allows for easier maintenance and assembly.
6. Fitting resist 200% over torque, with optimum vibration resistance.
7. Shaped fittings are machined from forged bodies for compact design and strength.
8. Fittings meet/exceed the performance and dimensional requirements of SAE J1453.
9. Minimized unnecessary fittings and adapters, streamlining the system.
10. Increased connector accessibility, making assembly and maintenance easier.
11. Standardized the connector system on the Aerialcat unit.
12. Incorporated pressure diagnostic system with Parker PD diagnostic test points into the connector design.

KME is providing a Parker Hannifin three-year leak free guarantee, which warrants the Seal-Lok, O-ring face seal connections to be leak-free for a period of three (3) year. This design assures the fire department the device is equipped with the best components available and reliability when needed!

UNDERWRITERS LABORATORY CERTIFICATION

All KME Aerialcat ladder and platforms are Type I tested and certified by Underwriters Laboratories Inc. Type I testing is a higher quality test, which means every weld is tested in the weld shop, prior to paint and assembly, so every weld is exposed, accessible and tested.

Underwriters Laboratories Inc. (UL) is known and recognized worldwide as a leading third party product safety certification organization for over 100 years. UL has served on National Fire Protection Association (NFPA) technical committees for over thirty years.

1. UL is a nationally recognized testing laboratory recognized by OSHA.

2. UL complies with the American Society for Testing and Materials (ASTM) Standard ASTM E543 "Determining the Qualifications for Nondestructive Testing Agencies."

3. UL has more than 40 years of automotive fire apparatus safety testing experience and 16 years of factory aerial device testing and Certification experience. UL has more than 100 years of experience developing and implementing product safety standards.

4. UL does not represent, is not associated with, nor is in the manufacture or repair of Automotive fire apparatus.

5. All work outlined in NFPA 1914, current Edition, including nondestructive testing, will be conducted at the manufacturer's facility. In addition, the following test work outlined in Section 20-24, Certification Tests, of NFPA 1901, 2003 Edition will be conducted:

   (a.) 1-1/2 Times Rated Capacity on Level Ground Stability Test: A load of 1-1/2 times rated capacity (as specified by the manufacturer) will be suspended from the tip of the aerial ladder, or the platform of the elevating platform, when it is in the position of least stability. If the manufacturer specifies a rated capacity while flowing water, then one times the water load and the worst-case nozzle reaction will be added to the stability test weights. The apparatus will show no signs of instability. For a water tower, the stability test includes 1-1/2 times the weight of the water in the system and 1-1/2 times the maximum nozzle reaction force when it is in the position of least stability.

   (b.) 1-1/3 Times Rated Capacity on a 5 degree Slope Stability Test: A load of 1-1/3 times rated capacity will be suspended from the tip of the aerial ladder, the platform of the elevating platform, or the tip of the water tower when it is in the position of least stability. The apparatus will show no signs of instability.

   (c.) Aerial Device Water System Tests: A friction loss test will be conducted for an aerial device equipped with a permanent water system and has a rated vertical height of 110 ft. or less. The standard model flow test results will be provided to the manufacturer. If the water system has been modified from the standard model configuration, a new flow test will be conducted to determine that the friction loss in the water system between the base of the swivel and the monitor outlet does not exceed 100 psi with 1000 GPM flowing and the water system at full extension.

   (d.) A maximum vertical height flow test will be conducted to determine that the water system is capable of flowing 1000 GPM at 100-psi nozzle pressure with the aerial device at full elevation and extension. If the apparatus is equipped with a fire pump designed to supply the water system, the test will be conducted using the onboard fire pump. The intake pressure to the fire pump will not exceed 20 psi.

6. UL provides the manufacturer a complete written Examination and Test Report for each aerial device inspection performed at the manufacturer's facility. This Report specifies the points of inspection and results of such examinations and tests. The test report, as required by NFPA 1914, will include the following test results:

   (a.) Torque verification of all mounting bolts including bolt size, grade, and torque specification.

   (b.) The following NDT methods and results will be recorded: All ferrous welds will be magnetic particle inspected for defects. All nonferrous welds will be visually inspected, and if questionable defects are identified, dye penetrant will be used to further evaluate the quality of the weld. All bolts and pins will be ultrasonically inspected for internal flaws.
   (c.) The following measurements will be taken and recorded in the examination and test record: bearing clearance and backlash, elevation cylinder drift, engine speed operating rpm, relief pressure, stabilizer extension cylinder drift, ladder section twist, hardness readings, base rail thickness, winch drift, extension brake drift, and extension cylinder drift.

7. All test work for fire pumps outlined in Section 16-13 of NFPA 1901, 2003 Edition will be conducted.

8. UL has included a list of all factory aerial device manufacturers for whom testing is currently being conducted on a regular basis.

9. UL carries ten million dollars in excess liability insurance for bodily injury and properly damage combined.

TESTING PERSONNEL

The UL inspectors performing the test work on the units are certified to Level II in the required NDT methods, under the requirements outlined in ASNT document CP-189.

The actual person(s) performing the inspection will present for review proof of Level II Certification in the required NDT methods.

Prior to submittal to the automotive fire apparatus manufacturer, the final Report will be reviewed by the Supervisor of Fire Equipment Services and a Registered Professional Engineer, both of whom are directly involved with the aerial device certification program at UL.

CERTIFICATION

1. When the unit successfully meets all the requirements outlined in NFPA 1901, 2003 Edition, UL will issue a Certificate of Automotive Fire Apparatus Examination and Test stating the units compliance with Section 20-24.

2. When the unit successfully meets all the requirements outlined in NFPA 1901, 2003 Edition, UL will issue a Certificate of Automotive Fire Apparatus Examination and Test stating the units compliance with Section 16-13.

FORCE DISTRIBUTION MEMBERS

The KME Aerialcat ladder is the only ladder designed with base section “Force Distribution Members”.

The force distribution members provide maximum overlap strength between the base and mid ladder sections, which include a series of exterior sidewall reinforcements welded along the outer wall of the base section side rails, on both sides.

A minimum of seven force distribution members will be provided to distribute dynamic vertical and lateral loads applied to the aerial base section when full speed rotation and elevation starts and stop occur.

The structure members are located on the exterior of the ladder to allow ease in testing and inspection.

Internal stress reinforcements are undesired, because they cannot be welded continuously to the interior of the base side rail components and the welds cannot be visually inspected after the ladder sections are assemble.

TRIPLE FRAME RAILS

All KME Aerialcat ladders and platform chassis are constructed using a triple frame rail design to provide driving stability and a long life, durable chassis. A double main frame rail extends from the front to the rear of the vehicle, with a third frame rail liner extending from the front axle to the rear axle for added structural integrity in the torque box and chassis belly area.

All KME frame rails are offered with a lifetime warranty, including the frame cross members.

100 GALLON FUEL TANK

KME can offer a 100-gallon fuel tank on all heavy duty Aerialcat platforms and ladders. This will allow the truck to work on scene for an extended period of time if needed.

SANDBLASTED DEVICE COMPONENTS

All Aerialcat ladder and platform weldments are sandblasted prior to the paint process, only after Underwriters Laboratory tested and inspect the components. Sandblasting the components removes mill slag, oils, rust, etc., ensuring greater paint adhesion to the metal.

Testing prior to paint increases the capability of UL find all discrepancies, which can be hidden by paint. Sandblasting is one step many manufacturers skip due to its added cost and company restricted capabilities. Every component on an Aerialcat ladder incorporates this process!

FLOATING WATERWAY MOUNT

All Aerialcat ladders and platforms utilize a floating waterway mount design. This allows the waterway sections to move up and down under the ladder sections in the event the waterway contacts a parapet, awning or building.

Each mounting point on the waterway is designed with ears that set on heavy-duty supports attached to the ladder sections, these supports are equipped with 1/2" x 3” bolts that extend through the water mounts, providing a minimum of 2" of movement up and down. This design reduces the possibility of the waterway and waterway seals from being damaged.

WATER ROTATION SWIVEL

The waterway rotation swivel in an Aerialcat ladder or platform is design with 32 individual collector ring circuits as a standard feature. This design allow the customer to upgrade their desired components at the ladder tip in platform, without the need to worry if enough circuit are available. In the event of a collector ring circuit failure, the additional circuits give a technician added circuit to switch channels, minimizing vehicle downtime.

+82° ELEVATION CAPABILITY

All Aerialcat ladders and platforms are designed to have the capability of elevating to +82°. Although this is not recommend for climbing, this capability gives the fire department the ability to setup the vehicle in tight or restrictive area, because when the ladder is elevated to maximum elevation, the end of the ladder or platform are within the width of the outriggers. This is very important when on a mid-mount the ladder must be positioned over the cab or on a rear mount the ladder must be positioned over

the rear, this capacity allows the operator to rotate the aerial past obstruction like trees, wires, buildings, etc. Remember if the outrigger can be set, the ladder will be capable of rotating within the width of the outriggers, another great advantage.

CRADLE PLATFORM MOUNT

All Aerialcat platforms are designed to be suspended from the end of the ladder fly section by an integral "cradle" shaped assembly that supports the platform beneath the center axis of the floor. This cradle design will transfer all platform loads directly to the ladder structure, not through the platform structure or leveling system. This system ensures that forces will not be transferred through the platform structure or leveling system when the platform is positioned on the ground or on a building roof, due to the cradle arms being the only component capable of contacting the ground or a building. Due to the platform pivot point being under the center of platform, the platform leveling system operates at lower pressures due to the leveling cylinders not supporting the weight of the platform or the load in the platform, yielding absolute, precise and smooth platform leveling.

The cradle arms also provide a structure for two (2) lifting eyes; these lifting eyes are attached to the cradle structure, which is the ladder structure, so if lifting is required, the loads are applied to the ladder, not the platform or leveling system.

COMPUTERIZED OUTRIGGER LEVELING SYSTEM

In addition to manual outrigger controls, the proposed Aerialcat device is equipped with a computerized automatic outrigger leveling system. The operator will have the option to manually or automatically set the outriggers by just activating two (2) control switches. The computerized system will assure full outrigger extension, proper jack penetration, and will level the vehicle within 1/2 degree of level for safe operation of the aerial device with 30 seconds.

When aerial operation are complete and the device is stowed, the system will automatically stow the outriggers if desired by the operator. When the operator activates the "Stow" button the outriggers will lower the truck to the ground (retracting the jacks), the system will pause for ten (10) second, then retract the outriggers to their full nested position. This system completely enhances the mechanical system provides a quick, accurate set-up in an emergency situation.

DEEPER COMPARTMENTS

The Aerial body is design to provide the maximum amount of compartmentation possible, yielding 27" deep lower compartments and 14" high air pack type compartments. This is a critical feature when trying to store PPV fans, saw boxes, etc in body compartments.

BEVELED OVERLAPPING DOORS

All Aerialcat ladder and platform bodies with hinged doors utilize 3/16" aluminum, beveled overlapping door design. This prevents the doors from binding when the outriggers are set; due to the possibility of the body flexing when the outriggers are set or aerial is being operated. The bevel on each door makes the door much more rigid and provide a great sealing surface for the compartment weather striping seal. The bevel also allows the hinged pivot point to be near the edge of the door exterior, allowing the door and door inner pan to pivot away from the compartment opening edge, yielding a clear, unobstructed door opening when the door is opened. The beveled door also make the inner door pane to only extend into the compartment approximately 1" less when the door is closed, yielding a deeper compartment when the door is closed.

AIR RIDE REAR SUSPENSION

KME is offering a chassis equipped with an air ride type rear suspension. An air ride suspension provides a superior ride and at the same time reduces vibration frequencies transferred from the road to the vehicle chassis, cab, body and aerial device. This feature reduces wear and tare and the possibility of fastener loosening on the chassis and aerial device.

EXCEPTIONS AND / OR CLARIFICATIONS

1. PAGE 21 CHASSIS FRAME ASSEMBLY

The chassis frame rail system will consist of two (2) full length primary frame rails, two (2) secondary frame rails extending from the front of the chassis to the center of the rear most primary cross member support, a third liner provided between the front stabilizers and the rear suspension. Mounted on top of the primary, secondary, and tertiary frame reinforcements there will be a heavy duty, welded steel "torque box" spanning from the forward point of the forward outriggers / downriggers to the rear of the chassis.

2. PAGE 83 WATER TOWER OPERATION

The approved flow rate of the water tower above the centerline as far as the deck gun design allows will be for a maximum of 1000 GPM.

Barry:

After reviewing the proposal you provided we realize the total cost for what meets our needs exceeds budget allocations. Would you be willing to sell the Aerial with a 100% performance bond and 3 year warranty for $ 795,000? We do need clarification on the list of questions below. If we can reach an agreement on the selling price I am prepared to go to the Board of Commissioners (BOC) requesting they approve by resolution the approval to purchase the KME Aerial with the 100% prepayment option. The BOC would take action on this resolution on November 27, 2006. I would brief the item to the BOC on November 13, 2006.

1) The roof notch on page 15, it should not be notched to reduce the interior crew area height.
2) The electric window controls for the driver and officer need to be located on the dash or higher on the door as they are hit be the occupants knee.
3) The cab door overlays should be full height
4) The cab jamb overlays, I want to make sure they extend an inch wrap around to the body.
5) Exterior cab overlay should state to wrap around the cab 2”
6) Windshield glass needs to be easily replaceable by local dealers
7) The grill should be polished
8) Wheel well liners needs to state 1/8” material
9) Interior cab trim page 18 the last line, the door panel should be stainless steel full height
10) The SCBA seats needs to state that the mounting brackets can be moved by unbolting, relocating, and rebolting to the desired position
11) Seat upholstery should be light gray and black speckled
12) SCBA inserts should state the insert cover will be padded and made of the same material as the seat and the seat back insert will be designed to support the firefighters back, with or without the SCBA bottle in place. The insert is held in place with two elastic cords
13) Should also include supplying and mounting an irons set in the cab on the tool board in roll over compliant brackets
14) Tow hooks does not list the 15000 lb pull rating
15) The rear suspension should list the two additional 1700 cu. In. reservoirs to supply the air suspension
16) We would like the retarder to activate on the gas pedal not the brake
17) Battery charger mounting location should be behind the drivers seat
18) We would like the cab map light on the officer side ceiling
19) That is a different model than the one listed
20) Unable to find the rear deck lights our spec #136
21) Pump enclosure should have two lights inside one each side with individual switches
22) Engine compartment should have two LED lights with individual switches
23) All emergency lights should have individual switches
24) Zone A lower page 50 should have four headlight mounted flashing LEDS

25) Zone C warning lights should have two LED's along with the rotators
26) The back up alarm should automatically adjust level for ambient noise levels
27) Different model for the siren and speakers
28) Need an additional siren brake button on the officer side
29) A Harrington intake valve should be provided on the RT side of the 6" pump panel
30) The discharge should be on the officer side
31) The crosslay cover should have a diamond plate cover with Hypalon end covers and short pigtails for the crosslays
32) The pump panel removable access we would like to have them secured with D handle and not the bolts
33) Should have five lights on the pump panel lighting
34) The compartments do not state the compartment as stated in our item 214 with dividers
35) The body trim listed as optional should be standard
36) Rear liners need to state 1/8" liners
37) Need to have 8 air bottle holders not 7
38) Needs to state 1000' of 5" in hose bed
39) The 120 volt lighting should be the model #'s we have listed in our 255, 256, 258, 356 and 357; they are not the focus models.
40) Needs to state that a mechanism to hold the ladders in place
41) We would like to change the 6 FT pike poles to New York hooks
42) Only 67 gallon tank and does not state it can be checked without raising the ladder
43) Our # 201 and 292 specify a warning message for bypass
44) You do not state the unit can be operated at 12' short jack
45) Outrigger lights need to be LED style
46) Outrigger controls need to have Hydraulic filter plugged indicator light
47) Need to have a level gauge in the cab
48) Only has 32 circuit requested 36
49) Need to include stokes basket as well as mount
50) Needs to have a set of irons (flat head and hooligan) in basket
51) Needs to have blue lights for cradle illumination lights
52) Can the basket openings be clear of the rail so you do not have to bend over to get out or in?
53) Need to check the square footage of basket area
54) Need to have rappelling arms as in our #352
55) Needs a angle indicator at the base and basket area
56) Nozzles need to be Sabremaster 1577
57) Needs to include service manuals

MORRISVILLE AERIAL SPECIFICATIONS

The bid for the Town of Morrisville Aerial will be advertised for 30 days starting August 18th 2006.
There will be a pre bid conference held at Morrisville Fire Station 1 on the 30th 2006 of August at 9 AM.
Station address:
100 Morrisville-Carpenter Road
Morrisville, NC 27560.

All bids must be delivered to:
Attn: Laurel Belanger
100 Town Hall Dr
Morrisville, NC 27560

All Bids must be received by September 18th 2006 at 12 PM

Bids will be opened on September 18th 2006 at 12 PM at Morrisville Town Hall Board of Commissioners Room

MANUFACTURES THAT BID INFORMATION WILL BE SENT TO:

KME
Barry Slagle
Slagle's Fire Equipment
1100 Bill Tuck Hwy
South Boston, VA 24592
Phone # (434) 575-7905
Fax# (434) 572-3373
www.slaglefire.com

SUTPHEN
Stevens Fire Equipment
Jerry Stevens
1000 E. Union St.
Morganton, NC 28655
Phone # (828) 439-9575 / (800) 859-2802
Fax# (828) 439-9902
E-mail sales@stevensfire.com
www.stevnsfire.com

PIERCE
Triad Fire Inc.
330 Pineview Dr.
P.O. Box 588
Kernersville, NC 27285-0588
Phone# (336) 996-2771
Fax# (336) 996-0649

E-ONE INC.
Fred Cureton
Director Southeast Region
Phone# (205) 608-4468
Mobile# (352) 859-0738
Fax# (205) 681-7239
E-mail fcureton@e-one.com

SMEAL
Metrolina Fire & Rescue Inc.
Rick Spake
602 E. Main St.
P.O. Box 834
Lincolnton, NC 28093
Phone# (704) 748-1320 / (888) 844-1320
Fax# (704) 748-1391
E-mail metrolinafire@metrolinafire.net
www.metrolinafire.net

SEAGRAVE
Rod Warner
Direct Sales Manager
Phone# (919) 614-6365
E-mail rod.warner@segrave.com

ROSENBAUR
C.W. WILLIAMS
David Eatmon Jole Callinhan
Office# (252) 977-3610 # (919) 497-7381
501 Instrument Drive
P.O. Box 7757
Rocky Mount, NC 27804
Phone# 1-800-277-3473
Fax# (252) 977-9241

AMERICAN LAFRANCE
JOHNSON FIRE & SAFTY
Bobby Johnson
General Manager
3101 Williamsburg County Highway
Cades, SC 29518
Phone# (800) 671-2784
E-mail bobby@johnsonfire.net

FERRARA
First Choice Fire & Safety Inc.
Mike Bordeaux
3414 University Station Road
Chapel Hill, NC 27514
Phone# (919) 383-3477 / 1-888-491-8501

GENERAL INFORMATION
Each bidder must indicate his compliance with these specifications by marking [Y] for "YES" or [N] for "NO" in the right hand column for each paragraph of this specification.

Indicating "YES" to a paragraph will mean full compliance; indicating "NO" will mean an exception is being taken.

The proposed apparatus will be constructed to withstand the severe and continuous use encountered during emergency fire fighting services. The apparatus will be of the latest type, carefully designed and constructed with due consideration to the nature and distribution of the load to be sustained.

All component manufacturers required procedures and materials shall be utilized as required to maintain the integrity of the warranty of that component. The final apparatus delivery will include a certification that the builder is approved by the component manufacturer and that all construction features and processes used comply with those required to maintain the warranty.

These specifications detail the proposal for general design criteria of cab and chassis components, aerial device, fire pump and related components, water tank, fire body, electrical components, painting, and equipment.

All items of these proposal specifications will conform to the National Fire Protection Association Standard 1901, 2003 Edition.

Builder will furnish satisfactory evidence of their ability to construct, supply service parts and technical assistance for the apparatus specified.

Apparatus and equipment must meet the specific requirements and intent of the requirements as specified herein. All items of these specifications will conform to the character of the proposed apparatus and the purpose for which it is intended. Criteria as specified by the National Fire Protection Association Standard No. 1901, 2003 Edition, entitled "Suggested Specifications for Motor Fire Apparatus". And approved by the American Insurance Association and International Association of Fire Chiefs, is hereby adopted and made a part of these specifications the same as if they were written out in full, insofar as they apply and are not specifically modified in the following detailed specifications. Bidder will provide only that equipment as required in the following specifications.

The fire apparatus and equipment to be furnished in meeting these specifications must be the products of an established, reputable fire apparatus and/or equipment manufacturer.

Each bidder will furnish satisfactory evidence of the manufacturer's ability to construct, supply service parts and technical assistance for the apparatus specified. The bidding company must state the location of the factory and location for post delivery service.

Each bidder will supply proof of product liability and facility insurance as well as proof of insurance for the designated repair center. Proof of insurance shall include the total dollar amount of insurance. **(No Exceptions.)**
The contractor will supply, at the time of delivery, at least two (2) copies of the following documents:

The manufacturer's record of apparatus construction details, including the following information:

1. Owners name and address
2. Apparatus manufacturer, model, and serial number
3. Chassis make, model, and serial number
4. GAWR of front and rear axles
5. Front tire size and total rated capacity in pounds
6. Rear tire size and total rated capacity in pounds
7. Chassis weight distribution in pounds with water and manufacturer mounted equipment front and rear
8. Engine make, model, serial number, number of cylinders, bore, stroke, displacement, compression ratio, rated horsepower and related speed per SAE J690, Certificates of Maximum Net Horsepower for Motor Trucks and Truck Tractors, and no-load governed speed.
9. Type of fuel and fuel tank capacity
10. Electrical system voltage and alternator output in amps.
11. Battery make and model, capacity in CCA
12. Transmission make, model and type
13. Pump to drive through the transmission yes or no
14. Engine to pump gear ratio and transmission gear ratio used.
15. Pump make, model, and rated capacity in gallons per minute, serial number, number of stages and impeller diameter in inches.
16. Pump transmission make, model and serial number.
17. Priming device type.
18. Type of pump pressure control system.
19. Water tank certified capacity in gallons
20. Paint numbers
21. Company name and signature or responsible company representative
22. The pump manufacturer certification of suction capability.
23. A copy of the apparatus manufacturer's approval for stationary pumping applications.
24. The apparatus engine manufacturer's certified brake horsepower curve for the engine furnished, showing the maximum no-load governed speed.
25. The apparatus pump manufacturer's certification of hydrostatic test.
26. The apparatus fire pump Underwriters Laboratory certification of inspection and test for the fire pump.
27. Weight documents from certified scale
    A. Showing actual loading on the front axle, rear axle(s) and overall vehicle (with the water tank full but without personnel, equipment and hose)
    B. Shall be supplied with the complete vehicle to determine compliance with Section 8-1

The apparatus manufacturer as conforming to all applicable federal motor vehicle safety standards will certify the chassis in effect at the date of contract. This will be attested to by the attachment of a Federal Motor Vehicle Safety Standard certification label on the vehicle by the contractor who will be recognized as the responsible final manufacturer.

The successful bidder will be responsible for preparing and maintaining a record file of parts and assemblies used to manufacture the apparatus. These records will be maintained in the factory of the bidder for a minimum of twenty (20) years. The file will contain copies of any and all reported deficiencies, all replacement parts required to maintain the apparatus, and original purchase documents. This shall include but not be limited to specifications, contract, invoices, incomplete chassis certificates, quality control reports and final delivery acceptance documents. The purchaser will have access to any and all documents contained in this file upon request.

Bids will be addressed and submitted in accordance with the advertised "Bid Notice". The words "Fire Apparatus Bid", the date, and the bid opening time must be stated on the face of the bid envelope. It is the bidder's responsibility to see that their proposals arrive on time. Late proposals, telegram, facsimile or telephones bids will not be considered.

Each bid will be accompanied by a detailed description of the apparatus and equipment it proposes to furnish. It is the intent of these specifications to cover the furnishing and delivery of a complete and soundly engineered apparatus equipped as specified. 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.

Brand name or model numbers have been specified for some items. These have been carefully selected because of their reliability and availability for replacement locally. In order to be most responsive, items named, or an item "equal to" the particular item specified by brand name or model, should be contained in the bid proposal. It is the bidder's responsibility to prove to the Purchaser that an item bid as "equal to" a particular specified item, is truly of equal quality, design, and function as the specified item. The Purchaser maintains the right to make a final decision as to the acceptability of an item bid as "equal to" a particular specified item.

No exceptions will be allowed for any of the aforementioned instructions. Bids not submitted in accordance with these instructions will be rejected.

SPECIAL CONDITIONS
No bid will be considered unless the bidder can meet the special conditions stated herein.

The complete apparatus must be manufactured in the United States of America.

PRICES AND PAYMENTS
The bid price will be F.O.B. Destination, on a delivered and accepted basis at the Fire Department.

Total price on bidder's proposal sheet must include all items listed in these specifications. Listing any items contained in the specification as an extra cost item, unless specifically requested to do so in these specifications, will automatically be cause for rejection.

Bidder will compute pricing less federal and state taxes. It is understood that any applicable taxes will be added to the proposed prices, unless the purchaser furnishes appropriate tax-exempt forms.

BID EVALUATION

Accepted bids received ***will be evaluated***. This evaluation will be based as a minimum on the following criteria:

Commitment of an expedient delivery.
Commitment to the general conditions contained herein, including warranty.
Completeness of the proposal, i.e. the degree which it responds to all requirements and requests for information contained herein.
Contractor's demonstrated capabilities and qualifications.
Equipment suppliers and/or local representative's demonstrated capabilities and qualifications.
Cost

EXCEPTIONS TO SPECIFICATIONS

Exceptions will be referenced to the item number and which of the specifications the exception applies to. Drawings, photographs, and technical information about the exception will be included as necessary. Any exceptions may be considered during the evaluation process, and the decision will be final.

Proposals taking total exceptions to specifications will not be accepted.

		Yes/ No
1.	**TECHNICAL INFORMATION** Bidder will furnish free of charge, upon request, technical information, graphs, charts, photographs, engineering diagrams, steering geometry, drive train certifications, instruction guides, or other documentation as requested to show that the equipment offered fully complies with these specifications. The successful bidder shall provide blueprints, which have been produced on computer-aided-design equipment. The blueprints submitted shall match exactly to the purchaser's specifications and are on "D" size paper, 24 inches x 36 inches. The blueprints are provided as follows: A - Left side B - Right side C - Rear view D - Top view The final production blueprints shall be provided and approved by the customer prior to any metal being sheared. The design of the equipment is in accordance with best engineering practices. The equipment design and accessories installed shall permit accessibility for use, maintenance and service. All components and assemblies shall be free of hazardous protrusions, sharp edges, cracks or other elements, which might cause injury to personnel or equipment.	
2.	**DELIVERY TIME** Each bidder will state the completed apparatus delivery time based on the number of calendar days, starting from the date the sales agreement is awarded and accepted by the apparatus manufacturer.	
3.	**BOND REQUIREMENTS** Any bonds or sureties (bid, performance, or other) required by the Purchasing Organization will be as specified below or as requested in the advertised "Bid Notice". A bid bond shall be submitted with the bidder's proposal. The bond will be for an amount equal to 10% of the proposed bid price. Failure to provide an acceptable, valid bid bond with the proposal shall result in the immediate rejection of the bidder's proposal. A performance bond shall be supplied by the successful bidder/manufacturer upon acceptance of the purchase agreement for the apparatus. The performance bond shall be for an amount equal to the full contract price (i.e. 100% bond). All bonds must be provided by the apparatus manufacturer; bonds provided by a sales representative, dealer, distributor, or agent of the apparatus manufacturer will not be acceptable. With respect to the qualifications of proposed bonds or sureties, the bidder's bonding company must meet the following requirements: a. An acceptable surety as outlined by the department of treasury on their most recent federal register at a limit of at least $10,000,000; b. A.M. Best rating of "A" or better with a financial rating of at least "VIII"; and c. Licensed as a surety in the state where the sale is to be made.	
4.	**USER'S LIST** Each bidder shall include a current "User's List" with a minimum of five (5) units that are within 250 miles of the purchaser. This list shall include customer name, person to contact, address and telephone number. Failure to include this list will result in rejection of the bid.	

5.	**MATERIAL AND WORKMANSHIP** All equipment furnished will be guaranteed to be new and of current manufacture, to meet all requirements of these specifications, and to be in intended use condition at time of delivery. All workmanship will be of high quality and accomplished in a professional manner so as to insure a functional apparatus with a pleasing, aesthetic appearance.	
6.	**WARRANTY** As a minimum, the apparatus manufacturer will warranty the apparatus against defects in workmanship and materials for a period of one (1) year from the date of delivery of the completed apparatus to the Purchaser. The mid ship fire pump shall have a warranty of two (2) years for all parts and labor. The bidding service center shall be a Hale authorized warranty repair/service center. The apparatus body shall have a minimum of a five (5) year warranty against structural defects. The chassis cab structure shall have a ten (10) year warranty against structural defects. The apparatus cab and body shall have a ten (10) year third party warranty against corrosion/rust per formation. The paint process utilized on the apparatus shall have a minimum of a seven (7) year Non-Prorated warranty.	
7.	**CONTRACT AWARD** The Purchaser reserves the right to reject any or all bids deemed to be unresponsive. The Purchaser also reserves the right to waive any informalities, irregularities and technicalities in procedure. The Purchaser reserves the right, before awarding the contract, to require a bidder to submit evidence of his qualifications as may be deemed necessary. Documentation, which may be required, is financial soundness, technical competency, and other pertinent qualifications of a bidder, including past performance (experience) with the Purchaser. Upon award of contract, the sales contract will be between the Purchaser and the manufacturer of the apparatus. Contracts between the Purchaser and a sales representative, dealer, distributor, or agent of the apparatus manufacturer will not be acceptable. (No Exceptions.)	
8.	**SALES ENGINEER** The successful bidder will designate a competent individual, acceptable to the purchaser; to perform the contractor's sales engineer functions. The sales engineer will provide a single point interface between the purchaser and the contractor on all matters concerning the contract.	
9.	**APPROVAL DRAWINGS** The purchaser prior to any metal being sheared or cut for the unit will approve detailed blue prints. The purchaser, manufacturer's representative and the apparatus manufacturer shall each have a copy of this blue print. Upon purchaser's approval, this print will become a part of the total contract. Drawings shall detail the following but not be limited to such items as how the chassis is being utilized, lights, sirens, all compartment locations and dimensions, special suctions, discharges, etc. Blue prints shall be a visual interpretation of the unit as it is to be supplied.	
10.	**INSPECTION VISITS** The successful bidder shall provide three (3) factory inspection trips for up to three (3) Fire Department representatives, to the apparatus manufacturer's facility. Transportation, meals, lodging, and other requisite expenses will be the bidder's responsibility. Transportation shall be via commercial airlines if the distance between the Town of Morrisville and the manufacturing facility is greater than 300 miles one way. The factory visits will occur at the following stages of production of the apparatus: 1.) Pre-Construction/Blueprint Review 2.) Pre-Paint inspection 3.) Final inspection upon completion The purchaser maintains the right to inspect the apparatus, within manufacturer's normal business	

	hours, at any other point during construction. Expenses incurred during non-specified inspection visits will be the responsibility of the purchaser. During inspection visits, the purchaser reserves the right to perform actual performance tests to evaluate completed portions of the unit. Testing will be accomplished with the assistance and resources of the contractor.	
11.	**DELIVERY, DELIVERY ENGINEER, AND TESTING** Delivery of the apparatus to the Fire Department shall remain the bidder's responsibility. A qualified and responsible representative of the contractor shall deliver the apparatus to Morrisville Fire Department, and remain in the purchaser's community for a sufficient time (normally three days), to instruct fire department personnel in the operation, care, and maintenance of the equipment delivered, and to mount small equipment items that were ordered with the apparatus. Before final acceptance of the apparatus, it will be tested in the presence of authorized representatives of the Purchaser. In the event the apparatus fails to meet the test requirements on first trial, a second trial may be made within thirty (30) days of the date of the first trial. Housing of the apparatus will not constitute acceptance until testing is successfully completed.	
12.	**INSTRUCTION MANUALS/DRAWINGS, SCHEMATIC** In accordance with standard commercial practices, applicable to <u>each</u> vehicle (including body and special equipment) furnished under the contract, the following listed manuals and schematics, in the quantity specified, will be provided at time of delivery of each vehicle. The contractor will supply at time of delivery, at least two copies of a complete operation and service manual covering the complete apparatus as delivered and accepted. The manual shall contain at least the following information: A. Descriptions, specifications, and ratings of chassis, and pump. B. Wiring diagrams C. Lubrication charts D. Operating instructions for the chassis, any major components such as a pump or engine, and any auxiliary systems. E. Instructions regarding the frequency and procedures recommended for maintenance. F. Parts replacement information	
13.	**VEHICLE FLUIDS PLATE** As required by N.F.P.A., the contractor will affix a permanent plate in the driver's compartment specifying the quantity and type of the following fluids used in the vehicle: A. Engine Oil B. Engine Coolant C. Chassis Transmission Fluid D. Pump Transmission Lubrication Fluid E. Pump Primer Fluid (if applicable) F. Drive Axle(s) Lubrication Fluid G. Air Conditioning Refrigerant H. Air Conditioning Lubrication Oil I. Power Steering Fluid J. Cab Tilt Mechanism Fluid K. Transfer Case Fluid L. Equipment Rack Fluid M. Air Compressor System Lubricant N. Generator System Lubricant O. Aerial Hydraulic Fluid The following information shall also be supplied on a Data Plate: P. Manufacturer Q. Production Number	

	R. Paint Number S. Year Built T. Date Chassis Shipped U. Vehicle Identification Number	
14.	**PRINCIPLE APPARATUS DIMENSIONS & G.V.W.R.** The principle dimensions of the completed apparatus will not exceed the following maximum acceptable dimensions: OVERALL LENGTH: 570" OVERALL WIDTH: 100" OVERALL HEIGHT: 146" WHEELBASE: 248"	
15.	**BIDDER TO SUPPLY AND FILL- IN PROPOSED DIMENSIONS:** OVERALL LENGTH: OVERALL WIDTH: OVERALL HEIGHT: WHEELBASE: The axle and total weight ratings of the completed apparatus will not be less than the following minimum acceptable weight ratings: MINIMUM FRONT G.A.W.R.: 22,500 lbs. MINIMUM REAR G.A.W.R.: 58,000 lbs. MINIMUM TOTAL G.V.W.R.: 80,500 lbs. **BIDDER TO SUPPLY AND FILL-IN PROPOSED ANXLE AND TOTAL VEHICLE WEIGHT RATINGS** FRONT G.A.W.R. | REAR G.A.W.R | TOTAL G.V.W.R. | Each proposal must include the principle dimensions, front G.A.W.R., rear G.A.W.R., and total G.V.W.R. of the proposed apparatus. Additionally, all bidders will provide a weight distribution of the fully loaded, completed vehicle; this will include a filled water tank, specified hose load, 2,500 lbs. of miscellaneous equipment allowance in accordance with NFPA-1901 requirements, and an equivalent personnel load of 200 lbs. per seating position.	
16.	**OCCUPANCY/SEAT BELT PLATE** There shall be provided and installed plate(s) which read **"OCCUPANTS MUST BE SEATED AND BELTED WHEN THE APPARATUS IS IN MOTION"**. This plate(s) shall be visible from each seated position.	
17.	**OVERALL HEIGHT PLATE** A plate or label that indicates vehicle height shall be mounted in the driving compartment and shall be clearly identified and visible to the driver while seated.	
18.	**APPARATUS MOVEMENT WARNING PLATE** A permanently affixed warning plate shall be installed near the door ajar light. The plate shall read **"DO NOT MOVE APPARATUS WHEN LIGHT IS ON".**	

19.	**SEATING CAPACITY PLATE - 6 PEOPLE** There shall be a permanently attached plate mounted in plain view in the cab. The plate shall read **"Seating Capacity - 6 People"**.	
20.	**GENERAL APPARATUS DESCRIPTION "AERIAL"** The unit will be designed to fully conform with the **"Aerial Fire Apparatus"** requirements as stated in the **NFPA 1901 Standard (2003 Revision)**, which will include the following required chapters as stated in this revision: Chapter 1 Administration Chapter 2 Referenced Publications Chapter 3 Definitions Chapter 4 General Requirements Chapter 8 Aerial Fire Apparatus Chapter 12 Chassis and Vehicle Components Chapter 13 Low Voltage Electrical Systems and Warning Systems Chapter 14 Driving and Crew Areas Chapter 15 Body, Compartments and Equipment Mounting Chapter 20 Aerial Devices	
21.	**CAB AND CHASSIS:** **CAB TYPE** FULL TILT FOUR DOOR EXTENDED CAB to extend at least 8" behind the rear door RAISED ROOF to provide at least a 59" floor to ceiling height ALUMINUM CONSTRUCTION	
22.	**CONTOUR WINDSHIELD** The cab will be a custom medium side opening four (4) door, aluminum, tilt style that is built specifically for fire service applications. The cab will be fully enclosed, capable of comfortably seating six (6) fire fighters in full fire fighting turnout gear, cab over engine design, with integral tilt mechanism and engine access on top of doghouse to ease fluid checks	
23.	**OPEN SPACE DESIGN** The cab interior will be the "Open-Space" design with no wall or window between the front and rear crew area to allow direct communication, better visibility and air circulation in the cab.	
24.	**CAB MATERIAL** The cab will be fabricated from aluminum alloys, utilizing the minimum material thickness as follows: Cab side panels .125 inch thick (1/8") Cab roof .125 inch thick (1/8") Forward cab front sheet .125 inch thick (1/8") Interior cab panels .125 inch thick (1/8") Other panels .125 inch thick (1/8") Cab doors .1875 inch thick (3/16" Engine enclosure side panels .250 inch thick (1/4")	

25.	**STEPPING, STANDING, & WALKING SURFACES** All stepping, standing, and walking surfaces on the body will meet NFPA #1901 anti-slip standards. Aluminum tread plate utilized for stepping, standing, and walking surfaces will be of the Non-Slip type. This material will be certified to meet the NFPA #1901 standard. Upon request by the purchaser, the manufacturer will supply proof of compliance with this requirement. All vertical surfaces on the body, which incorporate aluminum tread plate material, will utilize the same material pattern to provide a consistent overall appearance. **(There will be No Exceptions allowed for this paragraph)**	
26.	**CAB - BASE CONSTRUCTION** Cab sub-frame will be fabricated of structural aluminum alloy. This frame will extend the full length and width of the cab and be secured to the chassis frame through two (2) rear urethane self centering load cushions, two (2) forward pivot brackets, and two (2) cab locks. The front cab wall will be of double wall type construction, featuring an inner and outer panel. **(No Exceptions)**	
27.	**CRASH TESTING CERTIFICATION** To ensure the safety of the cab occupants and cab integrity, proof of third party testing will be provided. The cab will be certified for SAEJ2422 side impact, SAEJ2420 with ECER29 cab front impact, and ECER29 cab roof strength. To ensure the safety of the cab occupants the cab will contain airbag type rollover protection to include side protection for all seats.	
28.	**CAB ROOF - SPLIT LEVEL DESIGN** The roof will be of a split-level design with radius edges for a pleasing, streamline appearance. The roof will be ribbed internally for maximum stiffness. There will be a full length, polished aluminum rain gutter running horizontally along each side of the cab, over the doors and side windows. The cab roof over the rear crew area will be raised higher than the front driver and officer area. The front face of the raised roof section will be sloped, creating a streamlined interface with the standard, lower, forward roof section. This design will allow for additional interior height in the rear crew area. The rear crew area doors will extend to the radius edge of the raised roof.	
29.	**CAB DOORS** Four (4) side-opening doors will be provided. The cab doors will be totally aluminum construction with an extruded aluminum frame and an aluminum outer door skin. Doors will be full height from the step to the cab roof rain gutter and enclose the step area when the doors are closed. The rearward cab doors will have a radius cutout allowing the door opening to protrude forward over the cab wheel well, while providing full access to the rear crew area. There will be a heavy-duty piano type stainless steel hinge on each door of a minimum pin diameter of at least 5/16 inches. Hinges shall be slotted for ease of horizontal and vertical adjustment. There will be a cab door seal and, doors will close flush with the side of the cab. A heavy-duty belting material will be utilized to prevent the cab doors from opening greater than 90 degrees.	
30.	**ENTRY STEP AREA** Each of the forward entrance steps will be a minimum of 8-5/8" deep x 28-1/4" wide with the floor board recessed a minimum of 3" to avoid "shin knocking". Each step will be fabricated of aluminum tread plate. The cab step risers will be overlaid with aluminum tread plate. Each of the rear entrance steps will be a minimum of 8-5/8" deep x 22-1/4" wide. An intermediate step will be provided between the lower entrance step and the crew area floor for ease of entry and egress. Each set of steps and respective step risers will be fabricated of aluminum tread plate.	

31.	**DOOR LATCHES** Heavy-duty cast paddle latches will be provided on the interior and exterior of each cab door.	
32.	**INTERIOR DOOR OVERLAYS** Each door interior will have a brushed stainless steel cover to provide maximum wear protection.	
33.	**POLISHED STAINLESS STEEL DOOR JAMB OVERLAYS** Each cab door jamb will be equipped with polished stainless steel scuff plates to protect the cab paint when exiting and entering the cab this plate will wrap around the jamb and extend one (1) inch on the outside of the cab The scuff plate will extend from the bottom of the door to the top of the door.	
34.	**EXTERIOR CAB TRIM** A high luster stainless steel trim band will be provided along the cab sides at the same height as the bumper. Black vinyl trim molding will be installed along the top and bottom of the trim band.	
35.	**EXTERIOR CAB WALL OVERLAY** An aluminum tread plate overlay will be provided on the exterior rear cab wall. The tread plate overlay will extend around the cab to the sides two (2) inches and will be sealed with caulking around the edges to prevent moisture from getting between the cab and the overlay.	
36.	**WINDSHIELD/GLASS** Safety plate glass will be used in the windshield with tempered glass being used for the side windows, door glass, and side crew area glass. All glass will be tinted. The windshield will be of a contour design for improved visibility and style. The windshield should be of common designed so as to be easily replaced from local dealers A fixed window will be provided on each side of the cab behind the forward cab doors.	
37.	**WINDSHIELD WIPERS AND WASHER** Electrically operated, pantographic, wet arm, self-parking windshield wipers will be installed beneath both the drivers and officers front windshield. The motor assembly will be installed and accessible from inside the forward dashboard of the cab and washer fluid reservoir and pump will be installed and readily accessible for ease of filling and maintenance. The driver of the vehicle will be able to control wiper state (ON/OFF), speed (LOW /HI), and intermittent delay time (DLY) as well as washer pump (ON) utilizing a clearly labeled lever control on the steering column.	
38.	**GRAB HANDLES** Four (4) vertical aluminum knurled anti slip grab rails will be provided with one located one at each cab door entrance. Grab rail stanchions will be chrome plated and of an offset design, when necessary, to prevent "hand-pinching" when opening or closing the doors. Formed rubber gaskets will be provided between each stanchion base and the cab surface.	
39.	**INTERIOR GRAB RAILS** Four (4) vertical black cast aluminum “D” style entry assist handles will be located one (1) each side of cab interior on the “A” post and one (1) each side of the cab interior on the “C” post in the crew area to assist in entry and exiting of the cab. Each front cab door will be provided with one (1) black cast aluminum grab handle on the interior door panel to assist in entry and exiting of the cab and for closing the door. Each rear cab door will be provided with one (1) black cast aluminum grab handle on the interior door panel to assist in entry and exiting of the cab and for closing the door. Each rear cab door will also be provided with one (1) black cast aluminum safety rail, located horizontally across the rear door window opening.	

40.	**AIR INTAKE/OUTLET** There will be an air intake in the center front cab sheet for maximum airflow to the engine for better cooling. Two (2) air inlets / outlets will be located one (1) on each side of the cab horizontally above wheel well. This design will permit proper ducting of air through the engine compartment and cooling system. The air intake and outlets will be covered with a polished grille secured with stainless steel fasteners.	
41.	**WHEEL WELL LINERS** The front cab wheel wells will be equipped with fully removable, bolt-in, 1/8 aluminum inner wheel well liners. The liners will extend full depth into the front cab wheel wells will be equipped with fully removable, bolt-in 1/8 inch aluminum inner wheel well liners. The liners will extend full depth into the truck frame. The completely washable wheel well liners will be designed to protect the cab substructure, inner panels, and other miscellaneous installed components from road salts, debris, dirt accumulation and corrosion.	
42.	**STAINLESS STEEL FENDERETTES** The cab wheel well openings will be trimmed with replaceable, bolt-in, polished stainless steel fenderettes. The fenderettes will be secured to the cab with stainless steel threaded fasteners along the internal perimeter of the wheel well. Rubber welting will be installed between the fenderettes and the cab side panel.	
43.	**CAB MUD FLAPS** Heavy duty, black rubber type mud flaps will be provided behind the front wheels.	
44.	**CAB MIRRORS** Each forward cab door will have a Moto-Mirror Plus 16" x 6 ½", heated and motorized, stainless steel, West Coast type mirror mounted on a swing-away, bow type, stainless steel bracket. The mirrors will be individually remote controlled from the driver's position. A single dash mounted switch will control the mirror heating elements. Two (2) 6" diameter, stainless steel, convex spot mirrors will also be provided and mounted one (1) on each main mirror bracket.	
45.	**ELECTRIC WINDOWS** Both front cab doors will be equipped with electric operated windows. The control for each door will be an automotive style located on the console within easy reach of the driver and officer. The driver will also have a control to operate the passenger's side window as well as the rear crew area doors. A single master control will be located on the console. Both crew cab doors will be equipped with electric operated windows. The control will be an automotive style located on the inside door panel within easy reach of the crew cab passengers.	
46.	**INTERIOR CAB TRIM** The dash will be constructed of a Vinyl overlay ABS custom formed material to create an ergonomically designed interior to be user friendly and functional for the driver and officer. The instrument cluster will be centered in front of the driver and all gauges will be custom fitted in the ABS with a non-glare pewter panel. All warning lights and indicators will be clustered in the driver's seat area and installed in such a manner as to provide for easy identification. Backlighting for warning lights and indicators shall also be provided for easy identification. The transmission gear selector will be integrated into the center dash assembly toward the driver for easy access. There will be provisions for mounting of a switch panel in the center of the dash between the driver and officer. The top center of the dash assembly will contain one (1) large removable access door for access to the main chassis wiring panels and breaker panels.	

	The forward overhead panel will be covered with a one-piece custom formed ABS vinyl overlay, which will have integrated windshield defroster/heat vents The drivers overhead panel will contain AC, heat and defroster controls. The officers' overhead panel will contain a small pocket for map book storage, stereo, or misc. items.	
47.	**STORAGE/RADIO COMPARTMENTS** There will be a compartment provided under each front seat with a latched access door.	
48.	**FLOOR COVERING** The floor of the driver's compartment and the floor of the crew area will be lined with vinyl composite flooring to comply with National Fire Protection Association Standard 1901, 2003 Edition noise and heat requirements. The material utilized for this application will be certified to meet the National Fire Protection Association 1901, 1999 revision for anti-slip walking surfaces. The manufacturer must supply proof of compliance for this item. (No Exceptions)	
49.	**INTERIOR CAB UPHOLSTERY** The interior rear wall of the cab will be covered with padded upholstery to give durability and to match the other upholstered areas of the cab	
50.	**ENGINE ENCLOSURE** The forward portion of the engine enclosure will be covered with a vinyl ABS material formed overlay to match the balance of the cab interior. To allow maximum "elbow room" for the driver and officer, the forward portion of the engine enclosure will feature a contour shape. The engine enclosure will not significantly obstruct the driver's vision in any direction. The inside of the enclosure will be insulated to protect against heat and noise. A padded, hinged access door will be provided in the top rearward portion of the engine enclosure. The door will allow access to the engine oil, transmission fluid, and power steering fluid level dipsticks, and the coolant recovery tank. The access door will be provided with two (2) flush mounted latches and gas shock holders. There will be a vinyl ABS material cover over the access door to give a cleaner look to the top of the engine enclosure and doghouse area.	
51.	**ENGINE ENCLOSURE TREAD PLATE OVERLAY** The lower rear area of the engine enclosure will be overlaid with a polished aluminum tread plate material for wear protection.	
	CAB SEATING & ACCESSORIES	
52.	**DRIVER'S SEAT** A Seats electric style high back style electrically controlled type seat shall be provided. The seat will have fore, aft, and back tilt adjustment capabilities from a switch panel located on the front of the seat pedestal. The driver's seat shall be furnished with three point shoulder type seat belts. The seat belts shall be furnished with automatic retractors. Extensions shall be provided with the seat belts so the male end can be easily grasped and the female end easily located while sitting in a normal position.	
53.	**OFFICER'S SEAT** A Seat's incorporated 911 SCBA seat with high back shall be provided in the cab for the officer. The SCBA cavity shall be adjustable front to rear in .50" increments to accommodate different SCBA bottles. Padded cradle seat back, and integral headrest will be installed at the officer's seating position. Moving the SCBA cavity shall be accomplished by unbolting, relocating and rebolting in the desired location. The officer seat shall be furnished with three point shoulder type seat belts. The seat belts shall be furnished with automatic retractors. Extensions shall be provided with the seat belts so the male end can be easily grasped and the female end easily located while sitting in a normal position.	

54.	**REAR FACING SEATS (OUTBOARD)** Two (2) rear facing Seats incorporated 911 SCBA seats with high back shall be provided in the cab for the crew. The SCBA cavity shall be adjustable front to rear in .50" increments to accommodate different SCBA bottles. Padded cradle seat back, and integral headrest will be installed rear facing directly behind the driver's seat and the officer's seat. Moving the SCBA cavity shall be accomplished by unbolting, relocating and rebolting in the desired location. Seats shall be furnished with three point shoulder type seat belts. The seat belts shall be furnished with automatic retractors. Extensions shall be provided with the seat belts so the male end can be easily grasped and the female end easily located while sitting in a normal position.	
55.	**FORWARD FACING SEATS (INBOARD)** Two (2) forward facing Seats incorporated 911 SCBA seats with high back shall be provided in the cab for the crew. The SCBA cavity shall be adjustable front to rear in .50" increments to accommodate different SCBA bottles. Padded cradle seat back, and integral headrest will be installed centered on the rear cab wall. Heavily padded flip-up seat bottom cushions will be provided for these seats. Moving the SCBA cavity shall be accomplished by unbolting, relocating and rebolting in the desired location. Seats shall be furnished with three point shoulder type seat belts. The seat belts shall be furnished with automatic retractors. Extensions shall be provided with the seat belts so the male end can be easily grasped and the female end easily located while sitting in a normal position	
56.	**SEAT UPHOLSTERY** All seat upholstery shall be a light gray and black speckled Tuff-Tex material.	
57.	**BACK REST INSERTS** Provided with the Seats Inc. 911 SCBA seats shall be backrest inserts which covers the SCBA cavity. The insert cover shall be padded and covered with the same material as the seat. A total of five (5) inserts shall be provided. The seat back insert is designed to support the fire fighters back, with or without the SCBA bottle in place. The insert is held in place with two (2) elastic cords.	
58.	**SHOULDER HARNES HEIGHT ADJUSTMENT** All seating positions furnished with three (3) point shoulder type seat belts, shall include a height adjustment. This adjustment shall optimize the belts effectiveness and comfort for the seated firefighter.	
59.	**WALKAWAY BRACKETS** Five (5) Ziamatic model #ULLH Walk away bracket(s) will be installed. A positive latching mechanical means of holding the self-contained breathing apparatus. In the stowed position, will be provided such that the self-contained breathing apparatus. Unit cannot be retained in the mount unless the positive latch is engaged. The release mechanism will be accessible to fire department personnel while seated. The bracket model will accommodate the self-contained breathing apparatus currently in use by the fire department. .	
60.	**SEAT BELTS** All seating positions in the cab and crew area shall have RED seat belts.	
61.	**UPHOLSTERY** All ABS formed material panels, as well as all of the interior upholstery panels will be a dark silver color. The upholstered cab overhead and rear wall portions will utilize the same color material with padding underneath to provide additional insulation.	
62.	**SUN VISORS** To provide maximum protection for the driver, sun visors will be recess mounted in the overhead panel.	

63.	**INTERIOR CAB STORAGE** Two (2) horizontal unistruts mounted on the interior rear wall areas to each side on the forward facing SCBA seats for mounting 3/16" inch thickness tool boards that will span the full available width and height. Tool boards to be "DA" finished and spaced away from the interior material a minimum of ½". A set of irons with carrying strap will be mounted to the tool board on the officer's side with roll over compliant brackets. A storage box will be located under the forward facing seats and will have four (4) access doors two (2) in front and one (1) on each side. The box will be painted and textured to match the cab interior colors. The box will fit in the area under the forward facing seats without extending past the seats.	
64.	**MAP BOOK STORAGE** A map book compartment will be provided for horizontal storage of four (4) 3-inch 3-ring binders, which will be front-loaded. The storage compartment will be constructed from 1/8 inch aluminum which will be painted and textured to match the cab interior, a strap will be provided to secure the books in the compartment.	
65.	**ANTENNA INSTALLATION** An antenna mounting base, Model MATM with antenna shall be mounted and routed to the officer side seat box with enough cable to route to the instrument panel if needed. The final location of the antenna lead will be determined by the fire department. The mount shall be located on the cab roof just to the rear of the officer seat	
	CAB INSTRUMENTATION & CONTROLS	
66.	**CENTER DASHBOARD PANEL** The dashboard panel between the driver and officer will contain ten (10) multi-function, multiplexed switches to control chassis functions (headlights, windshield wipers, etc), a park brake control knob, a transmission shift control panel, and the vehicle siren control head. All items on the center dashboard panel will be within easy reach of both the driver and the officer. An information center display that has four (4) integral multi-function, multiplex switches will also be installed in the center dashboard panel.	
67.	**EMERGENCY SWITCH CONTROL CONSOLE** The emergency switch control console will be provided in the dashboard panel between the driver and officer. This switch console will separate the emergency/auxiliary functions from the regular chassis functions. Programmable touch pad type switches with integral light emitting diode (LED) indicator lights will be provided. A master warning light control switch will be provided, which will allow presetting of emergency light switches and will have a red integral indicator light. A primary warning light switch will be provided next to the master switch, along with a total of seven (7) load managing emergency switches. The tenth switch will be the ground light switch. All switches will be labeled to indicate switch function and shall be equipped with an integral light emitting diode (LED) indicator light.	

68. DRIVERS DASHBOARD PANEL

The main instrument panel will be centered in front of the driver and will have a hinged bottom with two latches at the top. The driver side dash panel will be 1/8 inch aluminum with an anti-glare surface. The driver's dashboard panel will contain an instrument warning light cluster and gauges.

The instrument cluster will be installed in the lower center of the driver's dashboard panel. It will be directly connected to the J1939 data bus as well as the multiplex system data bus and will possess 32 printed messages that can be illuminated from behind by LED's of a color specific to the importance level of the message.

The instrument cluster will be black, dead front and flush mounted. Of the 32 laser-etched messages, the bottom 12 shall be removable to allow a different message label to be inserted. The cluster will possess a hidden integral test switch to the right of the laser etched blue logo that will allow the operator to illuminate all indicator lights without cycling the ignition switch. The standard cluster will contain the following messages, as required, per the type of chassis being utilized and the options selected.

a) Right and left directional arrows (green in color)
b) Ignition ON indicator (yellow in color)
c) Hi beam indicator (blue in color)
d) Battery ON indicator (green in color)
e) Parking brake ON indicator (red in color)
f) Check transmission indicator (yellow in color)
g) Cab not latched indicator (red in color)
h) Stop engine indicator (red in color)
i) Check engine indicator (yellow in color)
j) ABS warning indicator (red in color)
k) Transmission temperature high indicator (red in color)
l) Low air rear (red in color)
m) Low air front (red in color)
n) Low coolant level (yellow in color)
o) Engine protect indicator (blue in color)
p) Fuel restriction indicator (yellow in color)
q) Water in fuel indicator (yellow in color)
r) Wait to start indicator (yellow in color)
s) External AC connect indicator (red in color)
t) Fasten seat belts indicator (red in color)
u) Fast idle indicator (yellow in color)
v) Do not move truck indicator (red in color)
w) Okay to pump indicator (green in color) [if required]
x) Inter axle lock indicator (green in color) [if required]
y) Driver controlled differential lock indicator (green in color) [if required]
z) ATC disable indicator (red in color) [if required]
aa) ATC active (yellow in color) [if required]
bb) Block heater on (yellow in color) [if required]

The main instrument panel will contain eight (8) primary gauges and will have available space for two (2) additional gauges. An ignition and engine start switch will be located on the driver's side dash panel. Each gauge will have a raised glass lens with polished chrome trim ring and be backlit by integral LED's. Each gauge will also possess an integral red warning light with a pre-programmed warning point. Gauges monitoring drive-train component status will be of the direct data bus type capable of displaying information broadcast on the J1939 data-link. With the exception of the mechanical air pressure gauge, each gauge will have an output capable of activating an audible alarm inside the dashboard. The eight (8) primary gauges will consist of:

a. Vehicle speedometer (0-85 mph) with digital odometer
b. Engine tachometer (0-3500 rpm) with digital hour meter
c. Engine oil pressure (0-100 psi) warning at 6 psi

69.	**AERIAL POWER CONTROLS** There will be a ladder power and a PTO engagement switch located in the overhead switch console. A ladder PTO and a ladder hour meter will be furnished adjacent to the power switches. See ladder description for details.	
70.	**MOBILE DATA TERMINAL AREA** There will be a flat surface area in front of the officer for placement of a laptop computer. There will be a 12volt plug provided with fulltime power on the front area of the dash.	
71.	**CENTER OVERHEAD PANEL** An overhead console will be provided on the cab roof between the driver and officer to permit installation of cab stereo, intercom systems, arrow stick controls, etc. The overhead panel will be painted to match the interior of the cab. The overhead console will not obstruct the driver's vision through the officer's side window.	

72. CLIMATE CONTROL SYSTEM

A climate-control system will be provided for total cab environmental comfort. This system will provide heating, cooling and defrost capabilities to all areas in the cab.

The system will consist of two (2) evaporator units, mounted in the center overhead of the cab. One (1) will provide comfort air and defrost for the front of the cab and one (1) will provide comfort air for the back of the cab.

The ceiling mounted evaporator/heater unit for the front will include the following:

1) Dual high output blower.
2) High efficiency coil that includes "rifled" tubing and oversized header tubes for maximum refrigerant distribution.
3) Four (4) front comfort air-conditioning/heat louvers shall be provided. They shall be positioned so that two (2) are on each side of the cab overhead, facing the driver and officer seat positions. They shall also be adjustable.
4) Four (4) defrost louvered outlets will be positioned across the windshield to provide optimum coverage. These outlets will also be adjustable.
5) Four (4) adjustable floor heat louvers will be provided, one (1) each below the driver and officer seat positions and one (1) under each rear facing rear crew seat.
6) Damper controls are pneumatically operated to provide air discharge to the windshield, front overhead air discharge louvers or floor position as required and will be located above the driver seat position.
7) An electric water valve in the heat mode controls temperature.
8) Unit housing is fully insulated.
9) **Minimum Heating BTU: 50,000**
10) **Minimum Air Conditioning BTU: 34,000**
11) CFM: 410 @ 13.8 volts

The ceiling mounted evaporator/heater unit for the crew area will include the following:

12) Dual high output blower
13) High efficiency coil which includes, "rifled" tubing and oversized header tubes for maximum refrigerant distribution
14) Air discharge for high output adjustable louvers positioned to provide maximum comfort in all rear seating positions
15) Unit housing is fully insulated.
16) Minimum Heating BTU: 52,000
17) Minimum Air Conditioning BTU: 36,400
18) CFM: 440 @ 13.8 volts

A 12-volt roof top condenser(s) will be strategically positioned on the cab roof so as not to interfere with any emergency lighting systems and will include the following:

19) High performance, long life fan assemblies. Fan motors shall be sealed around housing and shaft areas.
20) Condenser and coil design includes rifled tubing for maximum efficiency. Coil is painted black.
21) Condenser unit includes receiver drier with hi/lo pressure switch.
22) Wire harness includes necessary wiring for clutch circuit as well as a separate power relay circuit.
23) 14 gauge mounting brackets
24) 16-gauge condenser frame and fan shroud
25) 16 gauge aluminum cover, E-coated white

Mounting design enables easy servicing of all components and unit replacement if necessary.

The evaporator units will be covered with an ergonomically designed custom ABS panel to provide maximum headroom and a pleasing appearance. Color to match the interior.

73.	**CAB WALL & CEILING INSULATION** One (1) inch thick foam insulation will be provided between the upholstered and rear wall panels, for additional climate and sound protection.	
74.	**CAB TILT ASSEMBLY** The cab tilt mechanism will be custom designed for ease of maintenance and will consist of two (2) hydraulic cylinders. Hydraulic lines will be rated at 20,000 pounds per square inch (PSI) burst pressure. Each cylinder will have an attached hydraulic locking mechanism, in the event of a hydraulic failure. Hydraulic cylinders will be detachable to allow removal of the engine for major service. A mechanical cylinder stay bar and release will be provided to insure a positive lock in the tilted position. The two (2) rear outboard cab latches will be of the hydraulic pressure release, automatic re-latching type, and provide an automatic positive lock when the cab is lowered. The latch must not disengage or experience any damage when subjected to a pull apart tensile load of 6,000 pounds. The hydraulic pressure required to unlock the latch will not exceed 550 pounds per square inch. The latch will withstand 5,000 pounds per square inch without leaks or damage and withstand 1,000 continuous cycles of operation under a load of 1,000 pounds at liftoff. The tilt pump will be electric over hydraulic type, with a pressure rating of not less than 4,000 pounds per square inch Additionally, the cab tilt device shall be both electrically and hydraulically interlocked to prevent inadvertent activation of the cab tilt system. A **"CAB NOT LATCHED"** indicator light will be provided in the cab dash-warning cluster. A dual switch control will be provided for the cab tilt system.	
75.	**AUXILIARY MANUAL CAB LIFT** An auxiliary manual cab lift back up system will be furnished in the event of total electrical shutdown. It shall be located in an area, which is easily accessed.	
76.	**CHASSIS FRAME ASSEMBLY** The chassis frame will be fabricated in its entirety in the factory of the chassis manufacturer. This will prevent any split responsibility in warranty or service. The frame will consist of two channels fastened together by cross members. All structural fasteners used in the frame will be Grade 8 with vibration resistant aircraft nuts. Hardened steel washers will be used under all bolt heads and nuts to avoid stress concentrations. Top flange will be free of bolt heads. All spring hangers will be steel castings. Weldments will not be acceptable. Each mainframe rail will be 10-1/4 inch by 4 inch by 3/8 inch, fabricated from 110,000 pounds per square inch minimum yield steel. An additional mainframe inner liner will extend from the front of the chassis to the center of the rearmost main cross member. Total section modulus of each rail, with liner, will be 38.73 cubic inches and the total resisting bending moment (RBM) will be 4,260,300 inch pounds (in-lbs), per rail. A third, 16 inch by 4.75 inch by .375 inch exterior frame rail will be provided between the front stabilizers and rear suspension to transfer loads from the aerial device to the front and rear stabilizers. A fourth inner frame liner will be provided, which will extend approximately 22 inches forward of the front body mounts to the rear suspension mounting brackets. Formed frame rails or a fish plated frame will not be acceptable. The chassis frame assembly, consisting of frame rails, cross members, axles and steering box, will be finish painted before installation of any electrical wiring, fuel system components, or air system components.	

77.	**FRONT BUMPER** A one (1) piece, ten (10) gauge, 304-2b type polished stainless steel bumper, a minimum 10.00" inch high shall be attached to a bolted modular extension from a constructed on 50,000 psi tensile steel "C" channel mounted directly behind it to provide adequate support strength. The bumper shall be extended 19.00" from the front face of the cab. The bumper will be wrap design to match the contour of the front cab sheet metal. Documentation shall be provided, upon request to show that the options selected have been engineered for fit-up and approval for this modular bumper extension. A chart shall be provided to indicate the option locations and shall include, but not limited to the following options: air horn, mechanical sirens, speakers, hose trays (with hose capacities), winches, lights, discharge A gravel pan, constructed of bright aluminum tread plate, shall be furnished between the bumper and cab face. The gravel pan shall be properly supported from the underside to prevent flexing and vibrations of the aluminum tread plate.	
78.	**HOSE TRAY** A hose tray, constructed of aluminum, shall be placed in the center of the bumper extension. The tray shall have a capacity of 200' of 1.75" double jacket cotton-polyester hose. Black rubber grating shall be provided at the bottom of the tray. Drain holes shall also be provided.	
79.	**HINGED STORAGE WELL COVER-CENTER** One (1) hinged, latched, aluminum tread plate cover will be installed on the storage well located in the center bumper extension. The cover will be constructed of 3/16" thickness polished aluminum tread plate material with two (2) chrome plated "lift & turn" latches utilized for proper closing A gas type strut will be provided on one end of the cover for holding in the open position.	
80.	**TOW HOOKS** Two (2) chromed steel tow hooks shall be installed under the bumper and attached to the front frame members. The tow hooks shall be designed and positioned to allow up to a 15,000 pound straight horizontal pull in line with the centerline of the vehicle.	
81.	**FRONT AXLE** Front axle will be a Meritor MFS-20-133A-N, includes low friction "Easy Steer" bushing technology for maximum steering ease and longer life. The front axle will be rated at 22,500 lbs.	
82.	**FRONT DISC BRAKES** Meritor EX-225, 17" disc brakes will be provided for the front axle. Automatic slack adjusters are provided as standard equipment. Stemco premium oil seals with viewer glass will be provided on the front axle.	
83.	**FRONT SUSPENSION** Front suspension will be progressive rate front leaf springs. The spring will be permanently pinned at the front and have a shackle double pinned mounting at the rear. Suspensions allowing the spring to float freely at the ends without a permanent pin will not be acceptable. Double acting hydraulic shock absorbers will be furnished on the front axle. The shock absorbers will have a minimum bore of 1.38" and an outside diameter of approximately 3-1/4". The front leaf springs will have a minimum of 10 leaves, a minimum length of 51", and a minimum width of 3-1/2". The capacity at ground will be 23,000 lbs. All springs will be of center bolt design. Cup center springs will not be acceptable. All spring pins will be positively restrained from rotating in brackets and shackles.	

84.	**REAR AXLE** Rear axle assembly will be a tandem, Meritor RT-58-185 single reduction with a capacity of 58,000 lbs. Axles will have a gear reduction as required A driver controlled inner axle lock for RT series axles will be provided on the cab dash within easy reach of the driver. Oil seals will be provided as standard equipment. The rear axle/s will be geared for an approximate vehicle top speed of 65-70 MPH.	
85.	**REAR BRAKES** Brakes will be "S" Cam, 16-1/2" x 7" size and will be full air actuated with automatic slack adjusters.	
86.	**REAR SUSPENSION** A Raydan AL-600 air ride suspension will be provided for the tandem rear axle assembly. The suspension will have a weight rating equal to the rear axle weight rating up to 58,000 pounds. The chassis air system will be equipped with two (2) additional 1700 cu. In. reservoirs to supply the air suspension.	
	AIR & BRAKE SYSTEM	
87.	**BRAKE SYSTEM** A dual circuit, air operated braking system, meeting the design and performance requirements of Federal Motor Vehicle Safety Standard FMVSS-121 and the operating test requirements of National Fire Protection Association standard 1901, 2003 Edition shall be installed. They will be direct air type with dual air treadle in the cab. The system shall be powered by an engine mounted, gear driven air compressor protected by a heated air dryer. The air system shall be plumbed with reinforced, air brake tubing/hose in conformance with Society of Automotive Engineers (SAE) J844-94, Type B and United States Department of Transportation (U.S.D.O.T.) standards. The compressor discharge shall be plumbed with stainless steel braided hose lines with a Teflon lining. Nylon air lines shall be enclosed in high temperature convoluted loom run along the inside frame rails, secured with non-conductive, corrosion resistant strapping mounted with stand-off fasteners. Cord reinforced rubber hose lines with brass fittings shall be installed from frame rail to axle mounted air connections. The air system shall provide a rapid air build-up feature and low pressure protection valve with light and buzzer, designed to meet the requirements of National Fire Protection Association standard 1901, 2003 edition.	

88.	**ABS SYSTEM** A Wabco Anti-Skid Braking System (ABS) will be provided to improve braking control and reduce stopping distance. This braking system will be fitted to axles and all electrical connections will be environmentally sealed, water weatherproof, and 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 service trouble shooting, provisions in the system for an optional diagnostic tester will be provided. The system will test itself each time the vehicle is started and a dash mounted light will switch off once the vehicle is moving above 4 miles per hour. 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 would revert to normal braking action. A warning light will signal 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 sensor wheel slip. A deviation will be corrected by cylindrical brake application and release. If a malfunction occurs, the circuit will signal the operator and the malfunctioning half of the system will shut down. The system is installed in a diagonal pattern for side to side control. The system will insure that each wheel brakes with optimal efficiency up to five (5) times per second. The system will also control application of the auxiliary braking systems to prevent wheel lock.	
89.	**BRAKE AIR RESERVOIRS** There will be a minimum of four (4) air reservoirs and these shall be installed in conformance with best automotive practices. Reservoir capacity total will be a minimum of 7,355 cubic inches (cu. in.). A Rockwell/Wabco System Saver 1200 heated air dryer will be furnished. An automatic moisture ejector on the primary or wet tank will also be furnished.	
90.	**AIR LINES** The entire chassis air system will be plumbed utilizing reinforced, Synflex airlines. All of the air lines will be color coded to correspond with an air system Schematic and will be adequately protected from heat and chafing.	
91.	**AIR COMPRESSOR** Air compressor will be a minimum of 18.7 cubic feet per minute capacity. The Air brake system will be the quick build up type. The air compressor discharge line will be stainless steel braid reinforced Teflon hose. A pressure protection valve will be installed to prevent the use of air horns or other air operated devices should the air system pressure drop below 80 pounds per square inch (552 kPa). The chassis air system will meet National Fire Protection Association 1901, 2003 Edition for rapid air pressure build-up within sixty (60) seconds from a completely discharged air system. This 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 sixty (60) second build-up time.	

92. PARKING BRAKE

Parking brake will be of the spring-actuated type, mounted on the rear axle brake chambers. The parking brake control and red application warning light will be mounted on the cab instrument panel.

The parking brake will be plumbed to provide all wheel lock-up when applied.

WHEELS, TIRES & ACCESSORIES

93. WHEELS AND TIRES

The front and rear wheels will be Alcoa polished aluminum disc type. Tires and wheels will be balanced.

Two (2) front wheels will be 22.5 inches by 12.25 inches, hub piloted type.

Two (2) front tires will be 425/65R x 22.5, 20 ply tubeless radials; highway treads, with a rating of 23,000 pounds.

Eight (8) rear wheels will be 22.5 inches by x 9 inches.

Eight (8) rear tires will be 315/80R x 22.5, 18 ply tubeless radials, with a rating of 60,880 pounds.

The front tires will be highway tread, with a traction tread provided for the rear tires.

The front and rear tires will be Goodyear brand tires that will meet the weight requirement of the wheels and axles.

ENGINE, TRANSMISSION & ACCESSORIES

94. ENGINE

The engine will be a Cummins, Model ISM 500, diesel, turbo-charged, per the following specifications.

Max. Horsepower	500 HP @ 2100 RPM
Governed Speed	2100 RPM
Peak Torque	1550 lb. ft. @ 1300 RPM
Cylinders	Six (6)
Operating Cycles	Four (4)
Bore & Stroke	4. 9 x 5.8 in.
Displacement	661 cu. in.
Compression Ratio	16.1:1
Governor Type	Limiting Speed
Drive line Size	1810 Series
Radiator Size	1200 sq. in.

The engine oil filters will be engine manufacturers branded or approved. The engine oil filters will be accessible and easily serviced or replaced.

An air-operated fan clutch will be provided.

The engine will be installed in accordance with the engine manufacturer's instructions, and the chassis manufacturer will be able to furnish proof of engine installation approval by the engine manufacturer.

95.	**COOLING/RADIATOR** Radiator will be steel with bolted top and bottom tanks. The cooling system will be designed for a minimum of seven (7) Pounds per Square Inch operation. There will be a sight glass in the radiator to check the coolant level without removing the radiator cap. The core construction will be tube and fin with a minimum of four (4) tubes per row and a minimum of ten (10) fins per inch. Engine coolant will be treated with supplementary coolant additives (SCA's) required by engine manufacturers. Engine coolant will provide anti-freeze protection to -30 degrees Fahrenheit. The mixture will be per engine manufactures specifications. A skid plate will be provided for additional radiator protection. All coolant hoses will be equipped with constant torque type hose clamps. Transmission oil to liquid cooler will be furnished. A low engine coolant light located on the dash instrument panel will be provided.	
96.	**SILICONE ENGINE HOSES** Silicone rubber hoses will be furnished for the engine and heater system.	
97.	**ENGINE FAST IDLE** A fast idle for the electronic controlled engine will be provided. An ON/OFF switch on the dash will control the fast idle. An electronic interlock system will prevent the fast idle from operating unless the transmission is in "Neutral" and the parking brake is fully engaged. If the fast idle control is used in conjunction with a specified engine/transmission driven component or accessory, the fast idle control will be properly interlocked with the engagement of the specified component or accessory.	
98.	**AIR CLEANER** An engine air cleaner will be provided and will include a dry type element. Air cleaner will be installed in accordance with the engine manufacturer's recommendations.	
99.	**TRANSMISSION** An Allison World Transmission, Model 4000EVS-R electronically controlled, automatic transmission will be provided. Transmission specifications will be as follows: Max. Gross Input Power — 580 Horse Power Max. Gross Input Torque — 1675 foot pounds Input Speed (Range) — 1700- 2300 Revolutions Per Minute Shift Calibrations — 5 Speed Direct Gear (Pumping) — 4th (Lock-up) Direct Gear Ratio — 1.00:1 Overdrive Ratio — 0.74:1 Two (2) PTO openings shall be located on the left side and top of the converter housing (positions 9 o'clock and 3 o'clock). Transmission installation will be in accordance with the transmission manufacturer's specification. The transmission will be readily and easily removable for repairs or replacement. A backlit, touch-pad type shift control will be mounted in the cab, convenient to the driver. Shift control will be approved by the transmission manufacturer. The retarder will be controlled through a switch on the dash, with a green light indicator. Activation on the retarder will be in conjunction with the brakes via the pedal. An amber retarder activated light in the dash cluster will indicate activation. A transmission temperature gauge with warning light and audible alarm will also be provided The ABS system shall automatically disengage the auxiliary braking device, when required.	

100	**DRIVE LINES** Drivelines will be Dana (Spicer) 1810 series. The chassis manufacturer will utilize an electronic type-balancing machine to statically and dynamically balance all drive shafts. The chassis manufacturer will be able to provide proof of compliance with all drive shaft manufacturer's standards and specifications. (No Exceptions)	
101	**EXHAUST SYSTEM** The aluminized exhaust system will be installed in accordance with the engine manufacturer's requirements and meet all Environmental Protection Agency and State noise level requirements. Exhaust system components will be securely mounted and easily removable. The muffler will be fabricated from steel sheet and of a size compatible with the engine exhaust discharge. Exhaust tubing will be a minimum of 16 gauge cold rolled steel. Any flexible exhaust tubing will be Heat Distortion Tempered stainless steel type. All flex tubing clamps will be Flex-Seal II, packed with a pliable sealant, creating an emission type joint. To minimize heat build-up, exhaust tubing within the engine compartment will be wrapped with an insulating material. The exhaust will discharge on the right side of the apparatus forward of the rear axle. A straight pipe will terminate with an adapter suited for use with the Plymovent Exhaust Extraction System.	
102	**FUEL TANK** Fuel tank will be a minimum of 75 gallon capacity. It will have a minimum fuel filler neck of 2 inches Internal Diameter. A ½ inch minimum diameter drain plug will be provided. The tank will be fabricated from hot rolled, pickled and oiled steel. Provisions for an additional feed line and fuel level float will be provided for apparatus manufacturer's use. A .50 inch" vent shall be provided running from the top of the tank to just below the fuel fill inlet. The tank shall meet all FHWA 393.67 requirements including a fill capacity of 95% of tank volume. Fuel tank will be installed behind the rear wheels between the frame rails. All lines to and from the engine will be medium pressure aircraft type wire braid hoses. Fuel filtration will meet the requirements of the engine manufacturer. A fuel cooler will be provided, in accordance with manufacturer's specifications. A secondary electric fuel pump for re-priming will be furnished, with a switch on the dash.	
103	**FUEL SHUTOFF** A shutoff valve shall be installed in the fuel line, near the filter.	
104	**FUEL POCKET** A fuel fill will be provided in the left rear wheel well area. A Cast Products heavy duty cast aluminum spring loaded hinged fill door, labeled for the proper type fuel will be provided. The fuel fills will not interfere with optional air bottle compartments, if provided.	
105	**DUAL POWER STEERING** Steering will be dual integral, power assist type, utilizing an engine driven hydraulic pump, with a maximum operating pressure of 2000 Pounds per Square Inch. Steering design will permit a maximum of 5.6 turns from stop to stop. Steering system components will be mounted in accordance with the manufacturer's instructions.	
106	**STEERING WHEEL** Steering wheel will be vinyl padded, minimum 18 inches diameter, with a center hub mounted horn button. There will be a self-canceling, directional signal lever and a traffic hazard switch on the steering column. Pulling the directional signal lever toward the driver will control the high beam activation. The steering column will have tilting and telescoping capability.	

107	**ROAD SAFETY KIT** A road safety kit will be furnished with the following equipment: 1 - 2 1/2 pound B-C fire extinguisher 3 - triangle safety reflectors 1 - wheel lug wrench	
CHASSIS/BODY 12 VOLT ELECTRICAL		
108	**CHASSIS ELECTRICAL SYSTEM** All electrical wiring in the chassis will be SXL cross link insulated type. Wiring is to be color coded and include function codes every three (3) inches on both sides. Wiring harnesses will be routed in protective, heat resistant loom, securely and neatly installed. Two (2) 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.	
109	**WIRING HARNESS DESCRIPTION** The wiring harness contained on the chassis is designed to utilize wires of stranded copper or copper alloy of a gauge rated to carry 125 percent of maximum current for which the circuit is protected without exceeding 10 percent voltage drop across the circuit. Wiring is 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 Society of Automotive Engineers J1127 (Battery Cable), Society of Automotive Engineers J1128 (Low Tension Primary Cable), and Society of Automotive Engineers J1560 (Low Tension Thin Wall Primary Cable). The covering of harnesses is moisture resistant loom with a minimum rating of 289 Degrees Fahrenheit and a flammability rating of VW-1 as defined in Underwriter's Laboratory 62. The covering of jacketed cable has a minimum rating of 289 degrees Fahrenheit. All harnesses are securely installed in areas protected against heat, liquid contaminants and damage. The harness connections and terminations will use a method that provides a positive mechanical and electrical connection and are in accordance with the device manufacturer's instructions. No connections within the harness utilize wire nut, insulation displacement, or insulation piercing. All circuits conform to Society of Automotive Engineers J1292. 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.	
110	**DIRECT GROUNDING STRAPS** Direct grounding straps will be mounted to the following areas; frame to cab, frame to body and frame to pump enclosure. All exposed electrical connections will be coated with "Z-Guard 8000" to prevent corrosion.	

111	**AMP DRAW REPORT** The bidder shall provide, at the time of bid and delivery, an itemized print out of the expected amp draw if the entire vehicle's electrical system. The manufacturer of the apparatus shall provide the following: 1) Documentation of the electrical system performance tests. 2) A written load analysis, which shall include the following 3) The name plate rating of the alternator 4) The alternator rating under the conditions specified per: NFPA 1901,2003 edition, section 11-3.2 a) The minimum continuous load of each component that is specified per NFPA 1901, 2003 Edition, section 11-3.2 b) Additional loads that, when added to the minimum continuous load, determine the total connected load. c) Each individual intermittent load. All of the above listed items shall be provided by the bidder per NFPA 1901, 2003 Edition 11-15.	
112	**ELECTRICAL MANAGEMENT SYSTEM** The Class 1 Electrical Management System will be utilized on the chassis for all functions applicable. The system will consist of the following components A Display will be mounted in the center cab dashboard panel that will serve as an informational, status and diagnostic view panel of the vehicle electrical system. A Modem with a RS232 computer interface and standard telephone jack used to not only program the multiplex system but also serve as a factory direct gateway into the vehicle from any Class 1 multiplex authorized service facility shall be installed. A Universal System Manager (USM), which is the main controlling component of the multiplexing system will be provided and factory programmed to Department Of Transportation, National Fire Protection Association, Society of Automotive Engineers, the apparatus manufacturer's and customer specifications by the apparatus manufacturer's engineering department. The system installation will comply with Society of Automotive Engineers J551 requirements regarding Electromagnetic and Radio Frequency interference (EMI, RFI), and will utilize components and wiring practices that insure the system is protected against corrosion, excessive temperatures, water, excessive physical, and vibration damage by any equipment contained with the vehicle at the time of delivery. A Vocation Module is the interface between the multiplexing system and the pump system. This module will serve as the interface between the operator, engine, transmission and pumping system. The module will be installed under the driver's dash in a sealed enclosure that will include green indicating Light Emitting Diodes (LED's) that will indicate to service personnel the interlock state of the apparatus. In keeping with manufacturer's dedication to providing a reliable pumping system, the vocation module will be "backed-up" by a simple relay system; in the same enclosure. In the event of a multiplexing error involving pump operations the back up system can be activated to ensure reliable pumping operations at ALL times. In addition to controlling pump function, this vocation module will be able to provide automatic and/or manual activation of engine "Fast Idle" activation to maintain adequate alternator output and chassis voltage. Multiplexing Input/Output Modules, which are the multiplexing method of reducing the amount of wiring and components used on non-multiplexed apparatus. These modules will vary in Input/Output configuration, they shall be waterproof to allow installation outside of enclosed areas, and they will possess individual output internal circuit protection. The modules will also have three status indicators visible from a service persons vantage point that will indicate the status of the module. In the event a load requires more than the 7.5Amps of operating current, the module with activate a simple relay circuit integral to any of the 3 pillbox assemblies installed in the cab.	

113	**ALTERNATOR** The alternator will be a Leece Neville Model 4890JB, 320 amp, serpentine belt driven alternator. The installation will include an integral self-diagnostic regulator and rectifier for compact installations. The alternator installation will be designed to provide maximum output at engine idle speed to meet the maximum continuous electrical load of the apparatus as required.	
114	**BATTERY SYSTEM** Six (6) Group 31, maintenance free batteries will be provided. Each battery is rated at 925 Cold Cranking Amps at 0 degrees Fahrenheit. Reserve capacity will be 180 minutes.	
115	**BATTERY STORAGE** Batteries will be securely mounted and fully enclosed in fixed, stainless steel, ventilated battery boxes, located on each side of the chassis frame. Complete access will be provided when the cab is fully tilted. Batteries will be mounted on non-corrosive matting material. The battery box will be overlaid with an “l” shape polished aluminum tread plate cover, and will be easily removable for servicing batteries	
116	**BATTERY DISCONNECT SWITCH** The chassis batteries will be wired in parallel to a single 12 volt electrical system, controlled through a heavy duty, rotary type, master disconnect switch. The master disconnect switch will be located within easy access by the driver upon entering or exiting the cab. All electrical circuits will be disconnected when the switch is in the "OFF" position. One (1) set of jumper studs with plastic color coded covers shall be installed in the driver’s door area. This should allow enough room for easy jumper cable access. A tag shall be provided for positive/negative terminals.	
117	**110 VOLT SHORELINE CONNECTION - "SUPER" AUTO EJECT** One (1) Kussmaul "Super" Auto Eject model 091-55-20-120, automatic, 110 volt, 20 amp shoreline disconnect will be provided for the on board, 110 volt battery charging systems. The disconnect will be equipped with a National Electrical Manufacturer’s Association #5-20P male receptacle, which will automatically eject the shoreline when the vehicle starter is energized. A label will be provided that indicates voltage and amperage ratings. The Kussmaul auto-eject connection will be equipped with a Yellow weatherproof cover. The shoreline receptacle will be located in the area directly adjacent to the driver's side cab door.	
118	**BATTERY CHARGER SYSTEM** A Kussmaul Pump Plus 1200 single output battery charger/air compressor will be provided for maintaining the vehicle's single battery system. Unique electronic sensing circuits sense the true battery voltage while eliminating the need for external sense wires. Output current will be 40 amperes @ 12 volts DC. An LED (light emitting diode) bar graph display will be located near the shoreline connection to monitor the battery status. The unit will be mounted behind the driver’s seat**.**	
119	**LIGHTING - CAB INTERIOR** Four (4) combination red/white dome lights will be furnished in the cab, two (2) in the forward section and two (2) in the rear section. Each dome light will have an integral selector switch. Each dome light will also activate when the respective, adjacent cab door is opened.	
120	**CAB MAP LIGHT** A high intensity, gooseneck map light will be furnished and located at the right side of the cab dash. It will be mounted in such a manner as to naturally shine on the map book without adjustment. It will have a red lens cover that is removable by sliding to expose the white light.	
121	**CIGARETTE LIGHTER PLUG** One (1) 12 volt cigarette lighter style accessory outlet(s) will be installed in the cab of the truck for the fire departments accessory devices. The outlet will be located as directed near the officer's seating position for devices such as cellar phones.	

122	**HAND HELD SPOTLIGHT** A hand-held spotlight shall be provided on a bracket mounted on the officer's side of the engine tunnel. It shall have a coil-cord, a momentary switch and a 400,000-candle power minimum rated lamp. There shall be a 12 volt plug located in the same area to power the unit.	
123	**CAB MARKER LIGHTS AND REFLECTORS (LED)** Front marker/clearance lights will be mounted, one (1) on each side on top of the cab. Three (3) identification lights will be mounted and horizontally spaced between 6 inches and 12 inches apart facing forward, centered on top of the cab. The lights will be amber in color. Side facing reflectors will also be installed, one (1) on each side of the body, as far forward and as low as practical. The reflectors will be amber in color. One (1) amber directional light will be mounted on each side of the cab above the front wheel well area.	
124	**BODY MARKER LIGHTS AND REFLECTORS (LED)** Rear marker lights will be mounted, one (1) on each side of the body, as far back and high as practical. The lights will be red in color. Side facing reflectors will also be installed, one (1) on each side of the body, as far back as practical. The reflectors will be red in color. Rear clearance lights will be mounted, one (1) each side at the rear of the vehicle, as high as practical. Rear facing reflectors will also be installed, one (1) each side at the rear of the vehicle. Three (3) identification lights will be mounted and horizontally spaced between 6 inches and 12 inches apart facing rearward. The reflectors and identification lights will be recess mounted in the vertical surface of the rear step for protection from breakage. Three (3) identification lights will also be mounted, horizontally spaced between 6 inches and 12 inches apart facing rearward, centered on the front of the platform. All of the clearance lights, identification lights, and reflectors will be red in color. Intermediate side marker lights / turn signals will be provided, one (1) each side of the body, in an area forward of the rear axle. The lights will be amber in color. Intermediate, side facing reflectors will also be installed, one (1) on each side of the body, in an area forward of the rear axle. The reflectors will be amber in color. One (1) license plate light will be provided above the mounting position of the license plate. The light will be clear in color. All lights will be LED style.	
125	**CUSTOM CAB HEADLIGHTS** Two (2) dual, rectangular, halogen headlight modules in a cast aluminum bezel will be furnished on the front of the cab. Each side head light module will incorporate an individual low beam and a high beam headlight. High beam actuation will be controlled on the turn signal lever. The headlights shall be of a split design with the bulb and the reflector assembly being two independent parts and they shall be mounted so that they are easily accessible for bulb maintenance.	
126	**DAYTIME RUNNING LIGHTS** The chassis head lights will have integrated circuitry to actuate the low beam head lights at a maximum of 80 percent of capacity whenever the chassis engine is running.	
127	**SECONDARY DUAL LIGHT MODULE (LED)** Two (2) amber, arrow outlined, turn signals will be provided, one (1) in each side dual light module, above the headlights, in matching chrome plated bezels. The National Fire Protection Association required, Zone "A" lower warning lights will be incorporated into each side dual light module noted above.	

128	**EMERGENCY SWITCHES** A switch control console will be provided in the center dash panel between the driver's and officer's position. This console will separate the emergency / auxiliary electrical functions from the regular chassis functions. Rocker type switches with integral indicator lights will be provided. A master switch will be provided that will allow pre-setting of emergency light switches. It shall have a red integral indicator light. A primary emergency lighting switch will be provided, next to the master switch, along with a total of seven (7) load manageable emergency switches. The last remaining switch will be a ground light switch. All switches, (other than the master switch), will have switch function labeling and an integral indicator light.	
	BODY ELECTRICAL SYSTEM	
129	**12 VOLT BODY ELECTRICAL SYSTEM** All electrical lines in the body will be protected by automatic circuit breakers, conveniently located to permit ease of service. Flashers, heavy-duty solenoids and other major electrical controls will be located in a central area near the circuit breakers. All lines will be color and function coded every 3 inches for ease of identification. They shall be oversized for the intended loads and installed in accordance with a detailed diagram. A complete wiring diagram will be supplied with the apparatus. Wiring will be carefully protected from weather elements and snagging. Heavy duty loom will be used for the entire length. Grommets will be utilized where wiring passes through panels. In order to minimize the risk of heat damage, wires run in the engine compartment area will be carefully installed and suitably protected by the installation of heat resistant shielded loom. All electrical equipment will be installed to conform to the latest federal standards as outlined in **National Fire Protection Association standard-1901.**	
130	**BODY ELECTRICAL JUNCTION COMPARTMENT** A weather tight electric junction compartment will be provided. This weather tight electric junction compartment shall be recess mounted through the inside rear wall of the compartment to provide an easily accessible enclosure to house all of the body wiring junction points, terminal strips, solenoids, etc. The design of this compartment will <u>not</u> decrease the storage capacity area of the compartment in which it is located. A removable panel will be provided for access to this compartment.	
131	**AERIAL ELECTRICAL JUNCTION COMPARTMENT** An electric junction compartment will be provided near the aerial turntable. This compartment will be recessed through the rear wall of the body to provide an easily accessible enclosure to house all of the **aerial device** wiring, junction points, terminal strips, solenoids, etc. All wiring for the aerial device including outrigger, diverter valve, and swivel circuits will be enclosed in this compartment. The design of this compartment will not decrease the storage capacity area of the body in which it is located.	
132	**TAIL, STOP, TURN AND BACK-UP LIGHTS** Two (2) Whelen 600 series model #60R00XRR, 4-1/8 inches by 6-1/2 inches, LED red combination tail and stop lights, will be mounted one each side at the rear of the body with a chrome mounting flange. Two (2) Whelen 600 series model #60A00TAR, 4-1/8 inches by 6-1/2 inches, LED amber arrow turn signal lights, will be mounted one each side, on a vertical plane with the tail/stop lights with a chrome mounting flange. Two (2) Whelen 600 series, model 60C00WCR, 4-1/8 inches by 6-1/2 inches, white LED backup lights, will be mounted with a chrome mounting flange, one each side on a vertical plane with the turn/tail/stop signals. These lights will activate when the transmission is placed in reverse gear.	

133	**COMPARTMENT LIGHTS (LED)** Each exterior compartment will have a minimum of two (2) white dome lights per level. Each light will come on automatically when the respective door is opened and the master battery switch is on. An additional 10 dome lights will be supplied location to be determined by fire department.	
134	**TRAFFIC ADVISOR** One (1) Whelen LED "Traffic Advisor", model TA852L-43", rear directional light will be mounted on the rear of the apparatus to provided the best visibility. The light will be equipped with eight (8) lamps. The directional light will be activated by a control module. The control module will be conveniently located near the driver's position. The rear directional light will be wired through the load management system of the unit.	
135	**BACK UP CAMERA** A Safety Vision #**SV-CLCD65** rear vision camera system with audio will be provided to allow the driver to visually see and hear at the rear of the apparatus while in the cab. The system will include a flat screen 6.8" color monitor, color camera with microphone and LED Illuminators that will be mounted at the rear of the vehicle. Camera: Color SV-610 rear vision camera with microphone. 1/3 CCD imager, 4.3Mm Lens, 290,000 pixels, electronic shutter, LED illuminators, waterproof threaded pigtail. Monitor: Color SV-LCD68 rear vision monitor. 6.8 LCD screen, speaker, audio and video adjustment controls, mirror/normal image switch, automatic-on in reverse, free voltage 10VCD-26VDC. The system will also include a **SV-LCDCB** control box. Included cabling is the improved waterproof threaded metallic connector with rubber o-ring seal. Monitor only. 50 video cable includes waterproof threaded connector at camera end.	
136	**REAR DECK LIGHTS (LED)** Two (2) clear work lights will be provided on the underside of the turntable access platform. The lights will illuminate the ladder storage area and the rear tailboard step. The lights will be automatically activated with the ladder power circuit.	
137	**STEP LIGHTS (LED)** Chrome plated, shielded chassis and body step lights will be provided and controlled with marker light actuation. Step lights will be located to properly illuminate all body and chassis access steps and walkway areas.	
138	**SCENE LIGHTS** Two (2) Weldon, model #3812-0000-33, angled scene light will be provided, one on each side of the cab, directly behind the front cab entrance door. The scene lights will be controlled by a rocker switch in the master warning light switch console and when cab doors are opened on the lights respective side. All scene lights will be wired through the load management system.	
139	**UNDER CAB GROUND LIGHTS (LED)** One (1) rubber mounted ground light will be provided under each side cab door entrance step, four (4) total. The ground lights will turn on automatically with each respective door jamb switch and also by a master ground light switch in the warning light switch console. Each light will illuminate an area at a minimum 30 inches outward from the edge of the vehicle. The rear crew door ground lights will be positioned at an angle rearward to provide illumination at the pump panel and the front of the bodywork areas.	
140	**UNDER BODY GROUND LIGHTS (LED)** One (1) rubber mounted ground light will be provided under each front body corner, two (2) total. The ground lights will be activated by a master ground light switch in the cab and will be wired through the load management system. One (1) rubber mounted ground light will be provided under each rear body corner, two (2) total. The ground lights will be activated by a master ground light switch in the cab and will be wired through the load management system. All lights will be LED	

141	**"DO NOT MOVE APPARATUS" WARNING LIGHT WITH AUDIBLE ALARM** A red flashing warning light **with an integral audible alarm**, will be functionally located in the cab to signal when an unsafe condition is present such as an open cab door or body compartment door, an extended ladder rack, a deployed stabilizer, an extended light tower or any other device that when opened, extended or deployed may cause damage to the apparatus if it is moved. This light will be activated through the parking brake switch to signal only when the parking brake is released. This light will be labeled "DO NOT MOVE APPARATUS WHEN LIGHT IS ON".	
142	**PUMP ENCLOSURE WORK LIGHTS** Two (2) LED work lights will be mounted inside the pump enclosure, one (1) each side. Each light will be individually switched.	
143	**ENGINE COMPARTMENT WORK LIGHTS (LED)** Two (2) work lights will be mounted inside the engine enclosure, one (1) each side. Each light will be individually switched.	
144	**WARNING DEVICES:** **National Fire Protection Association LIGHTING PACKAGE** The following warning light package includes all of the minimum warning light and actuation requirements for the 2003 revision of the National Fire Protection Association 1901 Fire Apparatus Standard. The following lighting as specified will meet the requirements for both "Clearing Right of Way" and "Blocking Right of Way" as noted.	
145	**LIGHT PACKAGE ACTUATION CONTROLS** The entire warning light package will be actuated with a single warning light switch in the cab switch panel. The wiring for the warning light package will engage all of the lights required for "Clearing Right of Way" mode when the vehicle parking brake is not engaged. An automatic control system will be provided to switch the warning lights to the "Blocking Right of Way" mode when the vehicle parking brake is engaged. All lights will have individual switches to allow them to be deactivated.	
146	**ZONE A (FRONT - UPPER)** **CAB ROOF LIGHTBAR** A Whelen Mini Edge Ultra Freedom LED light bar, one on each side of the cab roof. The warning light bar will be furnished and rigidly mounted on top of the cab roof. Each light bar will be equipped with 4 four (6) LED flashers total. Four (4) corner red LED flashers, 2 forward facing LED flashers (one red and one white). The light bar lens colors will be clear. The white lights of the light bar will be disabled automatically for the "Blocking Right of Way" mode.	
147	**ZONE A (FRONT - LOWER)** **HEAD LIGHT MOUNTED WARNING LIGHTS** Four (4) headlight mounted Whelen 60R00FRR LED flashing light heads will be provided and will be mounted two (2) in each headlight cluster housing.	
148	**ZONE C (REAR - UPPER)** **REAR WARNING LIGHTS** Two (2) Whelen B6TL rotating halogen beacon lights with rearward facing model 70*02F*R flashing LED lights with polished aluminum housings will be mounted one (1) each side on the rear light stanchions. A red lens will be provided on the left side and an amber lens will be provided on the right side the LED lens will be in opposite colors.	
149	**ZONE C (REAR - LOWER)** **REAR WARNING LIGHTS** Two (2) surface mounted Whelen 70R00FRR LED flashing light heads will be furnished and will be mounted one (1) each side on the lower rear of the body. The lower rear flashing light heads will be equipped with red lenses and a chrome plated flange (7EFLANGE).	

150	**ZONE B & D (SIDE FRONT - LOWER)** **SIDE INTERSECTION WARNING LIGHTS** Two (2) surface mounted Whelen 70R00FRR LED flashing light heads will be furnished and will be mounted one (1) each side of the front bumper extension. The side intersection flashing light heads will be equipped with red lenses and a chrome plated flange (7EFLANGE).	
151	**ZONE B & D (SIDE CENTER - LOWER)** **SIDE CENTER WARNING LIGHTS** Four (4) surface mounted Whelen 70R00FRR LED flashing light heads will be furnished and will be mounted two (2) on each side and be spaced between the front and rear lower warning lights. The side center flashing light heads will be equipped with red lenses and a chrome plated flange (7EFLANGE).	
152	**ZONE B & D (SIDE REAR - LOWER)** **SIDE REAR WARNING LIGHTS** Two (2) surface mounted Whelen 70R00FRR LED flashing light heads will be furnished and will be mounted one (1) each side on the rear body fender or as close to the rear of the unit as practical and will face to each side of the unit. The side rear flashing light heads will be equipped with red lenses and a chrome plated flange (7EFLANGE).	
153	**WARNING LIGHT SYSTEM CERTIFICATION** The warning light system specified will have a total amperage draw of 45 AMPS with all lights activated in either the "Clearing Right of Way" or the "Blocking Right of Way" mode. This warning light system will be certified by the light system manufacturer, to meet all of the requirements as noted in Chapter 13 of the 2003 revision of the National Fire Protection Association 1901 Fire Apparatus Standard.	
	AUDIBLE WARNING EQUIPMENT	
154	**ELECTRIC HORN** A single electric horn activated by the steering wheel horn button will be furnished and installed in a functional location below the bumper.	
155	**BACK-UP ALARM** A back-up alarm will be provided, which will adjust automatically to ambient noise levels, whenever the vehicle is in reverse gear.	
156	**AIR HORNS** Two (2) Grover Stuttertone, chrome plated air horns will be at the front of the vehicle. The air horns will be mounted in full compliance with NFPA-1901. A 3/8" minimum air line "teed" with equal distance from each horn shall be installed. A protection valve shall be installed in-line to prevent loss of air, in the air brake system. The air horns will measure 24" in length. Both air horns will be recessed in the front bumper one on each side. The air horn/s will be controlled by a rocker switch on the officer's side location to be determined by fire department and the steering horn button on driver's side. An air horn/standard horn selector switch will be furnished on the dash for the drivers steering horn button	
157	**ELECTRONIC SIREN** One (1) Whelen model WS-295HFS3 electronic siren will be provided and mounted in the cab within easy reach of the officer. The electronic siren and speaker will meet the National Fire Protection Association required Society of Automotive Engineers certification to ensure compatibility between the siren and speaker. Two (2) Cast Product (CPI) model SA2403 (SH2015) polished aluminum siren speakers will be provided, recessed in the front bumper and wired to the electronic siren. They shall be mounted one on each side of the chassis rail attach points for the bumper. Speakers shall be rated 100 watt each.	

158	**FEDERAL Q2B MECHANICAL SIREN** One (1) Federal Model #Q2B mechanical siren will be provided to provide audible warning. Siren will have two (2) floor mounted switches for activation and two (2) push button brake switches. The floor mounted switches will be mounted on the floor on the outside area of each foot well. The push button brakes will be mounted on the dog box area. Siren will be powered thru the emergency warning light switch for preventing inadvertent operation. The Q2B siren will be wired through the load management system to prevent excessive amperage draw. The siren will be provided in addition to the required minimum NFPA audible warning requirements. The siren will be mounted on the left side of the bumper area.	
159	**SIGTRONICS MODEL #US-67S INTERCOM SYSTEM** A Sigtronics model US-67S intercom system will be provided in the front of the cab. The system will be equipped with radio interface capabilities. The master station will be capable of accepting up to six positions, and utilize a 12 volt nominal power supply. The unit will be housed in a rugged steel casing, which will be mounted per department specifications. .. The system will also be provided with all necessary interconnect and radio interface cables.	
160	**DRIVERS AND OFFICERS HEADSETS FOR INTERCOM SYSTEM** Six (6) SE-8 single plug, behind the head, radio headsets will be furnished. The headsets will have adjustable volume, noise-canceling electric microphone, adjustable head strap, and reversible, flex-style boom, which rotates for left or right dress. A total of six (6) 800120 head set jacks will be provided at the required seating positions in the cab. One (1) 800121 exterior head set jack will be provided for remote mounting at a location to be determined. A headset mounting hook will be provided, adjacent to each interior head set jack. Three (3) 800122 radio transmit switches will be provided at the required locations in the cab or at the exterior area of the units to be determined by the fire department.	

161 PUMP AND PLUMBING SYSTEM: HALE

HALE QMAX 150

1500 G.P.M.

Single Stage

The pump must deliver the percentage of rated capacity at the pressure listed below:
100 percent of rated capacity at 150 Pounds per Square Inch net pump pressure
100 percent of rated capacity at 165 Pounds per Square Inch net pump pressure
70 percent of rated capacity at 200 Pounds per Square Inch net pumps pressure
50 percent of rated capacity at 250 Pounds per Square Inch net pump pressure

When dry, the pump will be capable of taking suction and discharge water with a lift of 10 feet in not more than 45 seconds through 20 feet of appropriate size suction hose.

PUMP ASSEMBLY

1. The pump shall be of a size and design to mount on the chassis rails of custom truck chassis, and have the capacity of 1500 gallons per minute (U.S. GPM), National Fire Protection Association Standard-1901 rated performance.
2. The entire pump shall be assembled and tested at the pump manufacturer's factory.
3. The pump shall be powered by a drive line from the truck transmission. The engine shall provide sufficient horsepower and Revolutions Per Minute to enable the pump to meet and exceed its rated performance.
4. The entire pump, both suction and discharge passages, shall be hydrostatically tested to a pressure of 600 Pounds per Square Inch. The pump shall be fully tested at the pump manufacturer's factory in accordance with performance specifications as outlined by National Fire Protection Association Standard 1901, 2003 Edition. The pump shall be free from objectionable pulsation and vibration.
5. The pump body and related parts shall be of fine grain alloy cast iron, with a minimum tensile strength of 30,000 Pounds per Square Inch (2069 bar). All metal moving parts in contact with water shall be of high quality bronze or stainless steel. Pumps utilizing castings made of lower tensile strength cast iron not acceptable.
6. The pump body shall be horizontally split, on a single plane in two sections for easy removal of entire impeller assembly including wear rings and bearings from beneath the pump without disturbing piping or the mounting of the pump in chassis.
7. The pump body shall extend as one piece across the truck chassis from side mounting to side mounting and incorporate the discharge manifold system with a minimum of two (2) 4 inch ports and seven (7) 3 inch ports.
8. The pump shall have one double suction impeller. The pump body shall have two opposed discharge volute cutwaters to eliminate radial unbalance. (No exceptions)
9. The pump shaft is to be rigidly supported by three bearings for minimum deflection. One high lead bronze sleeve bearing shall be located immediately adjacent to the impeller (on side opposite the gearbox). The sleeve bearing is to be lubricated by a force fed, automatic oil lubricated design that is pressure balanced to exclude foreign material. (No exceptions.) The remaining bearings shall be heavy-duty, deep groove ball bearings in the gearbox and they shall be splash lubricated.
10. Only one (1) mechanical seal shall be used on the suction (inboard) side of the pump. The mechanical seal shall be 2.00” inches in diameter and shall be spring loaded, maintenance-free and self adjusting. The mechanical seal construction shall be a carbon sealing ring, stainless steel coil spring, Viton rubber boot, and a tungsten carbide seat with a Teflon backup seal.
11. Pump impeller shall be hard, fine grain bronze of the mixed flow design; accurately machined and individually balanced. The vanes of the impeller intake eyes shall be of sufficient size and design to provide ample reserve capacity utilizing minimum horsepower.
12. Impeller clearance rings shall be bronze, easily renewable without replacing impeller or pump volute body, and of wrap-around double labyrinth design for maximum efficiency. (No exceptions.)

162	**GEAR BOX** 1. Pump gearbox shall be of sufficient size to withstand up to 16,000 foot pounds of drive through torque of the engine system. The drive unit shall be designed with ample capacity for lubrication reserve and to maintain the proper operating temperature. 2. The gearbox drive shafts shall be of heat-treated chrome nickel steel and at least 2-3/4 inches in diameter, on both the input and output drive shafts. They shall withstand the full torque of the engine. 3. All gears drive and pump, shall be of highest quality electric furnace chrome nickel steel. Bores shall be ground to size and teeth integrated and hardened, to give an extremely accurate gear for long life, smooth, quiet running, and higher load carrying capability. An accurately cut helical design shall be provided to eliminate all possible end thrust. (No exceptions.) 4. The pump ratio shall be selected by the apparatus manufacturer to give maximum performance with the engine and transmission selected. 5. If the gearbox is equipped with a power shift, the shifting mechanism shall be a heat treated, hard anodized aluminum power cylinder, with stainless steel shaft. An in-cab control for rapid shift shall be provided that locks in road or pump. **6.** For automatic transmissions, three green warning lights shall be provided to indicate to the operator(s) when the pump has completed the shift from Road to Pump position. Two green lights to be located in the truck driving compartment and one green light on pump operator's panel adjacent to the throttle control. All lights shall have appropriate identification/instruction plates.	
163	**PRIMING PUMP** The priming pump shall be a positive displacement, lubricated rotary vane electric motor driven pump conforming to the requirements of National Fire Protection Association Standard 1901. The pump body shall be manufactured of heat treated anodized aluminum for wear and corrosion resistance. 1) The pump shall be capable of producing a minimum 22inches of mercury (Hg) vacuum at 2000 feet above sea level. 2) The electric motor shall be a 12 Volts Direct Current totally enclosed unit. 3) The priming pump shall require lubrication. Lubrication tank shall be located to allow ease of filling and checking level. **4)** The priming pump shall be operated by a single push-pull control valve mounted on the pump operator panel. The control valve shall be of all bronze construction.	
164	**PUMP SHIFT** The pump shift will be pneumatically operated and will incorporate a standard automotive air valve shifting mechanism for ease of maintenance and parts availability. The pump shift valve will be mounted in the cab and should be identified as **PUMP SHIFT**. Shifting instructions shall also be permanently inscribed on the pump shift switch plate. The in cab control valve will include a detent lock to prevent accidental shifting.	
165	**EMERGENCY PUMP SHIFT** An emergency manual pump shift control will be furnished on the left side pump panel to be utilized in the event the air shift control does not operate. A manual lock-up switch will be furnished in the cab to ensure positive lock-up of the transmission.	
166	**PUMP SHIFT INDICATORS LIGHT** The pump shift assembly will incorporate an indicating light system which will warn the operator if the shift to PUMP has not been completed and indicate when it has been completed. The switch that activates the lights must be mounted on the pump transmission and positioned so that the pump shift arm activates the switch only when the shift arm has completed its full travel into **PUMP** position.	

167	**TRANSMISSION LOCK** The automatic transmission will have a lock-up assembly to prevent the transmission from shifting gears while in the pumping mode.	
168	**BRAKING SYSTEM** A positive braking system will be provided to prevent vehicle movement during pumping operations. The air brakes furnished will compensate for this requirement.	
169	**PRESSURE CONTROL & ACCESSORIES** The apparatus will be equipped with a Fire Research "PRO" pressure governor in place of a standard pressure relief valve. The pressure will include an integral control head which will display either pressure or engine RPM as selected. The control head will also include "Preset" and "Idle" buttons. When operating in "pressure" mode, the governor will maintain a constant pump discharge pressure. The discharge pressure is monitored and compared to the selected pressure setting; the engine RPM is varies to keep the discharge pressure at the selected setting. When operating in "rpm" mode, the governor maintains a constant engine rpm. The pump discharge pressure is monitored; it can vary but will be limited to an increase of 30 psi. If the discharge pressure increases 30 psi, the pressure governor will automatically lower the engine rpm to reduce the discharge pressure. Extra heavy duty pump mounting brackets will be furnished. These will be bolted to the frame rails in such a position to perfectly align the pump so that the angular velocity of the drive line joints will be the same on each end of the drive shaft. This will assure full capacity performance with minimal vibration. Mounting hardware will utilize Grade 8 bolts.	
170	**PUMP MODULE** The pump module will be a self-supported structure mounted independently from the body and chassis cab. The design must allow normal frame deflection without imposing stress on the pump module structure or side running boards. The pump module will be a welded frame work utilizing structural steel components properly braced to withstand the rigors of chassis frame flex. The pump module will be bolted to the frame rails at four (4) points.	
171	**APPARATUS VALVES** All 2 inch or larger in-line suction and discharge valves will be full flow, drop-out style, to simplify servicing. Valves will be Akron Brass series #8800 chrome brass ball series with "Tork-Lok" feature. All 1-1/2 inch valves and smaller will be Akron #7800 series valves. All 3 inch or larger discharge valves will be **Akron** valves equipped with a "**Slow CLOZ"** option which decelerates the opening and closing of the valve to comply with National Fire Protection Association Standard-1901 requirements (Unless otherwise specified). All valves, plumbing and connections shall be installed in accordance with requirements determined by the tank, pump and body manufacturer's specifications. This is to ensure that no trade or manufacturer voids the warranty of another trade or manufacturer by using an improper assembly. **NO EXCEPTIONS!**	
172	**ELECTRIC VALVE CONTROLS** An electric control will be provided on the specified discharge valve to give the pump operator the capability of controlling one or more discharges with the touch of a button. The control will include a flush mounted control head adjacent to the specific discharge. The control shall indicate whether the valve is closed, gated or in the fully open position. An electric valve control will be provided for the following discharge/s: 1) Aerial waterway 2) Three (3) inch discharge (officer side)	
173	**PUMP ANODES** A pair of anodes will be provided on the fire pump with one mounted in the intake side of the pump and one in the outlet side. Each to have brightly painted hex heads for ease of location.	

174	**PIPING (STAINLESS STEEL)** All piping will be heavy duty, stainless steel pipe with National Pipe Thread and victaulic groove, or weld connections. Also, in order to minimize friction loss, only sweep type elbows will be used. Where vibration or chassis flexing may damage or loosen piping, all plumbing exiting the pump enclosure area will be equipped with victaulic or rubber couplings as necessary. Wherever threaded joints are used, the sealing compound will be of the non-hardening type to insure ease of removal for repair or replacement of couplings. All piping will be subjected to a hydrostatic test that consists of pressurizing the entire pump and valves, including suction lines. Following the pressure test, a vacuum test will be applied to the entire pump and valves. This test consists of developing 22 inches of vacuum and holding that vacuum for 10 minutes. The test will be considered a failure if ten (10) or more inches of vacuum is lost during the test.	
175	**MASTER DRAIN** A rotary type, 12 port master drain valve will be provided and controlled at the lower portion of the side pump panel. The valve will be located in the pump compartment lower than the main body and connected in such a manner as to allow complete water drainage of the pump body and all required accessories. Water will be drained below the apparatus body and away from the pump operator.	
176	**INDIVIDUAL BLEEDERS AND DRAINS** All lines will drain through either the master drain valve or will be equipped with individual drain valves. They shall be easily accessible and labeled for identification. One (1) individual quarter turn drain valve will be furnished for each 1-1/2 inch or larger discharge port and each 2-1/2 inch gated auxiliary suction. Drain/bleeder valves will be located at the bottom of the side pump module panels. All drains and bleeders will discharge below the running boards.	
SUCTION INLETS		
177	**PRIMARY INLETS** Two (2) 6 inch National Standard Thread suction inlets will be provided, one on the left pump panel and one on the right pump panel. A removable strainer and a chrome plated long handle cap will be installed on the left suction inlet. A Harrington model H500S-50-60NH will be installed on the right suction inlet	
178	**2-1/2 INCH AUXILIARY SIDE SUCTIONS** The 2-1/2 inch auxiliary suction valve will have a removable strainer, chrome plated, 2-1/2 inch National Standard Thread female swivels, and chrome plated plugs and retaining chains. All side 2-1/2 inch gated inlet valves will be recess mounted behind the side pump panels or body panels. **(No Exceptions)** It will be located on the left side pump panel mounted to the rear of the main inlet with a control at the valve.	
179	**TANK TO PUMP** One (1) 3 inch tank to pump line will be piped through the front bulkhead of the tank with a 90 degree elbow down into the tank sump. This line will be plumbed directly into the rear of the pump suction manifold for maximum efficiency. A 3 inch full flow in-line ball valve and check valve will be provided to prevent accidental pressurization of the water tank through the pump connection. Connection from the valve to the tank will be made by using a non-collapsible flexible rubber hose. A control handle will be located on the operator's panel with function plate.	

180	**TANK FILL** One (1) 2 inch gated full flow pump to tank refill line controlled at the pump panel will be provided. A deflector shield inside the tank will be furnished. Tank fill plumbing will utilize 2 inch hose for tank connection to accommodate flexing between components. (**NO EXCEPTIONS)**	
	DISCHARGES	
181	**PRIMARY DISCHARGES** Two and one-half (2-1/2") inch or larger discharge outlets will be provided to discharge the rated capacity of the pump in accordance with National Fire Protection Association Standard-1901. Each discharge will be controlled from the pump operator's panel. The main pump side discharges will be plumbed directly from the pump discharge manifold utilizing direct connect discharge valve flanges. The valves will be equipped with integral, 30 degree, chrome plated male outlets. All discharges will have chrome plated caps and retaining chains. There shall be two (2) 2-1/2 inch discharges at the left side pump panel. There shall be one (1) 3 inch discharge at the right side pump panel. There shall be one (1) 2-1/2 inch discharge at the right side pump panel. Front Discharge on right side bumper.	
182	**FRONT BUMPER DISCHARGE** One (1) 2 ½ “discharge will be plumbed to the officer side of the front bumper extension with 2 ½” piping and valve, which will be controlled from the pump operator’s panel. Flexible, high pressure hose will be utilized to plumb the discharge from the valve to the hard piping located at the front bumper. The discharge will terminate with a 2 ½” NST, 360 degree chrome plated swivel located on top of the tread plate apron to the Officer side. Automatic discharge drains shall be provided at all low points in the plumbing.	
183	**AERIAL WATERWAY DISCHARGE** The 4 inch aerial waterway discharge will be gated at the pump by a 4 inch full flow ball valve. The waterway will be capable of flowing 1500 GPM at the nozzle in the full extended and elevated position. The Akron ball valve will be equipped with an Akron #9303, "Navigator” electric valve control at the operator's panel. The control will be of current limiting design, requiring no clutches in the motor. Two (2) momentary open and close booted switches will be provided in a sealed control case made of brass material. The controller will have individual red, yellow and green long life light emitting diode (LED) with light pipes for maximum visibility. The valve control must be provided with a five year warranty. The piping from the pump to the rear of the vehicle will be 4 inch minimum ten (10) gauge stainless steel pipe. The aerial discharge pipe will connect to the turntable waterway swivel. The piping will be at least heavy duty, schedule 10 piping which will incorporate a minimum of two (2) victaulic clamps for easy removal.	

184	**HORIZONTAL CROSSLAYS** The cross lay hose bed will be transverse, in three (3) sections and will be located on the front of the body for quick attack deployment. The crosslay hose bed flooring will be removable slatted aluminum decking with a stainless steel scuff plate provided horizontally on each end. The pre-connected hose storage area will have a minimum total capacity of 3.5 cubic feet as required by National Fire Protection Association Standard-1901 to accommodate a minimum of 200 feet of 1 ¾ inch fire hose and nozzle currently used by the department in each of the two (2) front cross lays. The rear crosslay shall be designed to carry 200 feet of 2 ½ inch fire hose with nozzle currently used by the department. The hose storage area will have a 3/16" thick treadplate cover with red Hypalon end covers. The treadplate cover will be attached with a full length hinge and open toward the apparatus cab. The end covers will be secured with Velcro straps. Each 1 ¾ inch crosslay will be plumbed with 2 inch piping and equipped with a 2 inch valve and a 1-1/2 inch National Standard Thread bronze hose swivel. The swivels will be mounted towards the outside of the body for ease of hose connection during repacking. The 2 ½ inch crosslay will be plumbed with 3 inch piping and a 2 ½ inch National Standard Thread bronze swivel. The swivel will be located near the out side of the apparatus for ease of hose connection during repacking. Each crosslay hose bed floor will be slotted to allow the swivel to extend up through, allowing the pre-connected hose to be pulled off either side of the apparatus without kinking the hose at the coupling connection. Each crosslay will be provided with a short section of hose of the appropriate size to extend to the side of the hose storage to add in hose coupling and removal. An individual control and gauge will be provided at the operator's panel for each pre-connected hose storage area.	
	PUMP PANEL	
185	**SIDE MOUNT** The pump operator's control panel will be located on the left side of the apparatus. Both side panels will be completely removable and designed to facilitate access for service and maintenance.	
186	**VALVE CONTROLS** All none electrically controlled valves 1 inch or larger In-line valves will be controlled by chrome plated locking "T" handles. These shall be connected to swiveling type ends with ½ inch stainless steel threaded ends that are welded to ¾ inch tubing reinforced control rods. Rods will be designed to permit easy operation and minimal distortion when opening or closing a valve.	
187	**PUMP PANEL MATERIAL** The left side operator's panel, gauge panel, right side pump panel and right side access door will be fabricated from 14 gauge 304L stainless steel with a #4, (150/180 grit), standard polished finish.	
188	**HINGED PUMP ACCESS DOOR** A pump enclosure access door will be provided above the right side pump panel. This door will have a "D" ring, two-point latch mechanism and two (2) gas shock stay arms for ease of access.	
189	**HINGED GAUGE PANEL** A full width hinged gauge access panel will be provided at the operator's position. Chrome plated positive locks will be provided along with chain holders to prevent the front of the gauge panel from coming in contact with other panels when open.	
190	**REMOVABLE FORWARD PUMP ACCESS PANELS** Two (2) removable pump access panels will be furnished at the forward area of the pump enclosure accessed after raising the cab. Each access panel will be fabricated from 1/8" aluminum tread plate with a D-ring two point latch to secure the access panel.	
191	**PANEL FASTENERS** Stainless steel machine screws and lock washers will be used to hold these panels in position. The panels will be easily removable to provide complete access to the pump for major service.	

192	**SIDE MOUNT OPERATOR'S PANEL LIGHTING** The operator's panel will be illuminated by using a minimum of five (5) Weldon clear, LED lights under a polished stainless steel light shield. The shield will extend the full width of the control panel One (1) light under the operator's panel light shield will be actuated when fire pump is engaged in addition to the pump engaged light**.** The right side pump panel and running board will be illuminated by three (3) LED shielded step lights mounted on the side panel that are activated with the pump panel lights.	
193	**PUMP PANEL TRIM PLATES** A high polish trim plate will be provided around each discharge port and suction inlet opening to allow accessibility to the respective valve for service and repairs.	
194	**IDENTIFICATION PLATES** Identification plates will be provided for all gauges, controls, connections, switches, inlets and outlets. Plates will be engraved and color coded with polymer material for durability and accurate identification of controls.	
195	**PUMP OPERATOR'S PANEL** Particular attention is to be given to functional arrangement of all controls. The pump operator's panel will accommodate the following: 1) Hinged gauge panel 2) Water tank fill valve 3) Auxiliary suction valve control 4) All discharge valve controls 5) Auxiliary engine cooler controls 6) Water tank suction control valve 7) Pump primer valve 8) Engine throttle control 9) Master compound vacuum gauge 10) Master pressure gauge 11) Individual discharge compound gauges 12) Pump shift engaged indicator light 13) Water tank water level indicator 14) Engine tachometer 15) Engine oil pressure gauge with audible alarm 16) Engine water temperature gauge with audible alarm 17) Low voltage light and audible alarm 18) Pump panel light switch 19) Vacuum & pressure test plugs (Underwriters) 20) Speed counter (Underwriters) 21) Pump performance plate (Underwriters) 22) Pump serial No. plate 23) Master pump drain valve 24) Individual drains 25) Voltmeter 26) Air inlet/outlet at lower left hand panel 27) **Aerial Water flow Meter**	
196	**PRESSURE & COMPOUND GAUGES** All pressure and compound gauges shall be NoShok fluid filled gauges. The gauge faces will be white with black numerals.	

197	**MASTER GAUGES** One (1) 6” inch diameter compound pressure gauge 30 inches-0-600 Pounds per Square Inch (labeled: "PRESSURE") and one (1) 6” inch diameter compound vacuum gauge 30 inches -0-600 Pounds per Square Inch (labeled: "INTAKE") will be provided.	
198	**INDIVIDUAL PRESSURE GAUGES** Each 1-1/2 inch or larger discharge will be equipped with an individual, 3 inch" diameter 30 inches -0-600 Pounds per Square Inch compound pressure gauge.	
199	**FLOWMINDER** Fire Research Insight Ultimate model FPA400-040 combination digital flowmeter and pressure indicator kit shall be installed. The kit shall include a flowmeter/pressure display module, paddlewheel flow sensor, flow sensor housing with a mount for 4" plumbing, pressure sensor, and interconnecting cables. The display module case shall be waterproof, manufactured of anodized machined aluminum, and have dimensions not to exceed 4 3/8" high by 4 3/8" wide by 3 1/2" deep. The module shall have a digital LED display for flow with super bright digits more than 3/8" high. Flow rate shall be displayed in GPM. The module shall have an analog display for pressure with an expanded scale in the normal operating range for more accurate readings. The pressure indicator input and movement shall be electronic. Pressure shall be displayed in PSI. The flow meter/pressure indicator program features shall be accessed from front of the module. The program shall support multiple calibration points for flow and pressure, set points for high and low flow warnings, and flow totalizing functions. The pressure indicating needle shall be microprocessor controlled. The module shall be able to communicate with other FRC Insight flowmeters over a data link. A Fire Research Flowminder will be provided in lieu of analog pressure gauge(s) for the following discharge(s): 1) Aerial waterway discharge 2) 3” discharge	
200	**ENGINE COOLER** An auxiliary cooler or heat exchanger will be installed in the engine compartment between the engine and the chassis radiator. The cooler will permit the use of water from the pump for cooling system. Cooling will be accomplished without mixing engine and pump water.	
201	**ENGINE INFORMATION/WARNING SYSTEM** The pump operator's panel will be equipped with a **Fire Research TachPRO** to monitor engine functions. The TachPRO will display RPM, Battery Voltage, Engine Oil Pressure, Engine Coolant Temperature and Pump Hours. The TachPRO will provide audible warnings for Low Voltage, Low Engine Oil Pressure and High Engine Coolant Temperature.	
202	**WATER TANK LEVEL GAUGE** An Innovative Controls model 1400MW water level monitor will be provided. It will contain fourteen (14) high intensity LED's on the display in an inverted "V" pattern allowing the full, 3/4, 1/2, 1/4 and refill levels to be easily distinguished at a glance. It will be maintenance free and field adjustable.	
203	**OPERATOR'S PLATFORM** A slide-out platform will be located below the left side running board step. The platform will be constructed from 2 inches aluminum tubing with Grip-Strut material inserts the step will have a minimum weight rating of 500 pounds. The step will slide on stainless steel pins fitted in a machined frame, which will mount to the pump house frame. **Drawer slides are not acceptable.**	

204	**BOOSTER TANK:** **TANK CAPACITY** The booster tank will have a capacity of **300** gallons, constructed from UPF PolyIIE. **WARRANTY** The UPF PolyIIE water tank will be furnished with a lifetime warranty upon delivery. The manufacturer of the apparatus shall affirm that the tank is installed according to the tank manufacturer's requirements. This is to ensure the tank warranty remains intact once all construction is complete. . **CONSTRUCTION** The UPF PolyIIE water tank will be constructed from ½ inch thick PT2E polypropylene sheet stock. This material will be a non corrosive stress relieved thermo-plastic that is natural in color and Ultra Violet light stabilized for maximum protection. The water will be of a specific configuration and are also designed to be completely independent of the body and compartments. All joints and seams will be nitrogen welded and tested for maximum strength and integrity. The top of the booster 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" PT2E polypropylene (natural in color) and extend from approximately 4" off the floor to just under the cover. The longitudinal swash partitions will be constructed of 3/8" PT2E polypropylene (natural in color) 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 water between compartments. The partitions will be designed to provide maximum water flow. All swash partitions interlock with one another and are welded to each other as well as to the walls of the tank.	
205	**TANK LID** The tank cover will be constructed of ½ inch thick PT2E polypropylene that is natural in color, and Ultra Violet light stabilized. . It shall incorporate a sectional three-piece design which allows for individual removal and inspection if necessary. The tank cover will be recessed 3/8 inch from the top of the tank and will be welded to both sides and longitudinal partitions for maximum integrity. Each one of the covers will have hold downs consisting of 2 inch polypropylene dowels that are spaced a maximum of 30 inches apart. These dowels will extend through the covers and become welded to the transverse partitions. This will assist in keeping the cover rigid under fast filling conditions. A minimum of two lifting dowels will be drilled and tapped 1/2" of 13" to accommodate the lifting eyes.	
206	**TANK FILL TOWER** The tank will have a combination vent and manual fill tower. The fill tower will be constructed of ½ inch PT2 polypropylene and will have an outer perimeter dimension of at least of 8 inches by 8 inches. The tower will be located in the left front corner of the tank unless otherwise specified be the purchaser in Special Provisions. The tower will have a ¼ inch thick removable polypropylene screen and a PT2 polypropylene hinged type cover.	
207	**OVERFLOW AND VENT PIPE** The fill tower will be fitted with an integral 4 inch schedule 40 polypropylene overflow/vent pipe. This pipe will extend from the fill tower through the tank to a 4 inch coupling flush mounted into the bottom of the tank to allow water to overflow below the aerial body near the rear axles.	
208	**TANK SUMP AND CONNECTIONS** There will be one (1) sump standard per tank. The sump shall be a minimum of 8 inches wide, 8 inches long and 7 inches deep with a ¾ inch bottom and it shall be located in the center front bottom of the tank, unless specified otherwise in special provisions. The sump will have at least one of 3 inch threaded plug located at the bottom for a tank drain. An anti-swirl plate will be mounted inside the sump approximately 1 inch off the floor of the sump.	

209	**OUTLETS** There will be two (2) standard tank outlets; one for tank-to-pump suction line which will be at least one 3 inch coupling and one for a tank fill line which will be at least one 2 inch National Pipe Thread coupling. All tank fill couplings will be backed with flow deflectors to break up the stream of water entering the tank.	
210	**TANK MOUNTING** The tank will rest on body cross members that are spaced no more than 22 inches apart. The tank will be insulated from these cross members with at least 3/8 inch nylon webbing or ½ inch rubber that is at least 2-1/2 inches wide. The tank will be cradle-mounted using four (4) corner angles of 6 x 6 x 4 x .250 that are welded directly to the body cross members. The corner angles shall keep the tank from shifting left to right or front to rear. The tank is designed on the free-floating suspension principle and will not require the use of hold downs. The tank will be completely removable without disturbing or dismantling the apparatus body structure. A tread plate enclosure on top of the tank the will secure the tank in the mounts.	
BODY AND COMPARTMENTS		

211	**GENERAL** It is the intention of the fire department to purchase a completely modular body consisting of independent body modules or subassemblies bolted to an independent heavy duty support framework. The following body portions of these specifications outline the minimum standards of construction required by the fire department to meet this need. Bidders will supply satisfactory evidence of their ability to build such a unit. Bidders shall also include proof of the necessary tooling and fixtures required to produce parts in quantity to exact tolerances and evidence of a comprehensive body parts stocking program. To ensure the sole source manufacturing requirement is satisfied; the body, entire chassis and aerial device must be built by the same manufacturer... **NO EXCEPTION!** **COMPARTMENT FABRICATION ALUMINUM or Stainless Steel. NO EXCEPTIONS** All compartment panels and body side sheets will be entirely **Aluminum or Stainless Steel**. Each side compartment assembly will be both plug welded and stitch welded to ensure proper weld penetration on all panels while avoiding the warpage caused by a full seam weld. The side compartments will be welded on a fixture to ensure true body dimensions and squareness of all door openings. All compartments must be modular design with sweep-out style floors. To further ensure maximum strength and durability, each compartment box will be formed primarily from a single piece of material, broken at all four corners, with the top, bottom and door sill plates being the only welded portions of the compartment module. The side compartments and body side panels are then set into a body squaring fixture where the super structure is installed and the entire body is aligned to be completely symmetrical. Each compartment will be bolted to the subframe using minimum ¼ inch stainless steel bolts and ESNA type reusable self-locking nuts, or equal. Each compartment will be easily removable by unbolting with the use of hand tools in order to keep maintenance costs to a minimum and ensure easy, fast replacement of worn or damaged body parts. The bottoms of each running board compartment will be adequately braced to provide maximum loading without undue deflection. All seams will be caulked prior to finish paint to ensure proper compartment seal. Due to the ladder storage area and sweep out floors, the running board compartments of this style vehicle are of a split height, split depth, full width configuration. The referenced compartment sizes approximate the extreme outside compartment dimensions without deductions for the floor material thicknesses, flanges or ladder storage compartment headers. When hinged beveled overlapping doors are utilized, a ½ inch outward return break will be provided around the entire compartment door opening to form integral drip protection and a permanent installation channel for the rubber door seal gasket material. To assure proper vehicle weight distribution, the compartment dimensions may change in width with the final body shift and wheelbase.	
212	**SUBFRAME** Due to the greater weld strength and endurance limits of steel, the apparatus body will be supported by means of a steel subframe - **No Exceptions**. It will be constructed using structural channel, and /or tubing and be adequate in strength to support the compartments, equipment loads and running boards without undue deflection or flexing. The center ladder storage area framework will also be constructed using structural channels, angles, and/or tubing. This framework will be supported by the aerial device torque box and chassis frame rails. The subframe will extend the full length of the body. The entire subframe assembly will be properly cleaned and coated with an epoxy base zinc rich primer to seal the steel and prevent rusting or galvanic corrosion of the frame.	

213	**HARDWARE** All exterior hardware used for holding panels or tread plate will be stainless steel. All fasteners will be equipped with a lock-nut or lock washer and will also be coated with "Lock-Tight" material. **NOTE: The use of aluminum pop rivets or self tapping screws as a trim fastener will not be acceptable.**	
214	**COMPARTMENTS** There shall be a compartment on the officer's side vertically hinged with a door opening of 30" wide x 69" high x 27" deep. This compartment will have dividers provided as shown in **appendix C.** There shall be a compartment on the officer's side next to the above compartment horizontally hinged with a door opening of 30" wide x 26" high x 13" deep. There shall be a compartment that will fit an exhaust fan with the following measurements 29" wide x 23" deep x 30" tall, it shall be located as low as possible to provide ease of removal from the compartment. There shall be an additional 100 cubic feet of compartment space provided of various sizes.	
215	**DOORS** The compartment doors will be beveled overlapping type doors. The outer door the skin will be fabricated from 3/16" (5052 -H32) aluminum, which will be beveled 30 degrees on all four (4) side to add structural integrity to the door. The door frame will be constructed from 2" x 1" x 1/4" "C" channel on all running board compartments and 1" x 5" x 1/8" channel for air pack or high side compartment doors. The channel will be cut with a miter at each corner to assure squareness and a clean inner door edge. The door skin will be stitch welded internally leaving a clean edge around the door frame. Prior to paint, each door will be processed through a flat sanding machine to remove all high areas or imperfection on the door skin, this process will assure a smooth outer door surface and maximum paint adhesion. Each inner pan will constructed from 1/8" aluminum material, which will be provided with a "Brushed" finish. The brushed finish will allow the fire department to remove scratches from the inner door pan with sand paper or scuff pad. Each inner door pan will be fastened to the door frame channels to provide a smooth, snag-free inner door surface. The inner door pan on running board compartments (2") will enclose the latch and reinforcements completely, the pan be easily removable to access the enclosed latch mechanism	
216	**HINGES** Hinges will be full length polished stainless steel piano type. The hinges will be mounted with stainless steel hardware.	
217	**DOOR SEALS** All enclosed storage compartment will be fully gasketed around the perimeter of the compartment edge with heat resistant, "closed cell neoprene sponge" weather stripping, to insure a water tight seal.	
218	**DOOR LATCHES** Door latches will be Eberhard #206 automotive type mechanism or equal. Latches will be stainless steel "D" ring style handles for ease of operation even with gloves on. The blank door in a double door configuration will be provided with an internal two point slam paddle latch. Dissimilar metals insulating gaskets will be placed between the door handles and outer door panels to prevent any electrolytic reaction between dissimilar metals to protect paint.	

219	**STAY ARMS** Eberhard gas shock type door hold open devices will be provided for each vertically and horizontally hinged door. The inner door panels of each compartment door will be equipped with 1/8" brushed finished aluminum. Each panel will be fitted to the compartment door framework and will be equipped with adjustment slots for door hardware	
220	**COMPARTMENT FLOORS** The compartment floors will be flush with door opening to provide a sweep-out design, also to provide an unobstructed door opening and permit easy cleaning of each compartment. DRI-DECKING Dri-Deck brand floor material will be installed on all compartment floors. The Dri-Deck will be custom installed to provide full floor coverage and be easy to remove for cleaning. All shelves will also have Dri-Deck installed in them. The color will be Black. Compartments designed to set on running boards or with a lip at bottom of door opening, will not be acceptable.	
221	**COMPARTMENT SHELVING** Compartment shelving will consist of 3/16” Brushed aluminum, with a 2” lip on all four sides. Shelves will be vertically adjustable by mounting in heavy duty aluminum unistrut “C” channel tracking material, securely fastened to the compartment wall and will extend from top to bottom of the compartment. 5 adjustable shelves will be provided and mounted as directed by the fire department. 4 adjustable pull out shelves will be provided to be mounted as directed by the fire department 4 fixed pull out shelves will be provided to be mounted as directed by the fire department	
222	**COMPARTMENT TOPS** Compartment tops will be covered with 1/8" polished aluminum tread plate on both sides of the body. The aluminum tread plate will have a flange downward, over the top of compartments to serve as a drip rail above the compartment doors.	
223	**ACCESS PANELS** Removable access panels will be provided in the lower running board compartments to access hydraulic components, electrical harnesses and the rear body mounts. The finish on all access panels shall be the same as the finish required for compartment interiors.	
224	**COMPARTMENT VENTS** Machine stamped ventilating louvers will be furnished in each compartment, and so located that water cannot normally enter the compartment. A formed hat section will be bolted over each louver on the inside body wall to further prevent moisture from entering through the louver.	
225	**DRIP MOLDING** Compartment tops over all side compartments will be equipped with a flanged edge to provide protection against water run-off. A secondary polished extruded aluminum drip molding will be provided between lower compartments and auxiliary high side compartments.	

226	**BODY TRIM** The body will be protected and covered with bright finished polished aluminum tread plate on the aluminum body and stainless steel tread plate on the stainless steel body to prevent problems associated with the use of dissimilar metals. The tread plate will be fastened with stainless steel hardware and will be coated with rubber type undercoating between the body panel and tread plate to protect from moisture. All edges will be sealed with silver, rubber caulking. Polished tread plate will be provided at the following areas: a) All surfaces over the compartments or on top of body that will be necessary for personnel to walk or mount equipment: b) Entire rear of body c) Entire front of body d) Below aerial turntable decking e) Top of the pump enclosure f) Cover over the water tank g) Cover over hydraulic tank	
227	**REAR BODY PANEL** The entire rear of the body will be overlaid with polished tread plate, which will extend the full width between body side compartments. This panel will be full height from the bottom of the body to top of the body. The rear of the body will have two (2) opening to access the ground ladder storage area. The opening will be equipped with a hinged door as specified in the ground ladder storage section.	
228	**OUTRIGGER COVER PANELS** Each outrigger opening will be covered by a polished stainless panel mounted to the outrigger beam. The panels will be fabricated from 14 gauge stainless steel. Each panel will be adjustable up and down to help match the panel to the body lines. The outrigger covers will be fabricated only as wide as the outrigger beam, to allow positioning of the outriggers between parked cars or in tight areas.	
229	**RUB RAILS** A 1 inch by 1 inch solid polished extruded aluminum rub rail will be bolted below each running board compartment. The rub rails will be designed to bolt to the body from the bottom side of the compartment area to allow for easy replacement. Body rails are designed to protect body side panels from damage on initial impact. In order to keep road debris build-up to a minimum and for ease of cleaning, the rub rails will be spaced away from the body with nylon spacers.	
230	**RUNNING BOARDS STEPS** The driver and officer running board steps will be fabricated of 3/16"- inch polished aluminum tread plate. The outside edge on each step will be fabricated with a double break, return flange. The steps will be rigidly reinforced with a heavy duty support structure. The running boards will not form any part of the compartment design, and will be bolted into place with a minimum ½ inch clearance gap between any panel to facilitate water runoff. Grip-Strut anti-slip material insert will be installed in the driver side running board.	
231	**REAR ACCESS LADDER** Two (2) turntable access ladders, one on each side, will be provided at the rear of the apparatus. The access ladders will be bolted to the rear body panel and the rear tailboard step, providing a completely replaceable rear body module. The framework for the steps will be fabricated from 1/8” polished aluminum tread plate. A minimum of three (3) steps will be provided and will be fabricated from “Grip-Strut” anti slip material with extruded aluminum bullnose welded on the front edge of each step. The steps will provide unobstructed access or egress to and from the turntable.	

232	**REAR DROP DOWN STEP** A drop down step will be provided at the bottom of each access ladder to keep stepping to a minimum when the vehicle's outriggers are in operation. The step will swing down into position and will be made from "Grip-Strut" snit-slip material, which will be welded to framework fabricated from ½" aluminum. A safety pin will be provided to secure the step in the stowed position.	
233	**HANDRAILS** All non aerial device handrails are to be 1-1/4" diameter aluminum extruded tubing or stainless steel, with an anti slip knurling and chrome plated end brackets. Locations will be as follows: One pair of grab handles on each corner of the turntable walking deck to assist climbing to the turntable. One full length rubber covered rail attached to the rear edge of each access ladder. The rail will form a continuous loop at the top of each access ladder to assist climbing personnel as far as possible. The rear handrails are to be designed so they do not obstruct the ladder when operating over the rear of the vehicle at low angles of elevation.	
234	**REAR WHEEL WELL LINERS** Fully removable, bolt-in, 1/8 inch aluminum fender liners will be provided. The wheel well liners will extend from the outer wheel well body panel, into the truck frame. Removable vertical splash shields, inward of the wheels, will be provided to allow access to hydraulic components. The completely washable fender liners will be designed to protect the front and rear compartments and main body supports from road salts, dirt accumulation and corrosion.	
235	**REAR FENDERETTES** The tandem rear fenders will be equipped with easily replaceable, polished stainless steel fenderettes. The fenderettes will be equipped with a rubber gasket molding between the body panel and the fender. Integral welded crown type liners will not be acceptable.	
236	**AIR BOTTLE STORAGE COMPARTMENTS** A total of eight (8) SCBA air bottle storage compartments that are 8 inches high by 8 inches wide by 24 inches deep will be inserted into the body fender area on a 5 degree pitch. The compartments will be located so that there are four (4) on the left side and four (4) on the right side of the rear body fender panels. The entire area of the compartment interior will be rubber lined to absorb shock and help secure the bottle. Each storage compartment will be equipped with a polished stainless steel door.	
237	**MUD FLAPS** Heavy duty mud flaps will be provided behind the rear wheels.	
238	**REAR TOW EYES** Two (2) chrome plated tow eyes will be furnished on the rear of the vehicle. The tow eyes will be made from plate steel and will be bolted directly to the chassis frame rails with grade 8 bolts. The tow eyes will be smooth and free from sharp edges and will have a minimum eyelet hole of 2-1/2 inches.	
239	**PRIMARY HOSEBED** A hose bed will be provided at the rear section of the body below the aerial ladder. All surfaces of the hose bed will be free from all sharp objects such as bolts, nuts, etc., to avoid damage to fire hose. The hose will discharge straight off the rear of the vehicle below the aerial ladder. The hose bed will hold of 5" hose	
240	**HOSEBED FLOORING** Flooring shall be constructed from extruded aluminum and be properly spaced for ventilation. The flooring will be smooth and free from sharp edges to avoid hose damage. The hose bed floor will be removable to provide access to inner body framework.	

241	**HOSE CHUTE** The hose will be removed through a stainless steel hose chute located at the apparatus. The hose chute will discharge through the top portion of the compartments below the turntable on the right side of the apparatus. The hose chute design will accommodate 5" hose and couplings.	
242	**HOSEBED COVER** A custom made heavy duty Hypalon hosebed cover will be provided and secured to the top body flanges by twistlocks on the forward edge and Velcro material on the sides and rear of the cover. The color of the cover will be red	
	110/220 VOLT A.C. ELECTRICAL AND GENERATOR SECTION	
243	**110 VOLT ELECTRICAL SYSTEM TESTING** All line voltage wiring and permanently connected devices and equipment will be subjected to a dielectric voltage withstand test of 900 volts for one minute. The test will be conducted between live parts and the neutral conductor and between live parts and the vehicle frame with any switches in the circuits closed. The test will be conducted after all body work has been completed. The dielectric tester will have at least a 500 VA transformer with a sinusoidal output voltage that can be verified. Electrical polarity verification will be made of all permanently wired equipment and receptacles to determine that connections have been properly made.	
244	**OPERATIONAL TESTING** The apparatus manufacturer will perform the following operational test and will certify the power source and any devices that are attached to the line voltage electrical system are properly connected and in proper working order. The generator will be started from a cold start condition and the line voltage electrical system loaded to 100 percent of the rated voltage. The following items will be monitored and documented every 15 minutes. 1. The cranking time until the generator starts and runs. 2. The voltage, frequency, and amperes at continuous full rated load. 3. The generator oil pressure, water temperature, transmission temperature, hydraulic temperature, and the battery rate charge, as applicable. 4. The ambient temperature and altitude. The generator will operate at 100 percent of its rated wattage for a minimum of two (2) hours.	
245	**HYDRAULIC DRIVEN GENERATOR** The generator system will be an Onan model CMHG 15000 GenSet, PTO/Hydraulic type that is rated at 15,000 watts, 125/62.5 amps @120/240 VAC. It will be a single phase generator. The generator will maintain a 60Hz frequency between idle and 3000 rpm. The Onan display will be by FRC and will display Hz, voltage, amperage, oil temperature and hours.	
246	**WIRING** The generator output conductors will be at least 6 gauge and the output conductors will be routed through non-metallic conduit that is a minimum of ¾ inches in diameter.	
247	**GENERATOR PTO** A hot shift PTO will be provided on the transmission for the Onan generator. The PTO will be controlled from the cab, which will include a PTO engagement switch and a PTO engaged indicator light. The generator will be located as determined by engineering and the fire department. Locating the generator more than 144 inches from the main breaker panel may require the installation of an additional method for disconnecting power.	

248	**A. C. LOAD CENTER** The generator output line conductors will be wired from the generator output connections to a breaker panel. The breaker panel will be equipped with a properly sized main breaker using two (2) of the sixteen (16) spaces which leaves a total of fourteen (14) available spaces. The generator output conductors will be sized to 115 percent of the main breaker rating and shall be installed as indicated in the wiring section. Fourteen (14) appropriately sized, 120 volt, circuit breakers will be provided. The breaker panel will be located in an enclosed compartment as directed by the fire department.	
249	**WIRING METHODS** Wiring/conduit will not be attached to any chassis suspension components, water or fuel lines, air or air brake lines, fire pump piping, hydraulic lines, exhaust system components or low voltage wiring. All wiring will be installed at least 12 inches away from any exhaust piping and a minimum of 6 inches from any fuel lines. All wiring will be securely clamped within 6 inches of any junction box and at least every 24 inches of run. All supports will be of nonmetallic material or corrosion protected metal. All supports will not cut or abrade conduit or cable and will be mechanically fastened to the vehicle. All power supply assembly conductors, including neutral and grounding conductors, shall have an equivalent amperage rating and shall be sized to carry not less than 115 percent of the main breaker rating. All Type SO or Type SEO cable not installed in a compartment will be installed in wire loom. Where Type SO or Type SEO cable penetrates a metal surface, a rubber or plastic grommet or bushing will be provided. The installation of all 120/240 wiring will meet National Fire Protection Association-1901 Standards, 2003 Edition (NO EXCEPTIONS).	
250	**WIRING IDENTIFICATION** All line voltage conductors located inside the main breaker panel box will be individually and permanently identified. When pre-wiring for future power wiring installations, the non-terminated ends will be labeled in a method that details function and wire size.	
251	**GROUNDING** The neutral conductor of the power source will be bonded to the vehicle frame only at the power source. The grounded current carrying conductor (neutral) will be insulated from the equipment grounding conductors and from the equipment enclosures and other grounded parts. The neutral conductor will be colored white or gray. In addition to the bonding required for the lower voltage return current, each body and driving/crew compartment enclosure will be bonded to the vehicle frame by a copper conductor. The conductor will have a minimum amperage rating of 115 percent of the name plate current rating of the power source specification label.	
252	**CIRCUIT BREAKER/RECEPTACLE INSTALLATION** The system shall be installed by highly qualified electrical technicians to assure the required level of safety and protection to the fire apparatus operators. When multiple circuits are required, the circuits will be wired to the breaker panel in a staggered configuration to minimize electrical loads on each breaker or generator (leg) circuit. The wiring, electrical fixtures and components shall be of the highest industry quality standards available on the domestic market. The equipment shall be the type designed for mobile installations that are subject to vibration, moisture and severe continuous usage.	

253	**RECEPTACLE INSTALLATIONS** Any receptacle installed in a wet location must be a minimum of 24 inches above the ground and provided with an approved wet location cover. Wet receptacles may not be mounted at more than 45 degrees from vertical, nor can they be mounted in a face-up position. One (1) 110 volt, NEMA L5-20, 20 amp, Single twist-lock receptacle with weatherproof cover will be installed at each side of the of the rear wheel well panels. (Total of two (2)) Each receptacle will require one (1) 20 amp, 110 volt circuit breaker to be installed in the load center. One (1) 110 volt, NEMA L5-20, 20 amp, Single twist-lock receptacle with weatherproof cover will be installed at each side of the of the rear body panel. (Total of two (2)) Each receptacle will require one (1) 20 amp, 110 volt circuit breaker to be installed in the load center.	
254	**ELECTRIC CABLE REELS** Two (2) Hannay Model #ECR-1616-17-18, 110 volt, electric rewind cord reels will be provided and wired to the breaker panel. The reels will be securely mounted and equipped with a rewind controls adjacent to each reel. The cord reel will be mounted one on each side of the pump panel area. The circuit breaker used to protect any device attached to the cord reel will be sized to the smallest electrical connection used. Two hundred (200) feet of Type SO yellow 10/3 heavy duty electric cable will be provided on each of the reels. Two (2) NEMA 5-20R, 20 amp, three prong twistlock receptacle(s) will be provided on the end of the cable. Two (2) four (4) roller assembly(s) will be provided adjacent to each cord reel to provide un-obstructed deployment and rewinding of the cable. Two (2) cable ball stop(s) will be installed on the cable to keep the cable end from passing through the roller assembly.	
255	**LIGHTING (Telescoping)** Two (2) Fire Research FOCUS, model #OPA510-S50 top mounted, pull up scene light, deployable in a full 360 degree rotation. The entire assembly shall be UL listed as Scene light for Fire Service Use, manufactured by Fire Research. The tightening mechanism shall be of a twist lock (concentric ring) design, the use of a knob or latch to release the pole in order to raise and lower the telescoping portion of the pole will not be accepted. The lights will be mounted above the pump operator's panel in the pump enclosure, one (1) each side. Wiring used for the lighting shall be a minimum of 16 gauge three (3) wire cable that is properly supported and protected from damage. Two (2) model S50, 500 watt light heads will require one (1) 120 V, 15 amp circuit breaker each.	
256	**PORTABLE QUARTZ LIGHT** Three (3) Fire Research FOCUS, model #OPA700-S50, 500 watt portable quartz lights will be provided and mounted as directed by the fire department. The lights will be equipped with a quick release type mount and an appropriate 120 volt plug and a weatherproof "on-off" switch on the light head.	

257	**QUARTZ LIGHTS TOP OF BODY SWITCHING** The quartz lights on top of the body will be wired through the circuit breaker panel and switched at the cab dash or overhead. The control switches will be wired through low voltage relays to maintain 12 volt circuits in the cab.	
258	**LIGHTING (Non-Telescoping)** Two (2) Fire Research FOCUS, model #OPA570-S50 top mounted, non telescoping with full 400+ turning ability (which can rotate horizontally 1 1/4 full turns) to eliminate blind spots and positive stop which will not allow wires to bind. The entire assembly shall be UL listed as Scene light for Fire Service Use. The base will incorporate a self-adjusting friction brake so the light does not spin in transit and will be leak proof so as not to allow water to enter the compartment below its installation. The lights will be mounted on top of the body as directed by the fire department, one (1) each side. Wiring used for the lighting shall be a minimum of 16 gauge three (3) wire cable that is properly supported and protected from damage. Two (2) model OPA570-S50, 500 watt light heads will require one (1) 120 V, 15 amp circuit breaker per light.	
259	**QUARTZ LIGHTS ABOVE PUMP SWITCHING** The quartz lights above the pump will be wired through the circuit breaker panel On/Off switches for each light will be located on the pump panel	
260	**FIXED QUARTZ LIGHTS SWITCHING** The fixed quartz lights will be wired through the circuit breaker panel On/Off switches for each light will be located on the pump panel	
261	**PORTABLE QUARTZ LIGHTS SWITCHING** The portable quartz lights will be wired through the circuit breaker panel and switched from the breaker panel via the circuit breakers.	
262	**RECHARGEABLE HANDLIGHTS** Four (4) Streamlight "LiteBox" rechargeable hand light(s) and 12 volt charger will be installed as directed by the fire department. The charger will be wired to the chassis battery system.	
263	**WHEEL CHOCKS** Four (4) Zico model #SAC-44 folding wheel chocks will be provided and mounted as directed by the fire department.	
264	**DEALER SUPPLIED EQUIPMENT AND SERVICES:** One (1) Pre-construction trip to the manufacturing facility shall be provided that includes the salesperson and three (3) customer representatives. This shall occur approximately 60-90 days after the contract is signed. The trip is to be made by airfare if the distance traveled will exceed 300 miles and will include all food and lodging. One (1) inspection trip to the manufacturing facility when the apparatus is 90 percent complete shall be provided. This shall include the salesperson and three (3) customer representatives and should occur at the point where the apparatus is being wired and tread plate is being installed. This shall occur approximately three to four (3-4) weeks before the truck will be finished. The trip is to be made by airfare if the distance traveled will exceed 300 miles and will include all food and lodging. One (1) Final inspection trip to the manufacturing facility when the apparatus is complete shall be provided. This shall include the salesperson and three (3) customer representatives. The trip is to be made by airfare if the distance traveled will exceed 300 miles and will include all food and lodging.	

265	**PAINT, PREPARATION AND FINISH:** The PPG Delta, Low V.O.C., polyurethane finishing system, or equal, will be utilized. All exposed welds will be ground smooth for final finishing of areas to be painted. The compartments and doors shall be totally degreased and phosphatized. After final body work is completed, grinding (36 and 80 grit), and finish sanding will be used in preparation for priming. Priming will be a two (2) stage process. The first stage will consist of a coating with a two part component that is a self etching, corrosion resistant primer applied to chemically bond the surface of the metal for increased adhesion. The second stage will consist of multiple coats of a catalyzed, two component polyurethane, primer applied for leveling of small imperfections and top coat sealing. All removable items, such as brackets, compartment doors, etc. will be painted separately to insure finish paint behind mounted items. All compartment seams that are not welded but are exposed to high moisture environments will be sealed using permanent pliable caulking prior to finish paint. The inside and underside of the complete body assembly will be painted job color prior to installation of the body on the chassis. The interior of the compartments will be finish painted with Zolatone "Off-White with Black Speckling" scuff resistant paint to provide a protective application over all of the compartment interior surfaces. A clear coat protective coating will be applied to each compartment interior to provide maximum protection to the Zolatone finish. The chassis frame rails, running gear, pump and plumbing will be painted with Polyurethane paint to match the body color codes prior to the installation of any air lines or electrical system to ensure serviceability**.** The cab exterior will be painted using the PPG Delta system to match purchaser's furnished paint codes. A **two-tone** paint finish will be provided with the two-tone break line located approximately 3" below the cab side windows. The body will be finish sanded and prepared for final paint. Upon completion of final preparation, the cab exterior and body will be painted utilizing the highest quality, state of the art, low V.O.C., polyurethane base paint. Finish paint will be applied in multiple coats to ensure proper paint coverage with a high gloss finish. The cab exterior will be finish painted by the chassis manufacturer to match the customer requested color. A "Clear Coat" paint finish will be supplied to provide greater protection to the quality of the exterior paint finish**.** One (1) pint of each of the exterior color paints for touch-up purposes will be supplied when the apparatus is delivered to the end user.	
266	**PAINT CODE/S** The paint shall match customer furnished paint code/s and layout. The paint code/s will be as indicated below: **PAINT TYPE** **SINGLE COLOR: RED PAINT CODE # 75381** **PAINT TYPE:** **TWO/TONE COLOR: WHITE PAINT CODE # 2185**	
267	**PAINT FINISH WARRANTY** The finish paint on the unit will be provided with a seven (7) year paint finish guarantee which will warranty the finish for the following items: Peeling or delamination of the topcoat and/or other layers of paint. Cracking or checking. Loss of gloss caused by defective PPG Fleet Finishes that are warranted by this guarantee. A copy of this warranty will be submitted with the proposal.	

268	**RUSTPROOFING** The entire unit will be thoroughly rust-proofed utilizing rustproof and sound deadening materials that have been developed and field tested and found suitable for this type of application. Rust and sound proofing materials shall be applied to all surfaces as recommended by the manufacturer. Rust-proofing will be applied during the assembly process and upon completion to insure proper coverage in all critical areas on the unit. The following areas on the unit will be thoroughly rust-proofed : A. The entire underside area of the cab B. Internal areas of the cab support structure C. Internal areas of cab sheet metal reinforcements D. Internal areas of cab doors E. Entire underside of fire body F. All internal body areas which are not finished painted G. Between overlaid dissimilar metals H. Special attention shall be paid to internal body and cab fender areas I. Underside of rear step and side running boards	
	LETTERING AND STRIPING	
269	**GOLD LEAF AND REFLECTIVE LETTERING** The manufacturer will provide 22kt gold leaf corner scrolls provided and installed on the apparatus to be placed on the compartment doors in each corner of the door. **See Appendix D** Two (2)front corner scrolls shall be provided **See Appendix D** There shall be forty-one (41) Gold leaf letters/numbers provided and installed, they will be approximately ten (10) inches tall There shall be forty-five (45) Gold leaf letters provided and installed and they will be approximately three (3) inches tall There shall be forty-four (44) reflective letters/numbers provided and installed and they will be approximately five (5)inches tall There shall be five (5) reflective letters/numbers provided and installed and they will be approximately twelve (12)inches tall	
270	**AERIAL LETTERING PANELS** Painted aluminum panels will be furnished on each side of the aerial device base section. The panels will be approximately 14" high X 144" long, which will be painted to match the aerial ladder paint color.	
271	**REFLECTIVE STRIPING** Reflective striping shall be applied to the exterior of the apparatus in a manner consistent with the NFPA 1901 latest edition. It shall consist of a 1”, 6”, and a 1” wide stripe low across the front of the chassis and along the sides up to the first compartment on each side where it shall then angle up and back where it shall then run level to the back edge of the body. There shall be a gap provided between each of the stripes. The angle shall be based on the current layout on the department’s current apparatus. The Scotchlite stripes will be white in color. **REFER TO APPENDIX A.**	
272	**CUSTOM EMBLEMS** Two (2) custom made town seals will be provided by the Fire Department and two (2) scrambles will be designed to match fire department layouts. One (1) seal will be applied on each cab door, the scrambles will be on the front doors, and the town seals will be on the rear doors **REFER TO APPENDIX B**	
273	**STAY BACK SIGNAGE** A reflective **"Stay Back 500 Feet"** sign with four (4) inch high letters will be mounted on the rear of the vehicle as directed by the fire department	
	GROUND LADDERS AND ACCESSORIES	

274	**GROUND LADDER STORAGE AREA** All ground ladders (except as noted) will be stored horizontally in the center of the aerial body on adjustable fiberglass ladder slides. One (1) bank of ladders will be stored on each side of the turntable pedestal center support, inside the center section of the body. A hinged, beveled aluminum tread plate door will be provided for each bank of ladders at the rear of the vehicle. The doors will be constructed from 3/16" aluminum tread plate with a 3/16" full length stainless steel hinge. A mechanism will be provided e to prevent the ladders from sliding against the doors when in the closed position. Two (2) Eberhard gas shock door holders will be provided on each door. The doors will latch with an Eberhard #206 "D" ring handle.	
275	**LADDERS** The following **Alco-Lite** ground ladder compliment will be provided: 2 - Alco-Lite 35' Extension 1 - Alco-Lite 28' Extension 1 - Alco-Lite 20' Roof with hooks PRL - 20 1 - Alco-Lite 16' Roof with Hooks PRL-16 1 - Alco-Lite 14' Roof with Hooks PRL-16 (Mounted on aerial fly section) 1 - Alco-Lite 14' Folding FL-14 1 - Alco-Lite 10' Attic AEL-16	
276	**PIKE POLE STORAGE AREA** Six (6) pike pole tubes will be provided. They will be individual tube type holders, mounted in the ladder storage area (if space allows). Each holder will be equipped with a spring type holder and will be accessible from the rear of the apparatus. Each pike pole holder will be labeled to indicate the tube length.	
277	**PIKE POLES** 2 - Six (6) foot pike poles with fiberglass handles 2 - Eight (8) foot pike poles with fiberglass handles 2 - Twelve (12) foot pike poles with fiberglass handles	

THREE (3) SECTION 100' REAR-MOUNTED AERIAL LADDER/PLATFORM

GENERAL INFORMATION

The aerial ladder/platform assembly will be a three (3) section telescoping steel ladder, aluminum platform, pre-piped waterway, steel turntable, torque box and outriggers.

INTENT OF AERIAL SPECIFICATIONS

The intent of these specifications is to describe a telescoping elevating ladder. It will consist of the true ladder type. It will consist of an aluminum **1000** pound capacity platform, three (3) steel ladder sections, a steel turntable, torque box and four outriggers. The working height of the unit will be a minimum of **100'** and the horizontal reach will be **90'.**

It is the intent of the purchaser that the device must meet all the requirements of the National Fire Protection Association's (NFPA) 1901 standard, 2003 edition. It is also the intent of the purchaser to secure a fire service proven piece of apparatus that will be manufactured in the USA.

It is not the intent of the purchaser to deviate from this requirement; therefore, platforms attached to booms, whether solid or lattice, or articulating arms will not be considered as meeting these specifications or the intent of these specifications.

278 DESIGN STANDARDS

The design criteria of the unit will be to create a structure and system that emphasizes safety, product reliability, and ease of operation. These criteria will be:

1. The hydraulic system will be designed so that if a failure of any component or assembly within the system occurs, a single point failure of the entire system will not occur.
2. The minimum ultimate design condition at the ladder base will be **11.1** million inch pounds.
3. All structure load supporting elements of the aerial ladder that are made of a ductile material will have a design stress of not more than 50 % of the minimum yield strength of the material based on the combination of the live load and the dead load. This 2:1 structural safety factor meets the American National Standards Institute (ANSI) and the current National Fire Protection Association (NFPA) 1901 standard.
4. The aerial device will be capable of sustaining a static load one and one-half times it's rated platform capacity (live load), in every position in which the aerial device can be placed when the vehicle is on a firm and level surface.
5. The aerial device will be capable of sustaining a static load one and one-third times it's rated platform capacity (live load) in every position in which the aerial devices can be placed when the vehicle is on a slope of five degrees downward in the direction most likely to cause overturning.
6. All material and welds will have a fatigue life structural safety factor of 2:1. This will be

derived from a fracture mechanics analysis for crack initiation and propagation of the material and welds for all operating temperature ranges and will take into account structure weight, payload, wind load, ice load, nozzle reactions, and dynamics. Since modern engineering technology accepts the fact that a large welded structure whose failure can lead to injury should be analyzed using this procedure, **there can be no exceptions.**

7. All welds in the aerial device will be designed per the static and fatigue criteria of the American Welding Society No. D1.1-97. All aluminum welds will be designed per the static and fatigue criteria of the American Welding Society Standard No. D1.2-97.
8. Ladder deflections - The ladder will not deflect downward more than nine (9) inches with a rated platform load when the ladder is fully extended at 0 degrees elevation.
9. The aerial device will be capable of operating with a rated platform load in either of the following conditions:

a. Conditions of high wind up to 50 mph

b. Conditions of icing, up to a coating of .25" over the entire aerial structure.

All of the design criteria must be supported by the following test data:

1. Strain gauge testing of the complete aerial device.
2. Analysis of deflection data taken while the aerial device was under test load.
3. Accelerometer test to determine dynamic response during ladder operation.
4. Accelerometer test to determine dynamic response during road travel.
5. Material fracture mechanics testing.
6. Weld fracture mechanics testing.
7. Hydraulic component operating and burst strength testing.

279	**AERIAL LADDER MOUNTING** The elevating aerial ladder platform turntable will be rear mounted thus providing the following vehicle benefits: 1. Improved mobility 2. Greater positionability of the turntable for optimum reach at fire ground operations. 3. Increased compartmentation, hose load, water capacity in body, resulting from ladder being raised to clear the cab. 4. Shorter vehicle wheelbase. 5. Shorter overall length of vehicle.	
280	**HEIGHT AND REACH** The vertical height of the unit will be a minimum of **100 feet** as measured by National Fire Protection Association Standard-1901, 2003 Edition requirements, Section 20-7.2, which states, "The rated vertical height of the elevating platform assembly will be measured in a vertical plane from the top surface of the platform handrail to the ground, with the platform raised to its position of maximum elevation." The bidder will state the height of the unit as measured by NFPA-1901 standards. The horizontal reach of the unit will be a minimum of **90 feet** as measured by National Fire Protection Association Standard-1901, 2003 Edition requirements, Section 20-7.3, which states, "The rated horizontal reach of the elevating platform will be measured in a horizontal plane from the centerline of the turntable rotation to the outer edge of the platform handrail, with the elevating platform extended to its maximum horizontal reach." The bidder will state the height of the unit as measured by NFPA-1901 standards.	
281	**WELDMENT FIXTURES** To ensure exact tolerances between parts and part interchangeability, all weldments will be manufactured in fixtures. To further insure weld integrity in all weldments, the fixtures must be able to rotate to enable the weldment to be welded in the number 1 flat welding position resulting in maximum weld penetration in the welded material.	
282	**LASER BEAM ALIGNMENT** Prior to final welding, a **laser beam** will be utilized to assist in alignment of device components secured in the weldment fixtures. The laser will provide an exact line between components to ensure exact alignment of components before and after the final welding process.	
283	**MATERIAL STANDARD** The following standards for materials are to be used in the design of the aerial device. Materials are to be certified by the mill that manufactured the material. Materials that are certified or recertified by vendors other than the mill will not be acceptable. Material testing that is performed after the mill test will only occur for verification and not with the intent of "paper changing" the material classification.	
284	**HYDRAULIC SYSTEM** The hydraulic system will provide power to the entire aerial device as efficiently as possible without the use of a hydraulic cooler. **NO EXCEPTION!** A pressure compensated hydraulic axial piston pump will be provided. It will be capable of operating under any rated platform load condition and aerial device position at normal engine idle or governor controlled fast idle. The hydraulic pump will also be capable of generating sufficient flows to allow multiple aerial functions without significant loss of speed. A hydraulic system relief valve as well as individual circuit relief valves will be provided to prevent damage to any function or circuit. The relief valve will have a stainless steel relief spring to ensure proper function and product reliability.	

285	**HYDRAULIC OIL RESERVOIR** A 70 gallon hydraulic oil reservoir will be provided to supply the hydraulic system. A 2 inch gated suction line will be provided between the oil reservoir and the hydraulic pump. The tank fill will be provided with a strainer screen and vent cap. The dipstick will be located near the fill cap to provide access for checking fluid levels. The tank will be constructed from 10 gauge steel, which will be welded at all interior and exterior seams. Before adding fluid the tank must be cleaned and inspected to ensure no contaminants are present. . The oil level must be checkable without raising the ladder. **Suction and return ports are designed to Society of Automotive Engineers Straight Thread O-ring Specifications. These ports incorporate an o-ring seal rather than pipe threads.**	
286	**HYDRAULIC HOSE, TUBING AND FITTINGS** All hydraulic steel tubing, hydraulic rubber covered wire braided hoses, and hydraulic fittings/adapters will have a minimum burst pressure rating of four times the operating pressure. Hoses and tubing will be properly sized to minimize heat build up during extended periods of operation. Hoses and tubing will be properly sized to minimize flow restrictions. All hydraulic hose will have a tube and cover constructed of Nitrile elastomers and will have braided/spiral wire reinforcement capable of maintaining a 4:1 safety factor throughout all areas of the hydraulic system. The hose will meet appropriate Society of Automotive Engineers performance specifications: 100R2 or 100R12. The manufacturer will implement the most efficient, leak-free, fluid connector design in the industry. The manufacturer's entire aerial line must be certified as a Parker Genuine Parts design.	
287	**LEAK-FREE GUARANTEE** An exclusive three-year leak free guarantee warrants the Seal-Lok, O-ring face seal connections to be leak-free for a period of three (3) year. See Parker Genuine Parts warranty booklet for more information.	
288	**DIVERTER VALVE** There will be an automatic electric over hydraulic three (3) position diverter valve located at the left side of the apparatus. This diverter valve will divert hydraulic fluid to either the aerial ladder controls or the outrigger controls. To prevent accidental operation of the ladder prior to proper set-up of outriggers, the diverter valve will only allow hydraulic fluid to the outrigger controls until the outriggers are set properly. To prevent accidental operation of the outrigger system during aerial ladder operation the diverter valve will only allow hydraulic fluid to the ladder controls, when the aerial device is raised from the aerial travel support. In the event of electrical failure the operator will be able to move the diverter valve to the ladder or outrigger position for continuous uninterrupted operation.	

289	**OUTRIGGER SYSTEM HYDRAULIC CONTROL VALVES** The outrigger cylinder system will be controlled by a **pressure compensated, proportional control valve** that is designed for parallel hydraulic circuit operations. The valve must be the proportional type to provide the smoothest and most precise operation of the outriggers. Devices utilizing on/off type outrigger control valves in lieu of a proportional valve will not be acceptable! This valve will be modular in design so that individual sections can be replaced in the field, thus reducing maintenance costs. The valve housings will be made of high tensile cast iron for durability and the individual spools will be hard, chrome plated for long life and resistance to corrosion. Each valve will be equipped with a heavy-duty electric solenoid for electric control of the outrigger from the remote operator's station. Mechanical handles shall also be provided at the remote operator's station to provide override operation capability. The mechanical handles will be equipped with large knobs with integral labels inside each knob to indicate the function of the handle. Adjustments and troubleshooting will be accessible from the MDM display at the turntable control station.	
290	**LIFT, EXTENSION AND ROTATION HYDRAULIC CONTROL VALVE** The lift, extension, and rotation systems will be controlled by a **pressure compensated, proportional control valve**. This valve will be of modular construction to simplify troubleshooting and field service and minimize downtime. The main control valve will be positioned at the turntable control console for direct manual control of each aerial function. Adjustments and troubleshooting will be accessible from the MDM display at the turntable control station. Use of electrical controls at the main turntable control console will not be acceptable.	
291	**PRESSURE FILTER** The pressure filter shall be made of a micro glass medium which has the highest capture efficiency, dirt holding capacity and life expectancy over other media such as cellulose and synthetic. The pressure filter will have a bypass circuit protected by a check valve which will be installed around the pressure filter. The pressure line filter will be required even if a suction line filter is provided in the reservoir due to the inability of the suction line filter to trap contaminants that may enter the system. The pressure filter cartridge will have a sensor that indicates the condition of the filter and provides a warning text message at the MDM displays. The MDM will display the following warning message if the pressure filter is blocked or in the bypass mode: "Warning - Pressure Filter in By-Pass Mode". The pressure filter will have an absolute rating of ten (10) microns.	
292	**RETURN FILTER** The return filter shall be made of a micro glass medium, which has the highest capture efficiency, dirt holding capacity and life expectancy over other media such as cellulose and synthetic. The return filter will have a bypass circuit protected by a check valve, which will be installed around the return filter. The return filter cartridge will have a sensor, which will indicate the condition of the filter and provide a warning text message at the MDM displays. The MDM will display the following warning message if the return filter is blocked or in the bypass mode: "Warning - Return Filter in By-Pass Mode". The pressure filter will have an absolute rating of ten (10) microns.	

293 MOTION CONTROL SYSTEM

The ladder, outrigger system and interlock systems will be controlled with the hydraulic motion control system. The system will provide state of the art controls for the ladder, outriggers, and auto-level and interlock systems.

The turntable and platform control station will be equipped with a Master Display Module (MDM), which has programmed parameters for each aerial device function. These parameters will provide for proper machine operation and reduce the possibility of abusive operation. The number of wires required to connect the MDM module and control hardware is kept to a minimum through the use of serial CAN-bus data transmission technology. The CAN-bus modules are attached to each other using just two communication wires.

Each component of the system shall be proven, off the shelf components, which are available throughout the world. Proprietary hardware designs will not be acceptable due to the lack of parts availability and support.

The MDM module is also capable of monitoring engine and transmission J-1939 parameters and warns the operator if there are any conditions of the motion control system that are beyond the limits of pre-established ranges.. The MDM display has built-in troubleshooting and will allow troubleshooting and function history monitoring for the entire motion control system. The memory function allows a service technician to identify whether these warnings were ignored or overridden. This simplifies overall maintenance and repairs.

The motion control system will receive rotation information from an absolute encoder located on the rotation swivel. The encoder will provide absolute position of the turntable at any given position from 0° to 360°.

A MDM information center shall be provided at each aerial control station. The MDM display will allow the system to be diagnosed and calibrated without the need for separate controllers or computers.

The turntable and platform MDM displays will indicate the following information from four on-demand screens:

Elevation Angle of the ladder

Continuous Platform height from the ground to the top of the platform handrails. (Per NFPA requirements)

Continuous Platform horizontal reach from centerline of rotation to the front edge of the platform floor. (Per NFPA requirement)

A. Degree of rotation from centerline of vehicle
B. Cab avoidance warning system
C. Body avoidance warning system
D. Short jack warning
E. Cradle alignment
F. Rung Alignment
G. Breathing air level monitoring
H. Platform moment load monitoring

The turntable and platform MDM displays will indicate the following from automated warning/message screens:

I. Cab and Body Avoidance - "Reverse rotation or raise ladder"
J. "Moment Load Exceeded"
K. Short Jack Left Side - "Reverse Rotation"
L. Short Jack Right Side - "Reverse Rotation"
M. Ramp Down ladder control
N. Pressure Filter Status - "Warning - Pressure Filter In By-Pass Mode"
O. Return Filter Status - "Warning - Return Filter In By-Pass Mode"
P. Breathing Air Level - "Below 50% Air Level"
Q. Breathing Air Level - "Below 35% Air Level", Amber indicator light displayed
R. Breathing Air Level - "Warning - Below 20% Air Level", Red indicator light displayed with audible alarm
S. Breathing Air Level - "Warning - 0% Air Level", Red Amber indicator light displayed with audible alarm

294	**EMERGENCY HYDRAULIC PUMP SYSTEM** In the event of failure of the main hydraulic pump or vehicle engine, the unit will be equipped with an emergency hydraulic pump which will be parallel plumbed into the hydraulic system and be electrically driven from the chassis batteries. The emergency pump system will be capable of limited functions of the ladder and outriggers to stow the unit. The pumps will be controlled from both the right and left outriggers and turntable control stations with spring loaded momentary contact switches. The pump will have a separate hydraulic oil supply line that extends from the main supply line and attaches directly to the hydraulic oil reservoir. A shutoff valve for each line will be provided and check valves will be incorporated on the pressure side of the pump to ensure that one will continue to operate the ladder in the event the other fails. The pump will have high tensile steel shafts and gears with the shafts supported by needle bearings. The cylinder plate and gears will be ground as a set to ensure exact tolerances. Clearance will be maintained by a Mylar shim.	
295	**POWER TAKE OFF (PTO) 12 VOLT SWITCH** The apparatus will be equipped with a power shift PTO driven by the chassis transmission. An indicator light will be located in the cab next to the PTO switch to indicate when the PTO is engaged. The PTO will only engage with the parking brake applied and the transmission in neutral. If the unit is equipped with a pump, the PTO will be active if the transmission is in "Drive", only if the fire pump is engaged. The PTO will be a heavy duty pressure lubricated and cooled unit to allow for extended operations. A master 12-volt "Ladder Power" switch will be provided adjacent to the PTO switch for control of all 12-volt power to the ladder except for the emergency pump circuit.	
296	**HOUR METER** An aerial hour meter will be installed in the cab adjacent to the ladder power and PTO control switches. The hour meter will be wired to the aerial PTO circuit to record hours of operation for the aerial. The hour meter will aid in determining when preventive maintenance should be scheduled as outlined in the operator's manual.	
297	**ENGINE FAST IDLE ACTUATOR** The fast idle actuator will be used to raise the engine RPM to a preset level for proper aerial operation. The fast idle switches will be located at the main outrigger control station, turn table and the aerial platform control station/s. For the safety of personnel and equipment, the fast idle system will not activate unless the transmission is in neutral. The fast idle will also disengage when the generator is activated. **No exceptions to this system will be acceptable.**	
298	**TORQUE BOX** A torque box will be provided to transfer all aerial loads and torque into the four (4) outriggers, thus preventing the loads from being transferred through the chassis (no exceptions). The torque box will consist of two (2) outrigger housing weldments with one (1) integrally connected to the turntable pedestal structure, thus forming a single structural weldment for aerial load distribution among the outriggers. The unit will have a section modulus of 344 cubic inches, a torsional resistance of 1780 quadric inches and a 1688 quadric inches resistance to bending moment (RBM). The torque box will be bolted to the chassis frame rails with forty two (42), ¾ inch Society of Automotive Engineers grade 8 bolts and nuts. This type of construction will be required for the following reasons: 1. Replacement of the chassis in the event of vehicle damage to this chassis. 2. Replacement of the chassis due to age.	

299	**OUTRIGGERS** Four (4) double box beam type out and down outriggers will be provided. The side to side spread of the outriggers will be a maximum of 18' from centerline of the vertical jack beams. The apparatus must have the capability to set up with a 12' outrigger spread. The outrigger system must be capable of leveling the vehicle, fore/aft and side to side. **NO EXCEPTIONS!** The extension of the horizontal outrigger beam will be accomplished by a hydraulic cylinder which will have a 3 inch bore and 2 inch rod and 62 inch stroke. This cylinder will have cushion porting to reduce shocks associated with stopping the cylinder at full extension and retraction. The horizontal outrigger beam will be fabricated from ½ inch steel side plates and 1 inch steel top and bottom plates. For ease in maintenance the outrigger extension cylinder will be equipped with end connections that do not require removal of body panels to remove pins or extension cylinders. Each outrigger assembly will have 2 Nylatron slide pads with a total square area of 24 square inches to provide smooth operation and to extend the life of the outrigger. Each jack cylinder will have a 5 inch bore with a 3-3/4 inch rod and a 24 inch stroke. The jack cylinders will be equipped with integral (on the cylinder) holding valves, which will hold the jack cylinder in either the stowed position or the deployed position should a hydraulic line be severed at any point within the hydraulic system. Each jack cylinder will also have a thermal relief system that will prevent the cylinder fluid pressure from rising due to fluid temperature increase. The vertical jack cylinder rods will be fully enclosed by a telescopic inner steel jack box that will accomplish the following: Protect the cylinder rods against damage that may occur while on the fire ground. Add lateral stability to the outrigger structure. Provide a structure for installing safety pins. Each vertical jack box will be equipped with a five position mechanical safety pin. The safety pins will be a minimum of 1 inch in diameter and secured by a heavy duty chain to the outrigger beam. Outrigger cylinder rods that are exposed and thus susceptible to damage will not be acceptable.	
300	**JACK FOOT PADS** A permanently attached self-centering steel foot pad, ½ inch by 13.5 inches by 15.5" (209 sq. in.) will be provided on each vertical jack beam. Each foot pad will swivel longitudinal and require no adjustment during outrigger set-up. The outrigger pad will be attached without the use of a bearing type swivel due to the additional maintenance required with this design. Four (4) auxiliary outrigger pads will be provided for additional load distribution, measuring ½ inch by 24 inches by 24 inches (576 sq. in.). Each auxiliary pad will be fabricated of 6061-T6 high strength aluminum alloy and have a handle for easy use. The auxiliary pad will be secured in mounts located below the body compartments.	
301	**OUTRIGGER/LADDER INTERLOCK SYSTEM** An interlock system will be provided between the outriggers and ladder that prevents the operation of the ladder until the operator places all jacks in the load supporting configuration. Each outrigger will be equipped with a pressure sensitive switch that closes only when the jack is firmly in contact with the ground. Until all jack switches close, electrical power will not be transmitted to the turntable (preventing ladder operation). A key controlled override switch will be provided at the central outrigger control station for emergency override of the interlock system. A green indicator light will be provided on the outrigger control panel to indicate the position of the foot pad. Illumination of the indicator light indicates firm ground contact.	

302	**OUTRIGGER DEPLOYMENT WARNING ALARM** An outrigger deployment warning device will be provided to warn personnel in the vicinity of the apparatus that the outriggers are in motion. Whenever an outrigger control is utilized, the device will produce a pulsing tone, separate and distinctive from that of other audible warning systems provided on the apparatus. When the outrigger control is released to its neutral position, the audible warning will cease.	
303	**OUTRIGGER LIGHTING** **ALL LIGHTS SHALL BE <u>LED</u> TYPE.** Each outrigger will be equipped with the following light package: 1. One (1) double faced, 7 inch diameter, red flashing light mounted on the inside surface of the rear outriggers. 2. One (1) adjustable work light mounted under body to illuminate each outrigger foot pad area. Both the flashing lights and the foot pad illumination lights will be energized by the ladder power circuit.	
304	**OUTRIGGER WARNING LIGHTS** One (1) Whelen model 70R00FRR-LED, 3-1/16 inches by 7-1/4 inches red flashing LED light will be mounted on each of the outrigger cover panels for a total of four (4). The light will be equipped with a chrome plated flange (7EFLANGE). The outrigger warning lights will be energized by the ladder power circuit.	
305	**OUTRIGGER SCOTCHLITE** Yellow ScotchLite material will be furnished on both sides of the horizontal and vertical beams of the rear outriggers. Decals reading **"PULL PINS"** will be provided on the rear of the outrigger beams to help the operator stow the outriggers.	
306	**OUTRIGGER CONTROLS** An illuminated electronic outrigger control station will be provided, at the rear of the apparatus. The outrigger control switches will be enclosed in a recessed compartment to protect each control from damage or accidental movement. The controls will be located so the operator can see the outrigger he is operating. Body designs that block the view of the outriggers from the control station will not be acceptable. Out and down outrigger control functions for each outrigger will be operated independently so that the apparatus may be set up in restricted areas or on uneven terrain. The diverter valve override control will be mounted behind the left side outrigger control panel. An outrigger control panel will be provided at the left side of the body. Access will be provided for the operator to the diverter valve manual override control, outrigger manual override controls, the electrical system backup switch, and the rotation safety system reset button. The left outrigger control station will incorporate the following: A. Eight (8) outrigger set indicator lights B. One (1) ladder power indicator lights C. Rotation safety system override D. Fast idle switch E. Emergency pump control button with red indicator light F. Override key control with indicator light G. Waterway pressure gauge H. Panel light switch I. Warning decals J. "Hydraulic Filter Plugged" indicator light K. Hydraulic test ports L. Computerized Automatic Leveling Control System Controls	

307	**COMPUTERIZED OUTRIGGER LEVELING SYSTEM** The outrigger control system will incorporate a **Computerized Self Leveling System**, in addition to standard outrigger controls. The computerized system will assure full outrigger extension and proper jack penetration for safe operation of the aerial device. A control panel for the auto level will be located in main outrigger control panel. The control panel will include the following: A. "Automatic/Manual" selector switch B. "Extend Outriggers" control switch C. "Outriggers Extended" indicator light D. "Level Truck" control switch E. "Truck Level" indicator light F. "Lower Truck" control switch G. "Ladder Operation" indicator light H. "Stow" control button I. "Emergency Stop" control switch Four (4) individual "Automatic/Manual" selector switches Operation of the system will be in the following sequence: Select "Automatic" mode on the Automatic/Manual selector switch. Activate the "Extend Outriggers" button and pause until the "Outriggers Extended" light is illuminated. (Be sure the area around the outriggers is clear of personnel or obstructions) Place the outrigger auxiliary foot pads into position. With the jack clear of obstruction activate the "Level Truck" button which will extend the jack beam to full stroke and level the truck in a few seconds. When the truck is level, the "Truck Level" and the "Ladder Operation" indicator lights will illuminate. Once the truck is level, activate the "Lower Truck" button until the truck is at the desired height. Install outrigger safety pin in each jack and proceed with aerial operations The system will automatically stow the outriggers if desired by the operator. To activate the "Stow" function, the ladder will need to be in the cradle and the outrigger safety pins must be pulled from the jacks. When the operator activates the "Stow" button, the outriggers will lower the truck to the ground and retract the jacks. , The system will pause for ten (10) second, and then retract the outriggers to their full nested position.	
308	**OUTRIGGER LEVEL** A bubble type leveling device will be provided at the main outrigger control panel to assist with aerial device setup. This device will be mounted on the forward section of the front body panel and will be at eye level for the operator. The leveling device will be color coded indicating the following conditions: **Green-----safe operating zone.** **Yellow----caution operating zone.** Since use of this leveling device is of a critical nature, it will have a serialized number from the manufacturer to indicate documented quality control.	
309	**FORE/AFT LEVEL** A second level will be furnished to measure fore and aft level of the vehicle. The level will be mounted near the left main outrigger control panel. Leveling gauges should be provided in the cab in clear view of the driver to assist with proper set up.	

310	**TURNTABLE/TURNTABLE DECK** The turntable will be a fabricated steel weldment designed for the rotation and elevation of the ladder sections and platform. It will consist of the following: A 50-1/2" x 61" x 1" steel bearing plate and matching top plate that will be machined to insure proper fit to the rotation bearing. Manufacturers that do not mill both bearing surfaces will not be acceptable. **NO EXCEPTION!** A 94" W x 104" L octagonal, aluminum tread plate deck that will cover the entire turntable frame, providing a large walking surface around the ladder. It will have a 1.5" downward flange on all four (4) sides. An aluminum tread plate access step mounted near the heel of the ladder to provide easy access to the ladder from the turntable deck. Turntable safety handrails mounted at the rear and sides of the turntable. The handrails will be 1.25" diameter polished finish grade 304 stainless steel tubing with an extruded finned rubber grip covering and the joining fittings will be polished chrome plated tees and ells. All rails will be a minimum of 42" high, no exceptions. The turntable deck will be a free from obstructions as possible, due to the importance of this area when the vehicle is in a rescue mode. The turntable deck will allow easy access to the turntable even when the ladder is being operated over the rear of the vehicle. Turntables with the drive motor or breathing air bottles mounted in any walking areas (front or rear) of the turntable will not be acceptable.	
311	**FAIL SAFE TURNTABLE RETENTION BOLTS** The turntable weldment will be designed to incorporate two (2) retention bolts. The bolts will be 1.25 inch diameter and will be constructed of heat treated high strength steel which meets military standard number 5000. These bolts are required as a safety feature to support the ladder in the event of a weld failure on the turntable. **NO EXCEPTIONS!**	
312	**CRADLE ALIGNMENT INDICATOR ARROWS** Stainless steel arrows will be provided on the turntable surface and mounted so they are in full view of an operator when standing at the turntable control station. The arrows will assist the operator in indicating the alignment of the aerial ladder with the ladder travel cradle. The indicators will be overlaid with white ScotchLite material and suitably illuminated for nighttime operation.	
313	**HYDRAULIC, ELECTRIC AND WATER SWIVEL** Hydraulic power to the turntable hydraulic circuits will be provided through a three port, high pressure, hydraulic swivel that permits 360 degrees of continuous turntable rotation. Electrical power to the turntable electric circuits will be provided by a collector ring assembly. The collector rings will be used for electrical ground, ladder control functions, and a 110 volt AC system during 360 degrees of continuous turntable rotation. The collector ring assembly will have a minimum of **36** circuits. Water will be transferred to the aerial waterway by means of a five (5) inch water swivel enabling 360 degree continuous rotation of the turntable.	
314	**ENCODER** The swivel will be designed with an integral absolute encoder to provide continuous output to indicate the position of the turntable at any given time. The encoder will be designed to indicate position of the turntable even if power interruption occurs.	

315	**LADDER SECTION CONSTRUCTION** The elevating platform will consist of three (3) steel ladder sections referred to as the base section, mid section, and fly section. The design and construction criteria for these ladder sections will be: 1. Each section will be fabricated using high strength steel, welded together to form a structural unit. 2. All welding will be done by welders that have been certified in accordance with the American Welding Society Standard specifications. 3. Each ladder section will be constructed in an assembly fixture to ensure uniformity and interchangeability. K-bracing at each rung will be utilized to minimize side deflection of the ladder. All rungs will be 1-1/2 inches in diameter that are spaced at 14 inch centers and covered with serrated, replaceable rubber sheaths. The rung covering is to be held in place with contact cement and metal clips for ease of replacement. All rungs, K-braces, and diagonals will be positioned so that they are continuously welded to the ladder section. All side rails will be protected from interior corrosion by coating the interior of the rail with a corrosion preventative film that meets military specifications number MIL-C-16173D. Each rung will be equipped with a heavy duty serrated, replaceable rubber sheath to provide an anti-slip surface for fire fighting personnel. For additional safety, the covers will be constructed from a soft rubber to allow ice buildup to easily break off when the rung is stepped on by fire fighting personnel. This will be an added safety feature for water tower operations that must occur during cold weather conditions. Ladder designs that do not utilize rubber covers will not be acceptable due to the high cost and difficulty of replacing the anti slip surfaces and the inability to provide a safe rung surface during icing conditions. Ladder handrails and diagonal materials are to be constructed from square or rectangular tubing, which provides a greater welding surface area where the materials are attached to each other. Use of round material is not desired due to the smaller welding area surface associated with round materials.	
316	**AERIAL TRAVEL SUPPORT** A heavy duty rest will be provided to support the aerial in the travel position. Stainless steel bedding plates will be attached to the aerial base section to protect the aerial when the unit is in the travel position.	

317	**BASE LADDER SECTION** Due to forces created by elevation and rotation, torsional or "twisting" movement is present in all aerial device designs. To minimize the effect of this movement, the base section will have a box truss system underneath and in conjunction with the rungs. This will be accomplished by mounting 1 inch square tubing below and parallel to each base section rung and flush with the bottom of the side rails to form a space of 6 inches between the rungs and the tubing. Additionally, two K-braces will be positioned side by side in a vertical position between the 1 inch square tubing and the bottom of the rung. This will be done a minimum of every fourth rung on the base section. Each base rail for the base section will be a formed structure to provide a full length integral channel for the mid ladder section to interlock to the base section. The use of wear blocks or angles to interlock the ladder sections will not be acceptable. To provide maximum overlap strength between the base and mid sections, a series of outer side wall reinforcements **(Force Distribution Members)** will be incorporated along the outer wall of the base section side rails on both sides. A minimum of seven force distribution members will be provided. These members will serve to strengthen the side rail overlap area to prevent overlap failure. They will be equally spaced beginning at 81 inches from the end of the base section. Each member will be a minimum of ½ inch wide and will extend from the midpoint of the side rail to a point over the top inside edge of the side rail where it will join a formed channel welded on edge to the top inside edge of the base section side rail. All seven (7) members will be permanently welded on both sides of the members, to the base section side rail, the base section top edge and the top edge reinforcement channel. The top edge reinforcement will have a minimum wall thickness of ¼ inch and be a minimum of 4 inches tall. Internal stress reinforcements will not be allowed because they cannot be welded continuously to the interior of the base side rail components and the welds cannot be visually inspected after the ladder section is placed into service**.**	
318	**MID SECTION** Each base rail for the mid section will be a formed structure to provide a full length integral channel for the upper mid section to interlock to the mid ladder section. The mid section will be designed with sufficient internal clearances to house the extension cylinders. This will allow the extension cylinder rods to be fully enclosed and protected at all times from damage due to icing, road dirt, water spray and fire fighting personnel when climbing the ladder. This design will also keep the extension cylinder from obstructing the underside of the ladder.	
319	**FLY SECTION** The fly section will be designed specifically for the purpose of supporting the platform. This cradle support will be in the form of a solid and integral weldment designed to support the platform from underneath in the center. The cradle support will be designed to structurally support the platform, platform movements and loads due to aerial operations and over the road travel. The cradle supports will be designed to be the only component to touch the fire building or ground depending on ladder position. This design will also minimize the forces applied to the platform structure and the platform leveling system.	

320 LADDER SECTION DIMENSIONS

All bidders will state in the space provided below their dimensions on the unit proposed. Dimensions proposed must equal or exceed those specified.

	Side Rail Dimensions [L x W x H]	Side Rail Wall Inside	Outside Thickness	Handrail Height	Handrail Width
Base Section					
Mid Section					
Fly Section					

OVERLAP SURFACES BETWEEN SECTIONS

Base to Mid Section	
Mid to Fly Section	

321 PIKE POLE MOUNTED IN FLY SECTION

There will be a 10 foot pike pole furnished and mounted in the ladder fly section. The mounts shall include an aluminum tube for the pole and a mechanical pin to secure the hook end of the pole.

322 STOKES BASKET

A stokes basket and mount will be provided on the base section for mounting a rescue stretcher. The mounts will be constructed from aluminum and will be easily accessible from the inside the ladder section or from the top of the body.

323 ROOF LADDER MOUNT

There will be a mount furnished in the fly section of the ladder for a fourteen foot (14') roof ladder. The mounts will include an aluminum receptacle box for the heel end of the ladder and a mechanical pin lock for the roof hook end of the ladder.

324 PLATFORM MOUNTED PICK AXE

There shall be one (1) fiberglass Pick Head Axe with mounting bracket provided in the bucket. A strap shall be provided to hold the axe in the bucket**.**

325 PLATFORM MOUNTED IRONS

There shall be one (1) set on irons mounted in the bucket in an approved bracket to retain them**.**

326 CRADLE ILLUMINATION LIGHTS (LED)

Two (2) 12 volt lights will be mounted near the ladder travel support to provide illumination during night time operations. The lights will be wired and activated by the ladder power circuit. The lights will be Blue in color

327	**ELEVATION SYSTEM** Two (2) double acting lift cylinders will be attached between the turntable and the base section near the midpoint of the base section to create improved lifting geometry that results in lower hydraulic operating pressures and improved load distribution on the base ladder section. The cylinders will function only to elevate the aerial device and are not intended to serve as a structural member to stabilize the ladder during side-to-side movement. The lift cylinder rods will be attached to the base section with self aligning swivel bearings to prevent side loading on the lift cylinders and result in longer cylinder seal life. They will provide smooth precise elevation from **-5 degrees** below horizontal to **80 degrees** above horizontal. The lift cylinders will have a 7 inch internal bore, a 3-3/4 inch diameter rod and 71-3/4 inches stroke. The lift cylinders will be equipped with integral (on the cylinder) holding valves which prevents the ladder from lowering should a hydraulic line be ruptured at any point within the hydraulic system. They will also have a manifold line with velocity fuses between the cylinders to prevent uneven cylinder lift. They will also have both rod and piston hydraulic cushions. These cushions will decelerate the cylinder near the end of its stroke to allow a smooth stop at full stroke.	
328	**LADDER INTERLOCK SYSTEM** A limit switch at the aerial travel support will be provided to prevent operation of the outriggers once the aerial has been elevated from the nested position. This system prevents operation of the outriggers once the ladder has been elevated from the nested position.	
329	**LOAD METER** The system shall incorporate an integral load meter which will display load level on the aerial ladder and platform proportionate to the maximum-rated low elevation load of the device. The load meter will calculate the current load and display it on the MDM displays located at the turntable and the platform control console. The display instantly adjusts to changes in ladder angles, extension or live load. The load meter system shall include: A pressure transducer installed in the hydraulic system. The pressure transducer is to have an accuracy of plus or minus 1 percent. Bar Graph indicating moment load range. Actual percentage of moment load range. An audible horn mounted near the display.	
330	**ROTATION SYSTEM** A minimum 48.25 inches internal tooth monorace bearing will be provided for smooth 360 degree continuous rotation and sufficient strength. The upper inside half of the bearing will be bolted to the open base support plate with sixty-four (64) 7/8 inch diameter grade 8 bolts, with conical compression high strength washers to insure that the bolt is locked into the threaded hole. (Bolts designated as 8.2012 L-9 are not acceptable). Both upper and lower bearing surfaces will be milled to ensure a true mounting surface for the rotation bearing. Units that weld the bearing to their mounting plates will not be acceptable due to the tremendous cost and down time involved in replacing a damaged or defective bearing. A planetary drive speed reduction gear box powered by a hydraulic motor will provide precision rotation control throughout 360 degrees of rotation. An automatic spring applied hydraulically released disc type brake will be incorporated into the gear box to provide positive braking and holding of the turntable/ladder against reactionary forces such as water and gravity. The driver motor will be positioned on the turntable so it will not obstruct any walking area or stepping surface on the turntable deck.	

331	**ROTATION SAFETY SYSTEM** The Rotation Safety System has been designed to aid the aerial device operator who has primary operational responsibility for the rotation of the aerial device to prevent incidents such as overturn. The Rotation Safety System will sense outrigger extension and outrigger jack positioning in conjunction with aerial device movement. If the aerial device operator attempts to move the aerial device off vehicle center, and the outriggers are not fully extended on the side of rotation, and all jacks are not in firm ground contact, the Rotation Safety System will sense this fault and will audibly and visually warn the operator to return the aerial device to the center line position. If the operator continues rotation into the short-jacked zone, the aerial device rotation will stop. When rotation is stopped, the Rotation Safety System will only allow the operator to rotate back to the fully supported (jacked) side of the vehicle.	
332	**CAB PROXIMITY SYSTEM** A cab proximity system will be provided technology on the rotation and elevation systems. The purpose is to alert the aerial device operator when rotating left or right at low angles and/or lowering the ladder, toward the vehicle cab. The system will automatically stop rotation or lowering functions when the device is in the defined zone regardless of the ladder rotation degree or elevation degree. When system stops rotation towards the cab, the operator will only be allowed to rotate in the opposite direction or elevate the ladder above the defined zone. If the system stops the lowering function when the ladder is in the defined zone over the cab, the operator will only be allowed to raise or rotate the ladder away from the cab. The system will sound an audible alarm and display a warning message in the MDM display located at the control stations. The audible and visual warning message will remain active until the operator moves the device away from the defined hazard zone.	
333	**BODY PROXIMITY SYSTEM** A body proximity system will be provided utilizing technology on the rotation and elevation systems to alert the aerial device operator when rotating left or right at low angles and or lowering the ladder, toward the body. The system will also automatically stop rotation or lowering functions when the device is in the defined zone regardless of the ladder rotation degree or elevation degree. When the system stops rotation towards the body, the operator will only be capable of rotating in the opposite direction or elevate the ladder above the defined zone. If the system stops the lowering function when the ladder is in the defined zone over the body, the operator will only be capable of raising or rotating the ladder away from the body. The system will sound an audible alarm and display a warning message in the MDM display located at the control stations. The audible and visual warning message will stay activated until the operator moves the device from the defined zone.	

334	**EXTENSION/RETRACTION SYSTEM** A dual system of hydraulic cylinders and cables will provide full power operation of the extension and retraction modes. Each system will be capable of supporting the ladder in the event the other system fails. The cylinders will be used to extend and retract the mid-fly section and the cable system will be used to extend and retract the fly section. The cylinders will have a 3-1/2 inch internal bore, and 2-1/2 inch hollow rod. Both cylinders will be equipped with two integral holding valves to prevent both extension and retraction movements during water tower operations and other movements in the event a hydraulic line is severed... Additionally, the cylinder barrels containing the hydraulic fluid must be anchored in the base section to keep the transfer of weight at full extension to a minimum. To reduce maintenance requirements, both cylinders will be completely enclosed and protected inside the mid section side rail beams. This will ensure that cylinder rods will never be exposed to the elements even at full extension. To minimize down time, both cylinders will be easily removable from the rear of the vehicle by unbolting and sliding out the rear of the vehicle. Both cylinders will be completely independent of the cable extension/retraction system for the fly section, thus eliminating the need to disturb the cable system or waterway system should cylinder maintenance be required. The dual cable system will utilize two (2) ¾ inch extensions and two (2) ½ inch retraction cables routed via two (2) pulley sets located between the ladder sections. The cables will have a certified safety factor based on a breaking strength ratio of 8:1. A stroke multiplier cable system is undesirable. No Exceptions.	
335	**EXTENSION/RETRACTION FEATHERING** A feathering cushion system for the extension and retraction at the end of cylinder stroke when controlled from the platform. The system will automatically feather the movement of the ladder when the ladder approaches full extension or full retraction, regardless of the input speed from the operator.	
336	**LADDER SLIDE MECHANISM** Nylatron slide pads with a sliding coefficient of friction of **.15** will be used between the telescoping ladder sections. Slide pads will also be used to control side play between the ladder sections. Ultra-high molecular weight material is not acceptable. No Exceptions.	
337	**LADDER EXTENSION NUMBERS** ScotchLite numerals will be furnished on the inside of the ladder base section handrail on each side, to help the operator determine the distance the ladder is extended. Numbers will be displayed in five foot increments.	
338	**ELECTRIC AIR AND HYDRAULIC ROUTING SYSTEM** All lines to the platform will be enclosed and protected from the turntable to the platform. All lines will be routed through the base section side rails and then through flexible aluminum conduits that travel under and over the mid section and end at the base of the fly section. This system is required to reduce the maintenance problems associated with slip tubes and take-up pulleys. Ladder designs where electrical lines, airlines and hydraulic line are exposed on the interiors of the ladder handrails **will not be acceptable**.	
339	**PLATFORM CONSTRUCTION** The platform will be constructed in five assembly groups that includes the following: Platform framework, floor, handrails, corner gates, and access gate/access ladder.	
340	**PLATFORM FRAMEWORK** The support structure framework of the platform will be constructed of extruded square aluminum tubing. The floor of the platform will be constructed of extruded aluminum I-beam extrusions. An aluminum structure will be installed below the platform floor structure to provide a structural attachment point for the platform to the ladder section.	

341	**PLATFORM HANDRAIL ASSEMBLY** A handrail will be provided on all four sides of the platform. The handrail will enclose an area of the floor. The handrails on the front corners will be mounted on the same angle as the platform floor for a uniform front and side step area. A 4 inch kick plate will be provided around the floor and perimeter of the handrail assembly.	
342	**PLATFORM ACCESS GATES** Two (2) self-closing access gates will be provided for entry into the platform. They will be provided at the front corners of the platform. Both gates will be hinged at the rear and will swing inward. Each gate will include automotive **type** safety latches. Each gate will be designed utilizing 2" X"2" tubing, which will incorporate an integral handrail in the top section of the door. The integral handrail will be constructed from 1 ¼" round aluminum tubing that will be covered with a "glow-in-the-dark" anti-slip material. The gate hinge will be a two-point type hinge to eliminate binding associated with a piano type hinge.	
343	**PLATFORM ACCESS LADDER AND HANDRAILS** Continuous ladder contact between the platform and the ladder fly section will be maintained by attaching a sliding auxiliary ladder section to the platform that will follow the platform as it moves away from the ladder during elevation. Handrails will be provided between the ladder fly section and the platform that automatically position themselves for maximum protection for transfer to or from the platform no matter what the ladder's angle of elevation. The main entrance between the ladder and platform will be located at the rear. The rear gate will be 2.25" diameter round tubing, mounted to a two position spring loaded hinged, which will give the gate the capabilities of being lifted up 90° or up and in 90° into the platform. When the rear gate is in the closed position it will rest in a socket type receptacle located on the rear main handrail structure of the platform. The rear gate will be equipped with a mechanical pin to secure the gate in a fixed position.	
344	**PLATFORM FLOOR** The floor of the platform will be constructed of extruded aluminum tubing covered with anti-slip aluminum tread plate. The floor assembly will be one piece and will extend out past the handrail assembly 9 inches on each side and 11 inches on the front to make transfer of personnel in and out of the platform easier. The floor size will be a minimum of 55 inches by 88 inches to obtain approximately 33.61 square feet of floor area. The platform floor and the outside platform step will be on the same level. All corners of the floor will be beveled to facilitate close maneuvers to buildings. There will be a heavy duty extruded rubber bumper on the outside edge of the platform floor. The bumper will be the same thickness as the floor material and will be equipped with molded end caps to ensure uniform edges. The underside of the platform will be protected by solid aluminum tread plate with the exception of four (4) drain holes. . Platform floors that are not constructed from solid material will not be acceptable.	

345 PLATFORM MOUNTING

The platform will be suspended from the tip of the fly section by an integral "cradle" shaped assembly that supports the platform beneath the center axis of the floor. The cradle design will transfer all platform loads directly to the ladder structure. The "cradle" platform mount will also insure that forces will not be transferred through the platform structure when the platform is positioned on the ground or on a building roof. This support assembly will not hang below the top of the windshield and will not obstruct the driver's view.

The support structure must be designed to withstand the forces created by the vehicle when it encounters road irregularities. Hydraulic cushioning in the platform leveling system is not acceptable because fluids locked inside the cylinders by holding valves will not allow adequate dampening.

Two (2) heavy duty rubber bumpers will be provided on the platform cradle supports, one (1) each side. The rubber bumper will be positioned so it is the **only** component touching the building or ground depending on ladder position.

346 PLATFORM LEVELING SYSTEM

A platform leveling system will be provided and so designed that the platform together with its rated payload can be supported and maintained level in relation to the turntable regardless of the elevation of the ladder.

The leveling of the platform will be accomplished by the following two systems working together:

1. **Master/Slave Cylinders** - A dual master/slave hydraulic cylinder system will be provided with each side capable of maintaining the platform level. Two (2) master cylinders will be mounted between the turntable and base ladder section and two (2) slave cylinders will be mounted between the fly section and the platform. As the ladder is raised or lowered, hydraulic fluid will be transferred between the master and slave cylinders thus maintaining the platform level. Steel tubing and heat resistant flexible hydraulic lines will be provided between the master and slave cylinders. The slave cylinder seals will prevent oil leakage in order to avoid platform leveling problems during prolonged periods of inactivity of the aerial device.
2. **Auto Leveling** - An automatic pendulum level sensing device located in the platform will also be provided to further ensure the platform is maintained level regardless of the elevation of the ladder or vehicle position.

The following safety features will be provided in the leveling system:

The 2 inch basket pivot will be mounted under the center of the basket. **Rear mount pivots are not acceptable.**

The slave cylinders will be mounted outside of the platform for maximum platform space utilization and for personnel safety.

Holding valves will be provided on the slave cylinders to prevent the platform from tipping should any hydraulic leveling line be severed.

Heat resistant flexible hydraulic lines and steel tubing will be provided between the master and slave cylinders.

The platform and platform loads will be directly supported by the ladder section.

The leveling cylinder system will not be required to support the platform or platform loads when in aerial operation or travel position.

Since the platform is being supported by the ladder section, the leveling system will operate at much lower pressures to provide smoother leveling and less general maintenance to the system.

347 PLATFORM FLOOR HEAT SHIELD

The underside of the platform floor will be covered with 0.090 inch polished aluminum tread plate. The heat shield will be designed to enclose the platform waterway pipes, electrical junction boxes and any hoses or wires. The heat shields will also provide mounting surfaces for quartz lights and warning lights. The center section of the heat shield will be hinged to allow easy access to the components mounted under the platform floor.

348	**PLATFORM COVERING** The front, sides and doors of the platform will be covered with 0.090 inch painted aluminum. The color of the heat shield will match the ladder job color paint.	
349	**POMPIER SAFETY BELT LOOPS** Four (4) stainless steel pompier safety belt loops will be provided in the platform. The loops will be located as follows; one (1) near the platform operator's station, one on the left side of the platform and two (2) will be located on the front of the platform.	
350	**LIFTING RINGS** Two (2) 3 inch diameter lifting rings will be provided under the platform that will be attached directly to the platform support arms. This design will ensure that loads applied to the lifting eyes will be directly supported by the ladder structure and not transferred to the platform framework or the platform leveling system.	
351	**TEMPORARY STOKES ATTACHMENT ON PLATFORM** There shall be provisions made in the design of the platform that shall allow for a stokes basket to be temporarily but securely mounted on the platform for rescue operations. The design of the platform shall ensure that normal access to the platform control station for normal operation is attainable when a stokes basket is being utilized in a rescue condition. This unit when used shall not interfere with operation or mounted equipment.	
352	**PLATFORM RAPELLING ARM** There shall be one (1) 500 lb. Capacity rappelling arm mounted on the front of the aerial platform. The arm shall be capable of being folded into a stored position, yet remain permanently attached to the platform for safety reasons. The arm shall be equipped with two (2) rappelling eyes to attach rappelling gear or a stokes basket to it safety and quickly. Detachable arms that require the operator to physically install it for operation shall be unacceptable, for safety reasons. The arm shall be permanently mounted and shall utilize a spring loaded, locking pivot. When pivoted into a working position, the arm shall automatically “lock” into that position. When the arm is in the stowed position, it shall not interfere in any manner with operation of the monitor(s), lights, or platform gates/doors.	
353	**PLATFORM HOSE STORAGE COMPARTMENT** A hose storage compartment will be provided on the left side of the platform. The compartment will be fabricated from 1/8" aluminum tread plate and will be mounted on the outside of the platform. The compartment will be capable of holding a minimum of 100' of 1 3/4" light weight hose and nozzle.	
	PLATFORM 120 VOLT ELECTRICAL SYSTEM & ACCESSORIES	
354	**PLATFORM 120 VOLT SYSTEM** Two (2) 120 volt 20 amp electrical circuits utilizing 12 gauge five strand electrical cable will be provided to the platform. Circuits will be wired from the platform to the turntable through the collector ring assembly.	
355	**PLATFORM 120 VOLT RECEPTACLES** Two (2) 120 volt, National Electrical Manufacturer’s Association 5-20R, 20 amp, duplex straight blade receptacle with weatherproof covers will be provided. They will be installed one (1) on each side near the rear of the platform on the vertical supports. Each receptacle will require one (1) 20 amp, 120 volt circuit breaker to be installed in the load center.	
356	**PLATFORM QUARTZ LIGHTS** Two (2) Fire Research "Focus" model #OPA540-S75, 750 watt, 120 volt telescoping quartz lights will be mounted on the rear of the platform. Each light will be provided with telescoping poles and will be switched at the light head. Two (2) model S75, 750 watt light heads will require one (1) 120 V, 20 amp circuit breaker.	

357	**PLATFORM RECESSED QUARTZ LIGHTS** Two (2) 750 watt Fire Research "Focus" model #OPA200-S75, 750 watt, 120 volt quartz lights will be recess mounted on the platform. One (1) will be located on the front center of the platform and one (1) on the center bottom of the platform. These lights will be adjusted to illuminate the underside and sides of the platform without blinding the operator. Two (2) model S75, 750 watt light heads will require one (1) 120 V, 20 amp circuit breaker and will be switched from the platform console.	
358	**PLATFORM 110 VOLT LIGHT SWITCHING** One (1) switch will be provided at the turntable control console for the bottom recessed quartz lights. The switch will be wired to the light circuit to provide the operator with the ability to shut down the quartz lights from the turntable if the switch on the platform is in the on position.	
	PLATFORM 12 VOLT ELECTRICAL SYSTEM & ACCESSORIES	
359	**PLATFORM 12 VOLT CIRCUIT** All 12 volt electrical lines to the platform will be enclosed and protected from the turntable to the platform. All 12 volt electrical lines will be routed through the base section rails and extend through flexible aluminum conduits and terminate at the base of the fly section. Platform designs where electrical, air, or hydraulic lines are exposed on the interiors of the ladder handrails will not be acceptable. Two (2) 4 inch shielded work lights will be installed at the base of the ladder in the turntable heel pin step.	
360	**MARKER LIGHTS** Five (5) amber Light Emitting Diode (LED) marker lights will be mounted on the front of the platform. Two (2) Unity spotlights will be mounted at the rear of the base ladder section, one on each handrail. The lights will be equipped with a swivel base and an on/off switch on the light head itself. One (1) Unity spotlight and one (1) Unity floodlight will be mounted on the front of the platform handrail, one on each side. The lights will be equipped with a swivel base and an on/off switch on the light head itself.	
361	**AERIAL ILLUMINATION LIGHTS** The ladder sections will be equipped with blue lights that will be staggered to illuminate the ladder rungs for nighttime operations. The lights will be wired to the ladder power circuit with a disabling switch at the turntable control console. The lights will be equipped with blue lenses	
362	**PLATFORM WARNING LIGHTS** Four (4) Whelen 70R00FRR light emitting diode (LED) flashing lights will be provided on the platform in addition to the required National Fire Protection Association-1901 standard, 2003 edition, warning light package. Two (2) of the lights will be located on the front face of the platform floor structure and two (2) lights will be located on the side of the platform, one (1) each side. Each light will be equipped with a red lens. The lights will be activated with the ladder power circuit.	

363	**CONTROL STATIONS** There will be two (2) control stations. One will be known as the platform control station and the other will be known as the turntable control station. All elevation, extension and rotation operational controls will operate from both of these positions. These controls will be arranged to permit the operator to regulate the speed of these operations within the safety limits determined by the manufacturer. The control devices will be grouped in an identical manner at both stations for similarity of operation and to meet National Fire Protection Association Standard -1901, 2003 Edition. Platform load instruction information markers will be located at both control stations to indicate the recommended safe load of the platform. The control devices will be clearly marked and suitably lighted. The controls will be so designed to allow the turntable control station to override the platform controls even if the ladder is being operated by the platform controls. **No Exceptions Allowed.** The turntable control station will be located on the **left** side of the turntable so the operator can easily observe the platform while operating the controls.	
364	**TURNTABLE CONTROL STATION** The lower part of the console will be angled away from the operator to provide as much foot room as possible. An access door will be provided on the front of the console to provide complete access to the electrical and hydraulic components mounted inside the console. The console will be illuminated for night operations, and will have the following clearly labeled controls and indicators: 1) **MDM display** 2) Three (3) manual direct ladder/platform control levers. 3) A **"dead man switch"** that electrically opens the aerial control valve that will protect against accidental movement of the control handles. 4) Master electrical power switch with emergency shutdown capabilities. 5) Rung alignment indicator light for ladder climbing operations. 6) Cradle alignment indicator light. 7) Engine fast idle control switch. 8) Emergency pump power switch. 9) Keyed platform leveling switch. 10) 5,000 pounds per square inch hydraulic oil pressure gauge (Liquid filled). 11) Intercom controls 12) Bubble type angle indicator on base section near console. 13) Illuminated load chart on front of console. 14) Hinged aluminum tread plate console cover over controls 15) **"Waterway Charged" indicator light** 16) **Control switch for the bottom recessed platform quartz lights**	
365	**PLATFORM LADDER CONTROLLERS** Three (3) ladder directional controllers will be mounted on the platform control console. These will control extend/retract, rotation, and elevation. These controllers are part of the motion control system and allow safe operation of the ladder from the platform. The controllers will incorporate ICB; J-1939 CAN bus signaling, transmitted through two (2) J-1939 communication wires to reduce the chance of electrical failures since fewer wires and terminals will be utilized. Additionally, voltage sensitivity is eliminated thus providing superior motion control. Joystick controllers that utilize potentiometers or mechanical switches to control motion will not be acceptable.	

366	**PLATFORM CONTROL CONSOLE** The platform control console will be located at the right side rear of the platform to provide maximum room on the platform and to allow the operator to see around the platform and ladder sections simultaneously. An access door will be provided on the front of the console to provide complete access to the electrical and air system components mounted inside the console. The following controls will be located on or near the illuminated console. 1) **MDM display** 2) A **"dead man switch"**. This switch will electrically open the aerial control valve and will protect against accidental movement of the control handles. 3) Extend/Retract Control Lever 4) Elevation Control Lever 5) Left/Right Control Lever 6) Ladder speed control switch 7) Cradle Alignment Indicator Light 8) Fast Idle Control Switch 9) Rung Alignment Indicator 10) Panel Light/Power Switch 11) Bubble Type Angle Indicator mounted on handrail of ladder 12) Illuminated Load Chart 13) Hinged Aluminum Tread plate Console Cover	
367	**COMMUNICATION SYSTEM** A communication system will be furnished between the platform, pump panel, and the turntable operator's position. The communication speaker in the platform will require no operator attention to transmit or receive. The transmission and reception volume controls will be located at the turntable operator's position	
368	**BREATHING AIR SYSTEM** A breathing air system will be furnished which will include two (2) 5000pounds per square inch, 444 (total 888) cubic feet ASME air cylinders that are mounted on the side of the ladder base section in accordance with federal Department Of Transportation practices. The cylinders will be on the opposite side from the turntable control console. Air bottles that are mounted forward of the lift cylinders on the turntable will not be acceptable. The breathing air system will be "pre-piped" from the turntable to the platform using a Kevlar reinforced synthetic air hose. Air from the cylinders will be routed through the lower regulator to be reduced from cylinder pressure to airline pressure and then travels up and through the ladder sections to the platform control console. The air is then routed through an inline air filter and regulator located in the platform. Two (2) quick disconnects with plugs and retaining chains will be located in the platform. The air couplings will be matched to the type required by the fire department There will be a quick coupling at the turntable console for easy refilling of the breathing air system without disturbing air bottles. A fifty foot (50') refill hose will be provided as loose equipment with this system for recharging the air cylinder. The breathing air couplings will be **Schrader** type coupling to match the fire department's air system. Two (2) MSA breathing air masks will be provided for the breathing air system.	
369	**TURNTABLE AIR MASK STORAGE** One (1) aluminum tread plate water proof mask storage box with a positive latching hinged lid shall be provided in the area of the turntable console. The box shall be large enough to store two (2) air masks with extension hoses.	

370	**AIR LEVEL MONITORING SYSTEM** The system will monitor the breathing air level and display a message indicating air level on the MDM displays. A low breathing air alarm will be provided in the air line downstream from the high pressure regulator and it will activate a 95 decibel fast pulse alarm mounted at the turntable and platform control stations if the breathing air pressure falls to or below the set percentages of the system capacity.	
371	**AERIAL WATER SYSTEM** The aerial waterway system will be capable of being supplied by either a midship mounted pump and an external water source from the rear. The inlet at the rear shall be designed in a manner to function as a rear discharge if needed. The piping from the aerial discharge valve or the side inlet/s to the turntable swivel will be **5 inch stainless steel pipe**. A 5 inch water swivel will be located in the riser pipe from the tee permitting 360 degree continuous rotation of the ladder. A 5 inch double swivel piped waterway with 5 inch flex tube connection between the ladder waterway and the turntable swivel permitting water tower operations from minus 5 to plus 80 degrees. An anodized aluminum telescopic waterway will be mounted beneath the center of the aerial ladder. The waterway will have a 5 inch base section tube, 4.5 inch mid section tube, 4 inch fly tube. The waterway will be secured to the ladder sections with cradle type mounts to prevent up and down movement in the waterway that exceeds 2 inches. An automatic drain will be provided in the aerial water way to automatically drain the system and protect from freezing conditions. This valve will also act as a vacuum relief valve for the waterway when extending the aerial device while discharges in the closed position. A 2-1/2 inch relief valve preset at 225 pounds per square inch will be located beneath the turntable to protect the water system from excessive pressures. A 1-1/2 inch drain valve will be installed and operated from the rear of the apparatus.	
372	**REAR INLET/DISCHARGE ADAPTER** The rear aerial inlet will be equipped with a 5" NST to 5” storz adapter with cap and chain. **NOTE:** A 2.5" pressure gauge will be provided near the inlet/outlet to indicate waterway pressure.	
373	**PLATFORM WATER SYSTEM (DUAL MONITORS)** A 4 inch water swivel located under the platform will connect from fly waterway to the platform waterway. The water swivel will permit full operation at any elevation of the aerial device. Two (2) 4 inch pipes will be provided to transfer water from the swivel to the deck guns. The platform waterway pipes will be formed tubing to reduce friction loss in the waterway. Designs that include cut and welded pipes will not be acceptable. All platform waterway piping will be completely removable for service or replacement. Platform designs in which the waterway is welded or utilized for structural integrity of the platform will not be acceptable. **NO EXCEPTION!** A hand wheel operated 4 inch butterfly valve will be provided toward the front of the platform beneath each deck gun to enable it be shutdown for use of the pre-connects.	
374	**SHOWER NOZZLE** One (1) 100 Gallon Per Minute shower nozzle will be located beneath the platform for heat protection for platform personnel. A direct linkage control to open and close this valve will be provided inside the platform.	
375	**ADDITIONAL DISCHARGES** Additional platform piping will be provided as follows: One (1) gated 2-1/2 inch pre-connect with cap and chain	

376 LEFT PLATFORM MONITOR AND NOZZLE

An Akron model #3578 "StreamMaster" electrically controlled monitor will be installed on the left side front of the platform. The monitor relay box will be located on the platform, adjacent to the monitor, and will be easily accessible for service.

The monitor will be equipped with a 3-1/2" outlet and a 4" inlet.

The monitor will have a vertical sweep of 135°, and a horizontal sweep of 348°.

An Akron model #1577 "Sabermaster" electrically controlled master stream nozzle will be installed on the end of the left monitor.

The monitor and nozzle functions will be controlled from each of the aerial control consoles. The monitor and nozzle controls at the platform and turntable, station will consist of three (3) individual spring-loaded, self-centering, weather resistant toggle switches. The monitor and nozzle control functions will be as follows:

- UP / DOWN
- LEFT / RIGHT
- STRAIGHT STREAM / FOG

The monitor will be equipped with an "Auto Stow" feature that will automatically deploy the monitor and will also place the monitor into its stowed position when actuated by a toggle switch.

377 RIGHT PLATFORM MONITOR AND NOZZLE

An Akron model #3578 "StreamMaster" electrically controlled monitor will be installed on the left side front of the platform. The monitor relay box will be located on the platform, adjacent to the monitor, and will be easily accessible for service.

The monitor will be equipped with a 3-1/2" outlet and a 4" inlet.

The monitor will have a vertical sweep of 135°, and a horizontal sweep of 348°.

An Akron model #1577 "Sabermaster" electrically controlled master stream nozzle will be installed on the end of the right monitor.

The monitor and nozzle functions will be controlled from each of the aerial control consoles. The monitor and nozzle controls at the platform and turntable, station will consist of three (3) individual spring-loaded, self-centering, weather resistant toggle switches. The monitor and nozzle control functions will be as follows:

- UP / DOWN
- LEFT / RIGHT
- STRAIGHT STREAM / FOG

The monitor will be equipped with an "Auto Stow" feature that will automatically deploy the monitor and will also place the monitor into its stowed position when actuated by a toggle switch.

378 MINIMUM LADDER CAPACITIES

The following ladder/platform load capacities will be established while the truck is level and with outriggers fully extended and lowered to relieve the chassis weight from the axles. Capacities are based upon full extension and 360 degree rotation.

LADDER/PLATFORM CAPACITIES IN POUNDS
(50 MPH WIND CONDITIONS / UNCHARGED WATERWAY)
DEGREES OF ELEVATION

	-5 to 20	20 to 30	30 to 40	40 to 50	50 to 60	60 to 80
Base Section	250	250	500	500	500	1000
Mid Section	---	250	250	500	500	500
Fly Section	---	---	250	250	500	500
Platform	1000	1000	1000	1000	1000	1000

379 WATER TOWER OPERATION

The ladder/platform and water system will be designed to permit the following total flows of a single monitor:

1. 1500 Gallons Per Minute at 90 degrees to ladder centerline either side.
2. 1500 Gallons Per Minute parallel to ladder centerline and as far below horizontal as nozzle design allows.
3. 1500 Gallons Per Minute above ladder centerline as far as deck gun design allows.

MINIMUM LADDER/PLATFORM CAPACITIES IN POUNDS
(50 MPH WIND CONDITIONS / CHARGED WATERWAY)
DEGREES OF ELEVATION

	-5 to 20	20 to 40	40 to 60	60 to 80
Base Section	---	250	250	500
Mid Section	---	250	250	500
Fly Section	---	---	250	500
Platform	500	500	500	500

380 OPERATIONS ON GRADES

The aerial unit can be operated in any plane up to 3.5 degrees out of level at full platform capacities. Operation beyond this limit will be at operator's discretion.

381 PAINTING

Prior to any painting, all weldments such as the outrigger beams, torque box, turntable, and ladder sections will be sand blasted, cleaned and inspected to insure the removal of any surface imperfections and to insure superior paint adhesion to the metal.

The entire painting system will utilize a single manufacturer's paint for compatibility between primers and finished coats. All painting will be done in atmosphere controlled spray booths. The weldments will then be primed with Ditzler (PPG) Epoxy Primer. All seams between adjoining pieces that are not continuously welded will be caulked to inhibit corrosion.

Before assembly, in preparation for final painting, the aerial unit will be thoroughly cleaned in a manner that conforms to good painting practices.

The aerial components will then be sprayed with Ditzler (PPG) Polyurethane primer sealer. Finish paint used on the turntable, lift cylinder, and ladder sections will be painted Ditzler (PPG) Durethane Polyurethane **#2185 white**. The base rails of the mid-fly and fly section/s of the ladder will be painted with hard coat black paint.

The torque box will be painted to match job color or the base color of the body, allowing easy touch-up after extended use.

The outrigger beams will be painted PPG **#33723 silver** enamel, allowing easy touch-up after extended use.

382 LADDER CORROSION INHIBITOR

All internal surfaces of the ladder that are exposed to the atmosphere, i.e., inside base, mid and fly section side rails will be undercoated prior to ladder assembly using Procyon Corrosion Inhibitor to prevent internal corrosion. The corrosion inhibitor must meet the Boeing BMS-3-29 specification and meet a 1500-hour salt spray test. **Manufactures that do not rustproof the interiors of the ladder sections will not be acceptable. NO EXCEPTION!**

383	**PREVENTIVE MAINTENANCE & OPERATIONAL FAMILIARIZATION PROGRAM OUTLINE** An on-site program shall be provided to familiarize fire department personnel with the new apparatus. . This program shall be designed to assure complete understanding of all aspects of the aerial device in the operating environment. After the unit has been accepted, a factory qualified Field Service Technician shall remain on site for a minimum of three (3) days to assist fire department personnel with familiarization and training. . The familiarization program shall be designed to instruct an individual who has never utilized an aerial device of this type before. Fire department personnel will complete a through training regimen regarding the operating systems of the aerial device that includes emergency operations. Introductory service skills utilizing the vehicle shall also be demonstrated. **FAMILIARIZATION PROGRAM** To instruct Fire Department personnel in the operation, preventive maintenance and care of the aerial device, this familiarization program shall be oriented towards a hands-on approach utilizing the new apparatus. 1. Identify individual training needs and determine specific training requirements. 2. Explain operations of the entire aerial device. Each participant shall perform hands-on operation with the aerial including the required steps for safe operation. 3. Troubleshooting will be emphasized and reinforced continually throughout the familiarization period. 4. Preventive maintenance procedures shall be determined and definite schedules developed to assure proper maintenance of the aerial device. 5. This training shall also include information regarding the ordering of parts through the local service center by utilizing the parts manual. Familiarization in the use of tools and how to replace minor assemblies shall be included in the familiarization program, as applicable. Equally important, this phase will include information and training so the fire department can properly determine when to contact appropriate service personnel for assistance.	
384	**SERVICE** Due to the importance of keeping this vital piece of firefighting apparatus in service, the manufacturer of the aerial device will maintain a network of service centers with factory trained personnel. The aerial manufacturer will also have a separate facility for servicing units to prevent conflicts with production units. The service facility will carry an inventory of parts that are maintained separately from production parts.	
385	**WARNING DECALS** Warning decals will be provided in appropriate locations to alert the operator of potential hazards and operating instructions. All warning labels will be in general compliance with A.N.S.I. Z34.1 recommendations.	
386	**MANUALS** The aerial manufacturer will provide the following manuals pertaining to the aerial device: 1. Two (2) Operator's manuals 2. Two (2) Parts manuals 3. Two (2) Complete Electrical and Hydraulic Diagrams 4. Two (2) Service Manuals	

387	**SPECIAL TOOLS** A steel tool box will be provided with the following special tools for retorquing of specified bolts as recommended by the aerial manufacturer: Torque wrench 4:1 multiplier Extensions, adapters and sockets as required	
388	**AERIAL APPARATUS CERTIFICATIONS (TYPE 1)** The aerial device will be tested in compliance with the National Fire Protection Association's Standard #1914 (latest edition). Ongoing structural and physical property testing during construction will also be completed. Personnel holding a Level II certification to detect defects and improperly secured components will conduct the following tests: what kind of certification? 1. Three (3) random samples of each lot or shipment of raw material (plate, tubing, bar, etc.) and fabricated parts from outside vendors will have a mechanical (tensile, yield, and elongation) and chemical (material content) analysis performed. 2. Magnetic particle inspections will be conducted on all ferrous welds to ensure the integrity of the weldments and also detect any flaws or weaknesses. These tests will be performed prior to paint or assembly. 3. Die penetrate testing will be conducted on all structural aluminum welds 4. Ultrasonic inspection will be used to detect any flaws in pins, bolts and other critical mounting components. The bolts will be tested after any torquing to ensure the bolt was not damaged. 5. All extension/retraction cables will be proof load tested, serialized, and certified by the cable vendor. All cable ends will be dye penetrate tested to detect any cracks, imperfections, etc. 6. Functional tests, load tests, stability tests and visual structural examination will be performed. These tests will determine any unusual deflection, vibration, or instability that may be characteristic of the unit. 7. Hydraulic oil sample tests will be conducted prior to delivery. 8. A waterway pressure test will be performed. Upon completion of the preceding inspections, the independent testing company will issue a Certificate of Inspection indicating that all specified standards have been satisfied. The Type I certification will be provided by an approved third part test administrator. Aerial manufacturers not utilizing third party, independent testing companies will not be acceptable.	

389 TESTS

The following test will be conducted to the aerial device prior to delivery and all listed tests will be witnessed and certified by Underwriters Laboratories Inc. (UL) to ensure the device meets all requirements of National Fire Protection Association Standard-1901, 2003 Edition.

The manufacturer of the aerial device is required to provide a written statement signed by the Chief Engineer that certifies the aerial unit's ability to perform the following tests:

1. **1-1/2:1 DYNAMIC STABILITY AND LIFT TEST** - A test of the apparatus will be performed to certify that the ladder sections and platform are so designed and powered to support a load representing 150 percent of the manufacturer's rated payload capacity at maximum horizontal reach on level ground. Since this is a dynamic test, the load must be raised, lowered and rotated without evidence of instability. Specifically, 1500 pounds of weight shall be placed in the platform while the ladder is fully extended at zero degrees. The ladder will then be rotated a full 360 degrees.
2. **1-1/3:1 DYNAMIC STABILITY AND LIFT TEST** - A test of the apparatus will be performed to certify that the tip and ladder sections and platform are so designed and powered to support a load representing 133 percent of the manufacturer's rated payload capacity at maximum horizontal reach on a five (5) degree slope. Since this is a dynamic test, the load must be raised, lowered and rotated without evidence of instability. Specifically, 1333 pounds of weight shall be placed in the platform while the ladder is fully extended at zero degrees. The ladder will then be rotated a full 360 degrees.
3. **TIME TEST** - A test of the apparatus will be performed to raise the platform from a bedded position extended to full height and rotated through a 90 degree turn smoothly and without undue vibration. The maximum time period allowed for this test is 150 seconds**.**
4. **WATER TOWER TEST #1** - A test of the apparatus will be performed to test its ability to discharge 1500 gallons per minute parallel to the ladder with the unit at full extension, zero degree elevation and during a 360 degree rotation. The unit will be capable of performing this test with a payload of 500 pounds of weight in the platform.
5. **WATER TOWER TEST #2** - A test of the apparatus will be performed to test the ability to discharge 1500 gallons per minute, 90 degrees to the ladder with the ladder at full extension, zero degree elevation and through 360 degrees of rotation. The unit will be capable of performing this test with a payload of 500 pounds of weight in the platform.
6. **WATER TEST #3** - A test of the apparatus will be performed to test the ability to discharge 1500 Gallons Per Minute above the ladder centerline and as many degrees above 0 degrees as the deck gun design allows. This test will also be performed with the ladder fully extended at 0 degrees elevation and during a 360 degree rotation with a platform payload of 500 pounds.

Bidders must state, in writing, the ability to comply with all of the above tests. Failure to do so will be grounds for rejection of the bid.

WARRANTIES & REQUIRED INFORMATION

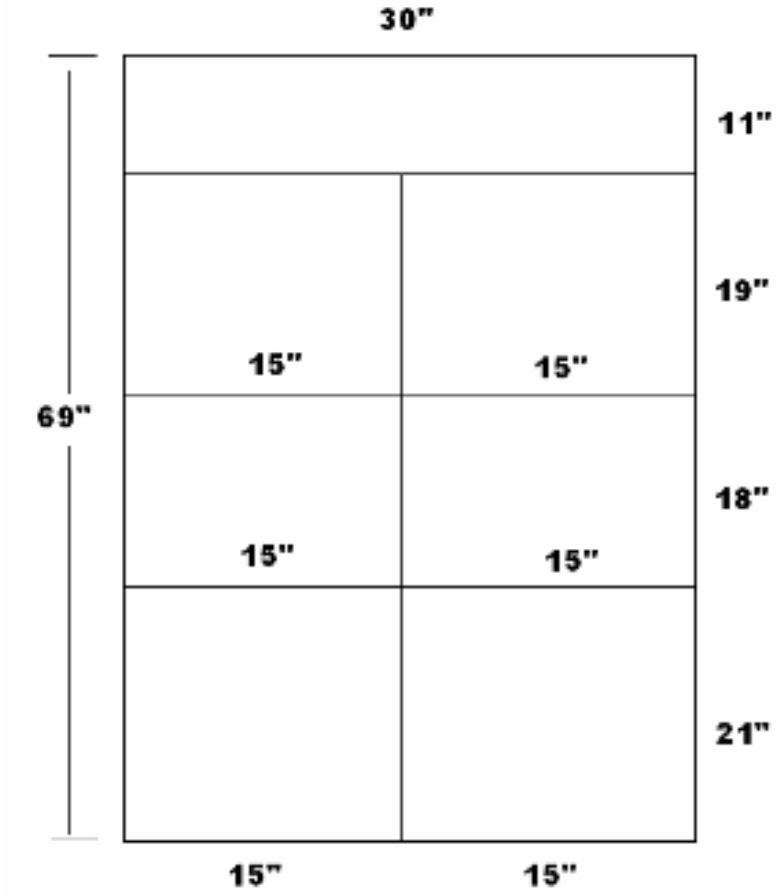
380.	**VEHICLE WARRANTY** The proposed vehicle includes a one (1) year new vehicle warranty, upon delivery and acceptance of the vehicle. The warranty will ensure that the vehicle has been manufactured to the proposed contract specifications and will be free from defects in material and workmanship that may appear under normal use and service within the warranty period. The warranty may be subject to different time and mileage limitations for specific components and parts. This warranty is issued to the original purchaser of the vehicle. The warranty will not apply to tires, batteries, or other parts or components that are warranted directly by their respective manufacturers. The warranty will not apply to routine maintenance requirements as described in the service and operators manual. No warranty whether express, implied, statutory or otherwise including, but not limited to any warranty of merchantability or fitness for purpose will be imposed.	
	COMPONENT WARRANTY INTERVALS	
381.	**OVERALL UNIT AND CUSTOM CHASSIS** All components and parts of the vehicle are warranted for a period of one (1) year from the time the vehicle is accepted, unless excluded elsewhere in this warranty or certain parts or components are described as having longer warranty periods. .	
382.	**ENGINE WARRANTY** The unit will be equipped with a Fire Service rated engine, which will come furnished with a Five (5) year Engine Manufacturer's warranty. A copy of the manufacturer's warranty will be supplied to define additional details of the warranty provisions.	
383.	**TRANSMISSION WARRANTY** The proposed Allison transmission will be provided with a five (5) year warranty. A copy of the Allison transmission warranty will be supplied to define additional details of the warranty provisions.	
384.	**CUSTOM CHASSIS FRAME RAILS** The proposed custom chassis frame and cross members will be warranted for an unlimited time period. A copy of the frame rail warranty will be supplied to define additional details of the warranty provisions.	
385.	**MERITOR AXLE WARRANTY** The Meritor axle/s will be provided with a five (5) year warranty. A copy of Meritor's warranty will be supplied to define additional details of the warranty provisions.	
386.	**CAB STRUCTURE** The proposed cab weldment, including sheet metal and primary support structure will be warranted against loss of integrity or failure due to defects in material or workmanship for a period of five (5) years from the date of acceptance of the unit.	
387.	**BODY STRUCTURE** The proposed body weldment, including sheet metal and primary support structure will be warranted against loss of integrity or failure due to defects in material or workmanship for a period of five (5) years from the date of acceptance of the unit.	
388.	**CORROSION** The proposed cab and body will be warranted against rust-through or perforation, due to corrosion from within, for a period of ten (10) years. Perforation is defined as a condition in which an actual hole occurs in a sheet metal panel due to rust or corrosion from within. Surface rust or corrosion caused by chips or scratches in the paint are not covered by this warranty.	
389.	**PAINT FINISH WARRANTY** The proposed finish paint on the unit will be provided with a seven (7) year paint finish guarantee which will cover the finish for the following items: Peeling or delaminating of the topcoat and/or other layers of paint, cracking or checking and/or loss of gloss caused by defective PPG Fleet Finishes which are covered by this guarantee. A copy of this warranty will be submitted with the proposal.	

390.	**AERIAL DEVICE STRUCTURE** The proposed aerial device weldment, including outriggers, torque box, turntable and ladder sections will be warranted against loss of integrity or failure due to defects in material or workmanship for a period of five (5) years from the date of acceptance of the unit.	
391.	**AERIAL WATERWAY WARRANTY** The proposed aerial waterway will be covered by a one (1) year warranty to cover the waterway seals and individual tube assemblies.	
392.	**WATER TANK (LIFETIME)** The water tank manufacturer will warrant the proposed water tank for the "Lifetime" of the unit. A copy of the manufacturer's warranty will be supplied to define additional details of the warranty provisions.	
393.	**HALE FIRE PUMP (FIVE (5) YEARS)** The proposed Hale fire pump will be warranted by the pump manufacturer for a period of five (5) years. The warranty will cover replacement parts and labor for the warranted components. A copy of the manufacturer's warranty will be supplied to define additional details of the warranty provisions.	
OPTIONS		
394.	Three-year bumper-to-bumper warranty	
395.	Five-year bumper-to-bumper warranty	

Appendix A

Appendix B

Appendix C



Appendix D

Appendix D

TOWN OF MORRISVILLE * PO BOX 166 * MORRISVILLE, NC 27560

RESOLUTION 2006-171 OF THE MORRISVILLE TOWN BOARD OF COMMISSIONERS PERTAINING TO PURCHASE OF ONE KME AERIAL PLATFORM

WHEREAS, funding has been approved in the FY 07 budget in the amount of $850,000.00 to replace the Fire Department 1984 Grumman Aerial Platform; and

WHEREAS, $800,000.00 is allocated to replace the Aerial Platform; and

WEREAS, $50,000.00 is allocated to replace loose equipment; and

WHEREAS, the Town of Morrisville held two bid openings to receive proposals; and

WHEREAS, the Town of Morrisville received one proposal from KME for an Aerial Platform with a total cost of $ 841,785.74; and

WHEREAS, the Fire Department evaluated the proposal and identified 57 clarifications that needed to be satisfactorily answered by KME; and

WHEREAS, KME satisfactorily answered all 57 clarifications; and

WHEREAS, KME was asked if they would sell the apparatus with needed options for $795,000.00; and

WHEREAS, KME agreed to sell the apparatus with needed options for $795,000.00:

NOW, THEREFORE, BE IT RESOLVED THAT THE MORRISVILLE TOWN BOARD OF COMMISSIONERS APPROVES THE PURCHASE OF ONE KME AERIAL PLATFORM WITH THE 100% PREPAYMENT DISCOUINT, 2 YEAR BUMPER TO BUMPER WARRANTY AND 100% PERFORMANCE BOND FOR $795,000.00.

Adopted this 27th day of November 2006.

_____
Jan Faulkner, Mayor

ATTEST:

_____
Diana R. Davis, Town Clerk