**BODY SPECIFICATIONS**

**NFPA 2009 STANDARDS**

This unit shall comply with the NFPA standards effective January 1, 2009.

Certification of slip resistance of all stepping, standing and walking surfaces shall be supplied with delivery of the apparatus.

A plate that is highly visible to the driver while seated shall be provided which states the overall height, length, and gross vehicle weight rating.

The manufacturer shall have programs in place for training, proficiency testing and performance for any staff involved with certifications.

An official of the company shall designate, in writing, which is qualified to witness and certify test results.

**PAINT WARRANTY TEN YEAR**

The PPG paint performance guarantee will cover the areas of the vehicle finished with the specified product for a period of TEN (10) years beginning the day the vehicle is delivered to the purchaser.

* Peeling or delaminating of the topcoat and/or other layers of paint.
* Cracking or checking.
* Loss of gloss caused by cracking, checking, or hazing.
* Any paint failure caused Finishes, which are covered by this guarantee.

All guarantee exclusions, limitations, and methods of claims are covered in the full certificate provided to the original purchaser.

Note: Surety bond, if required, will cover standard one year warranty period only and will not cover any extended warranties allowed by seller or other component manufacturers.

**CAB STRUCTURE WARRANTY**

The cab structure shall be warranted for a period of ten (10) years with the complete detail of the warranty outlined in a document provided upon request.

**TRANSMISSION WARRANTY**

The Allison EVS transmission shall be warranted for a period of five (5) years with the complete detail of the warranty outlined in a document provided upon request.

**ENGINE WARRANTY**

The Cummins engine shall be warranted for a period of five (5) years or 100,000 miles, whichever comes first, with the complete detail of the warranty outlined in a document provided upon request.

**FRAME WARRANTY**

The frame and cross members shall carry a lifetime warranty with the complete detail of the warranty outlined in a document provided upon request.

**FRONT AND REAR AXLE WARRANTY**

The front and rear axles shall be warranted by Meritor for two (2) years with unlimited miles under the general service application.

**CAB AND CHASSIS WARRANTY**

The cab and chassis shall carry a twenty-four (24) month warranty providing limited parts and labor from the date the complete apparatus is delivered to the end user. The complete detail of the warranty shall be outlined in a document provided upon request.

**STATIC LOAD SEAT TEST INFORMATION**

This model of seat shall have successfully completed the static load tests set forth by FMVSS 207/210. This testing shall include a simultaneous forward load of 3000 pounds each on the lap and shoulder belts and twenty (20) times the weight through the center of gravity. This model of seat installed in the cab model, as specified, shall have successfully completed the dynamic sled testing using FMVSS 208 as a guide with the following accommodations. In order to reflect the larger size outfitted firefighters, the test dummy used shall be a 95th percentile hybrid III male weighing 225 pounds rather than the 50th percentile male dummy weighing 165 pounds as referenced in FMVSS 208.

The materials used in construction of the seat shall also have successfully completed testing with regard to the flammability of materials used in the occupant compartments of motor vehicles as outlined in FMVSS 302, of which dictates the allowable burning rate of materials in the occupant compartments of motor vehicles.

**CAB TEST INFORMATION**

The cab as built shall have successfully completed the pre-load side impact, static roof load application and frontal impact without encroachment to the occupant survival space when tested in accordance with Section 4 of SAE J2420 COE Frontal Strength Evaluation Dynamic Loading Heavy Trucks, Section 5 of SAE J2422 Cab Roof Strength Evaluation Quasi –Static Loading Heavy Trucks and ECE R29 Uniform Provisions Concerning the Approval of Vehicles with regard to the Protection of the Occupants of the Cab of a Commercial Vehicles Annex 3 Paragraph 5.

The above tests shall have been witnessed by and attested to by an independent third party. The test results shall have been recorded using cameras, high speed imagers, accelerometers and strain gauges.

Documentation of the testing shall be provided upon request.

**CAB INTEGRITY CERTIFICATION**

The manufacturer shall provide a cab crash test certification with this proposal including SAE J2422 Cab Roof Strength Evaluation - Quasi-Static Loading for Heavy Trucks and SAE J2420 COE Frontal Strength Evaluation - Dynamic Load for Heavy Trucks.

**CAB TEST INFORMATION**

Roof Crush

The cab shall be subjected to a roof crush test of 120,000 pounds exceeding the requirements of ECE 29 criteria. The 120,000 requirement is important to ensure to most structurally sound and safe cab in the event of a crash or roll over.

Side Impact

The cab shall be subjected to dynamic moving barrier slammed into the side of the cab at 7.5 mph, striking with an impact of 15,157 foot pounds of energy. This test will closely represent the forces a cab would incur in a rollover incident.

Frontal Impact

The cab shall withstand a frontal force produced from a moving barrier slammed into the front of the cab traveling at 10.5 mph, striking with an impact of 42,587 foot pounds of energy.

The same cab shall withstand all tests without any measurable intrusion into the survival space of the occupant area.

**OPERATION AND PARTS LIST MANUALS**

Each cab and chassis shall include two (2) electronic copies of the operation manuals and parts listings. The manuals shall include information specific to the components included on the apparatus.

**ENGINE AND TRANSMISSION MANUALS**

One (1) paper copy of the specific engine and transmission manuals shall accompany each cab and chassis.

**AS BUILT WIRING DIAGRAMS**

Each cab and chassis shall include one (1) digital copy of the wiring schematics and component wiring. The wiring schematics shall be developed on a software program such as VeSys Design or equal that provides continuity in files and diagram. The software shall allow you to trace through the design schematics to identify cross referenced items such as in-line connectors and wires. The software shall be interactive which allows you to view one electrical assembly drawing, click on a wire routing and the program will take you to the related circuit assembly or termination point. The software shall also provide a searchable function allowing you to view multiple diagrams using readily available pdf viewers. The digital copy of the wiring schematics shall be compatible with hand held devices such as I-Pads.

**ROAD SAFETY KIT**

One (1) 2-1/2# ABC DOT Approved fire extinguisher shall be provided. The fire extinguisher shall be shipped loose with the chassis.

One (1) set of DOT approved hazard triangles shall be supplied with the chassis. They shall be stored in a plastic case and shipped loose with the chassis.

One (1) first aid kit

**CAB CUSTOM STYLE**

The cab shall be a custom, cab over engine style, with the driver and officer positions ahead of the engine and front axle. The cab shall be specifically designed and manufactured for the fire service industry.

The cab shall be of a totally enclosed full tilt design, with the interior area completely open to improve visibility and verbal communication between the occupants. The cab shall be capable of tilting 45-degrees, allowing the chassis engine to be removed, if required, without tilting the cab beyond 45-degrees. No Exceptions.

The cab shall be locked down by a two (2)-point automatic spring-loaded hook mechanism that actuates after the cab has been lowered.

The rear wall of the cab shall offer a seamless wrap around style on each of the rear corners thereby alleviating water entering the cab as well as additional rigidity.

The cab shall also feature ample driver and officer foot room.

The crew floor shall feature a complete flat floor design.

The leading edge of the cab floor from the steps shall meet NFPA 13-7.3 slip resistance requirements, by using bi-directional, knurled trim piece on both the front and rear cab doors. No Exceptions.

The cab shall incorporate a two-step design at each door, with a first step height of approximately 22” from the ground. The leading edge of the first step shall be 5" further outboard than the second step to provide a staircase design for safer egress.

The front cab first step shall measure a minimum of 32" wide x 9-1/2" deep. The front cab intermediate step shall measure a minimum 33" wide x 8-1/2" deep.

The crew cab first step shall measure a minimum of 20-1/2" wide x 9-1/2" deep. The crew cab intermediate step shall measure a minimum 22" wide x 9-1/2" deep.

The cab shall meet or exceed cab impact test (SAE J-2420, cab rollover test (SAE J2422), and cab seating requirements (FMVSS 210, and FMVSS 208).

The cab shall include 4 doors. They shall have a front two (2) cab doors shall have a minimum clear opening of 42.5" wide by 81” high measured from the top of the lower cab step to the top of the door opening.; and the rear two (2) crew doors shall be a minimum clear door opening of 32.5" wide by 89” high measured from the top of the lower cab step to the top of the door opening. The length of the door will vary depending on door type.

**ROOF STYLE – MINIMUM OF A 8" RAISED**

The cab roof design shall incorporate an angled front roof, transitioning into a rolled extrusion for a swept back design.

The roof height shall feature an 8" minimum raise starting over the driver and officer positions and continuing back to the roof and rear wall joint.

The raised roof shall offer a crew head height area a minimum of 63-1/2” from the floor to the ceiling in the crew areas for optimum headroom.

A drip rail shall be provided along the top radius of each cab side. The drip rails shall help prevent water from the cab roof running down the cab side.

**CAB DOORS**

The cab shall include a total of four (4) doors, two (2) forward and two (2) rear crew doors.

The forward cab doors shall be a minimum of 45" wide, and have a cab structure opening of 42.5" wide; and the rear crew doors shall be a minimum of 35" wide, and have a minimum cab structure opening of 32.5" wide to provide enhanced entry and egress of the cab.

All cab doors shall open a minimum of 85 degrees for the safety of personnel during entrance or egression from the cab.

Each cab door shall feature:

* Superior strength and rigidity from 3/16" closed section extruded door frames
* Insulation and damping inside each door for a solid feel and minimized reverberation when closed
* A minimum of 1" rolled rubber bulb seal style gasket and an "L" foam seal around the door ensuring a weather tight fit
* Integrated, mechanical door stop
* A full length, hidden piano style 10 gauge stainless steel door hinge with a 1/4" pin, which shall be mounted inside the panel of the door prohibiting dirt and debris from becoming trapped in the hinge
* An integrated one-piece inner door assembly that includes a glass track, mounting provisions for window regulator, door handle and door panel shall be utilized. The inner door assembly shall be easily removed with nut inserts. Self-tapping screws shall not be acceptable.

**CAB STEPS**

The cab steps shall meet NFPA 13-7.3 in size and slip resistance requirements.

The cab shall incorporate a two-step design at each door, with a first step height of approximately 22” from the ground. The leading edge of the first step shall be 5" further outboard than the second step to provide a staircase design for safer egress.

The front cab first step shall measure a minimum of 32" wide x 9-1/2" deep. The front cab intermediate step shall measure a minimum 33" wide x 8-1/2" deep.

The crew cab first step shall measure a minimum of 20-1/4" wide x 9-1/2" deep. The crew cab intermediate step shall measure a minimum 22-1/2" wide x 9-1/2" deep.

The top crew step shall incorporate an angle approximately midway from the rear wall to the crew door hinge extending out the flooring under the rear facing outer seat positions, offering foot placement for safety while seated in this position.

**CAB STEP TRIM**

The lower cab steps at all doors shall be finished with slotted aluminum tread plate. The intermediate cab steps shall be finished with an embossed aluminum tread plate.

**CAB STEP TRIM KICKPLATE**

The cab step risers at all doors, the vertical section of all steps, shall include an aluminum tread plate finish.

**BARRIER FREE DOORS**

The cab doors shall be "barrier free" style, meaning the door shall be constructed to cover the entry down to the intermediate step, leaving the bottom step open. Each door shall provide approximately 33" of clearance from the ground to the bottom of the door so the door may be opened without stopping due to guard rails along highways.

The lower step well of the cab shall be painted job to match the lower primary color of the cab.

**DOOR HANDLES**

The exterior door handles shall be constructed of die-cast steel. They shall feature heavy duty pull style handles which are extended out and suitable for easy grasping with a gloved hand.

The handles shall be complimentary to the cab exterior and shall be black in color.

The interior door handle shall be a paddle style which shall be black in color. The paddle shall be hinged towards the front of the cab and shall include a manual door lock unless otherwise specified.

**CAB DOOR LOCKS**

All cab doors shall include manual door locks with keys. The door lock shall include a toggle and shall be an integral part of the interior door handle which is red in color. The exterior door lock is integral with the door latch. The cab doors may be unlocked from the exterior with a key or through a thumb turn from inside the cab.

**INTERIOR CAB DOORS**

All cab doors shall feature of an aluminum interior panel.

**INTERIOR CAB DOOR FINISH**

All cab doors shall feature a DA sanded finish.

**INTERIOR FRONT DOOR PULL**

The interior driver and officer cab doors shall each include one (1) customized cast aluminum single piece door grab pulls designed specifically for the fire service.

The single piece door pull shall have a curved designed in an “L” formation to provide multiple points for grasping with a gloved hand. The horizontal dimension shall be a minimum of 28" and the vertical dimension shall be a minimum of 20". The door pulls shall have an ergonomic curve making them easier to grasp when entering and exiting the cab. No Exceptions.

The door pull shall feature secure mounting in three separate locations of the pull utilizing stainless steel fasteners with nut inserts in each location. Self-taping screws or other mounting techniques shall not be allowed for interior door pulls or grab handles.

Each handle shall be constructed of A356 aluminum casting and shall feature a black powder coated finish.

**INTERIOR GRAB HANDLE REAR DOOR**

A black powder coated cast aluminum grab handle shall be provided on the inside of each rear crew door. The handle shall extend horizontally the width of the window just above the windowsill. The handle shall assist with entry and egress from the crew area of the vehicle.

The interior driver and officer rear cab crew doors shall include one (1) customized cast aluminum single piece door grab pulls designed specifically for the fire service.

The door pulls shall have an ergonomic curve making them easier to grasp when entering and exiting the cab. No Exceptions.

The door pull shall feature secure mounting with stainless steel fasteners with nut inserts in each location. Self-taping screws or other mounting techniques shall not be allowed for interior door pulls or grab handles.

Each handle shall be constructed of A356 aluminum casting and shall feature a black powder coated finish.

**WINDSHIELD**

Windshield shall be rated for apparatus that was built by manufacture.

**WINDSHIELD WIPER SYSTEM**

Windshield wipers shall operate in accordance with manufacture build.

**WINDSHIELD WIPER ACTIVATION**

The windshield wipers shall be activated through a switch on the driver's panel, with intermittent control.

**WINDOW -DRIVER'S DOOR**

The driver's door shall include a window which measures a minimum of 25.5" wide x 21" high with a minimum clear viewing area of 694 square inches. The glass shall include a standard automotive tint and through the use of a manual crank style handle shall roll completely into the door housing.

The window shall be trimmed in a black anodized aluminum ring and rubber seal to keep water from entering the cab when closed.

**WINDOW- OFFICER'S DOOR**

The officer's door shall include a window which measures a minimum of 25.5" wide x 21" high with a minimum clear viewing area of 694 square inches. The glass shall include a standard automotive tint and through the use of a manual crank style handle shall roll completely into the door housing.

The window shall be trimmed in a black anodized aluminum ring and rubber seal to keep water from entering the cab when closed.

**REAR DRIVER SIDE CREW WINDOW**

The rear driver's side crew door shall include a window measuring 20.75" wide x 21.75"high with a minimum clear viewable area of 451 square inches. The glass shall include a standard automotive tint and through the use of a manual crank style handle shall roll completely into the door housing.

**REAR OFFICER SIDE CREW WINDOW**

The rear officer's side door shall include a window which is 20.75" wide x 21.75" high with a minimum clear viewable area of 451 square inches. The glass shall include standard automotive tint and through the use of a crank style handle shall roll completely into the door housing.

**DRIVER CANOPY SIDE WINDOW**

The cab shall include a fixed driver's side window glass which shall be located between the cab front and rear doors. The glass shall include a standard automotive tint and shall be trimmed in a black anodized rubber ring for a tight seal when closed.

**OFFICER CANOPY SIDE WINDOW**

The cab shall include a fixed officer's side window glass which shall be located between the cab front and rear doors. The glass shall include a standard automotive tint and shall be trimmed in a black anodized rubber ring for a tight seal when closed.

**CAB INSULATION**

The cab shall be completely insulated from road and vehicle resonance, exterior sound and thermal intrusion.

**DAMPING INSULATION**

The entire cab, including the ceiling and walls shall include additional insulation reducing structure borne noise from vibration, impact and resonance within the cab.

**ENGINE TUNNEL INSULATION**

The engine tunnel shall include an insulated barrier from noise on the underside of each tunnel surface. This barrier shall be engineered for surrounding engines.

The insulation barrier shall provide an acceptable decibel level within the cab meeting or exceeding the recommendations of NFPA 1901.

The thickness of the engine tunnel insulation shall be 1" thick. The insulating material shall be open cell polyether based foam with a textured surface, specifically designed for acoustic absorption.

Use of aluminized faced material on the engine tunnel shall not be acceptable. No exceptions.

The engine tunnel insulation shall be precisely cut and sealed to fit each segment on the underside of the tunnel surface. The insulation shall then be affixed by a pressure sensitive adhesive.

The insulation shall meet or exceed FMVSS 302 flammability testing.

**INTERIOR TRIM MATERIAL**

The interior trim shall feature a UV resistant Polyester and Polypropylene blend carpet which features excellent, tear strength.

The carpet shall be flame retardant meeting California Fire Code 117, UFAC Class 1, and BIFMA Class 1 and shall have a high resistance to abrasion.

The interior of the cab including the ceiling panels shall feature this soft trim and shall be black in color. The ceiling area of the crew area shall be covered in durable carpet.

**REAR WALL INTERIOR MATERIAL**

The rear wall of the cab shall be covered in black carpet material for a pleasing appearance.

**SUN VISORS**

The driver and officer seats shall feature a sun visor mounted in the header over each seating position. The sun visors shall be gray tinted plastic.

**CAB DASH**

The cab dash shall offer heavy duty, durable construction from formed aluminum.

This construction shall allow for a clean, seamless dash area that shall reduce unnecessary joining of cab dash components. This design allows for the following features:

* Optimal heating and cooling of cab occupants, HVAC louvers shall be integrated into the gauge panel with a total of six (6) louvers; three louvers pointing at the driver and three louvers pointing at the officer.
* For improved safety cab switches and controls shall be ergonomically located within easy reach of the driver when in the seated position with seatbelts fastened. This design will reduce driver distraction and increase safety by putting frequently accessed driver controls within easy reach to allow the driver more time to focus on the road.
* The officer side cab dash shall house the three HVAC louvers on the officer side. This panel will also provide ergonomically located switches and controls for the officer. All controls shall be within easy reach while in the seated position with seatbelts fastened.
* Access panels on the top of the dash for both the driver and officer sides easing maintenance access to controls, components and gauge assemblies
* The driver side dash shall include gauges for primary air pressure, secondary air pressure, a Pacific Insight instrumentation gauge panel and the DEF gauge as standard
* The driver side dash shall also include two (2) lower panels to the left and right of the steering column for switches such as the Off/Ignition and start switches and the park brake assembly
* The dash shall include a provision for switches to the right of the Driver
* The officer dash shall include a flat area for optional mounting cradles or brackets for a laptop computer, mobile data terminal, map compartment or clip board
* The officer dash shall include a provision for switches to the left of the Officer

**ENGINE TUNNEL**

The engine tunnel shall be constructed of aluminum offering superior durability in addition to thermal and acoustic resistance.

The tunnel shall feature a polyurethane coating which shall match the dash and header in texture and color for a consistent appearance and robust finish.

The engine tunnel shall feature:

* A low profile design measuring approximately 41" wide and 23" in height from the crew floor shall offer optimum visibility of the windshield and cab interior from any seated position. No Exception.
* The engine tunnel at the driver's position shall be a tapered design.
* The engine tunnel at the officer's position shall be a tapered design.

**CAB DASH & ENGINE TUNNEL**

The cab dash and the engine tunnel of the cab shall be coated with polyurethane coating for a durable finish. The color shall be black.

**CUP HOLDER**

Two (2) cup holders shall be provided. There shall be one mounted on both the driver and officer side, and shall be in the forward outer portion on the upper portion of the dash.

**INSTRUMENTATION PANEL**

The instrumentation panel inlay shall be powder coat black.

**INTERIOR CAB FINISH**

The interior cab shall be finished in a high performance polyurethane coating including the interior A, B, C and D pillars, all occupant seat frames and any surrounding surfaces extending to the ball seal around each door. This type of coating shall feature:

* Durability, scratch, chemical and abrasion resistance
* Consistent, even coverage and a uniform texture
* Resistance from fading from exposure to UV light
* Black in color

**CAB HEADER**

The cab header shall offer heavy duty, durable construction using aluminum. The material shall be at least .13" thick.

Non-Metal construction shall not be acceptable.

The cab header shall offer a finish of a polyurethane coating for a rugged design and finish.

The polyurethane finish shall provide a tough, flexible, impact-absorbing, chemical & abrasion-resistant, even-textured and skid-resistant surface. The polyurethane finish shall offer durability and scratch resistance even against today's advanced firefighting turnout materials with consistent, even coverage and a uniform texture. The polyurethane coating finish shall resist fading from UV light.

**HVAC HEATING AND COOLING SYSTEMS**

The interior cab climate control shall be comprised of a dual system which shall include a defroster, a cab and crew heater and air conditioner for a complete HVAC system. The air conditioning system shall be comprised of compressor, condenser, and a minimum of two (2) evaporators to provide consistent temperature control throughout the entire cab.

The system shall be rated as an Emergency Vehicle grade for the use in Fire and Rescue style vehicles and shall provide environmental air treatment in accordance with published SAE standards.

The HVAC system shall be a total and complete system, not incorporating the use of auxiliary heating and cooling systems. The HVAC system shall provide sufficient defrosting, heating and cooling to the entire cab without the need for any auxiliary systems.

**DEFROSTING SYSTEM**

The defrosting system shall feature:

* To provide maximum defrost and heating performance, a 30,000 BTU heater-defroster unit with 718 CFM of air flow will be provided inside the cab.
* The defroster unit will be strategically located under the center forward portion of the instrument panel. For easy access, a removable cover will be installed over the defroster unit.
* Mounting under the dash with fresh air intake providing excellent defrost and demist capabilities. Systems not utilizing fresh intake shall not be acceptable. No Exceptions.
* Six (6) vents shall be located in the top forward portion of the dash for superior defrosting properties across the entire windshield.
* The system shall be capable of clearing 90 percent or more of the windshield in fifteen (15) minutes or less after a three (3) hour cold soak at 0 degrees Fahrenheit (-17.78 degrees Celsius).
* The system shall exceed Flash Flogging standards that are set forth in the SAE Heavy Duty Cab with Sleeper specifications. Documentation from a third party testing facility shall be available upon request. No Exception.
* The defroster will include an integral aluminum frame air filter, high performance dual scroll blowers, and ducts designed to provide maximum defrosting capabilities for the one (1) piece windshield.

**HEATING SYSTEM**

The heating system shall feature:

* Delivery of a minimum of 48,000 BTU/hour of heat to the entire cab.
* Heat and air circulation shall be provided to the driver and officer foot area of the cab as standard through ducting in the foot well area of both positions.
* Substantial air movement and heating provided to the driver and officer's position, with six (6) adjustable louvers, located in the dash, three (3) adjustable louvers directed at the driver and three (3) adjustable louvers directed at the officer
* A single engine tunnel mounted unit shall be supplied at the rear of the engine tunnel.
* Substantial air flow and heat provided to the crew area of the cab, with adjustable louvers.
* There shall be a minimum of 3,324 CFM of air flow per unit on the highest setting and a minimum of 718 CFM of airflow on the lowest setting, per unit.
* The heater shall be plumbed with a shut off valve at the engine, so that the coolant by-passes the heaters.

**AIR CONDITIONING**

The air conditioning system shall feature:

* A minimum of 72,000 BTU/hour of cooling capacity to the entire cab.
* One (1) evaporator shall be located under the center dash and One (1) crew evaporator shall be located at the rear of the engine tunnel between the rear facing seats.
* A gravity condensation drain system shall be utilized.
* Substantial air movement and optimum cooling provided to the driver and officer positions, with six (6) adjustable louvers, located in the dash, three (3) adjustable louvers directed at the driver and three (3) adjustable louvers directed at the officer
* Substantial air flow and optimum cooling provided to the crew areas of the cab, with adjustable louvers facing the crew seating positions.

Proposals offering ceiling mounted evaporator units in the center of the cab above the engine tunnel shall not be accepted as this is a safety consideration due to the lack of visibility and communication within the cab.

**CAB PAINT AIR CONDITIONING CONDENSER**

The air conditioning condenser shall be painted to match the roof color.

**CONDENSER**

The cab air conditioning system shall include one (1) low profile HE-condenser which shall be centered forward on the roof of the cab.

**HEATING AND COOLING CONTROLS**

The HVAC system shall be controlled from the Driver dash through three (3) turn style knobs for the temperature control, the fan control and for the mode.

**REAR CREW AREA CONTROLS – EVAPORATOR MOUNTED**

The controls for the crew area heat and A/C shall be located on the tunnel mounted evaporator unit.

**SEAT AND SEAT BELT COLOR**

This seat in the cab shall be black in color with a red seat belt.

**DRIVER SEAT**

The driver's seat shall be a H. O. Bostrom Sierra Electric 8-Way, high back ABTS bucket seat.  The seat shall have contoured, high-density cushions with lumbar support. The seat cushion shall be supported with a serpentine spring suspension. The seat shall have eight-inch fore and aft adjustment, 2 inch height adjustment, front of seat tilt, rear of seat tilt, reclining seat back and occupancy sensor in the seat cushion. All seat adjustments will be electric and will be adjusted with a switch mounted under the front of the seat cushion. The seat control switch bracket will have a slotted mounting to allow up to 1” of rearward adjustment to accommodate user preference.

The seat shall be equipped with a red, integrated 3-point shoulder harness and lap belt and an emergency locking retractor. The seat belt shall include a buckle latched switch. The seat belt shall include a rotating bezel guide at the upper shoulder point and shall be routed through the seat frame and covering to protect webbing.

**SEAT BACK**

The seat back shall incorporate a standard style headrest.

**SEAT MOUNTING DRIVER**

The driver’s electric seat shall be installed in an ergonomic position in relation to the cab dash.

The power seat or seats installed in the cab shall be wired directly to battery power.

**SEAT MATERIAL**

The seats shall include a covering of high strength, wear resistant fabric made of durable ballistic polyester.

A PVC coating shall be bonded to the back side of the material to help protect the seats from UV rays and from being saturated or contaminated by fluids.

**DRIVER SEAT BOX STORAGE COMPARTMENT**

There shall be a storage area under the driver’s seat. The compartment shall be 21.25 inches wide, 22.50 inches long, and 6.25 inches high. The access opening shall be 12.00 inches wide and 4.50 inches high.

**OFFICER SEAT**

The officer's seat shall be a H. O. Bostrom ABTS (All Belts To Seat/Integrated Seat Belts) series high back. The seat shall have contoured, high-density cushions with lumbar support. The seat cushion shall be supported with a serpentine spring suspension. The back recline shall include a locking mechanism on both sides of the seat and shall have a release handle located at the retractor side of the seat assembly. The seat shall have a double-locking five-inch fore and aft adjustment and occupancy sensor in the seat cushion. The seat shall include a pneumatic suspension with 3” of vertical ride range adjustable with a molded switch located on the retractor side of the seat assembly. The suspension shall be internally tethered and shall not require secondary tethers from the suspension to the cab structure.

The seat shall be equipped with a red integrated 3-point shoulder harness and lap belt and an emergency locking retractor. The seat belt shall include a buckle latched switch. The seat belt shall include a rotating bezel guide at the upper shoulder point and shall be routed through the seat frame and covering to protect webbing.

**SEAT BACK**

A SecureAll™ SCBA locking system which shall be one bracket model and store all U.S. and International SCBA brands and sizes while in transit or for storage within the seat back. The bracket shall be easily adjustable for all SCBA brands and cylinder diameters. All adjustment points shall utilize similar hardware and adjustments shall be made with one tool.

* The bracket shall be adjustable to compensate for different cylinder lengths without the use of tools. The adjustment shall be made by raising a lever and moving the top clamp vertically
* A center guide fork shall keep the SCBA tank in place for a safe and comfortable fit in the seat back cavity. The SCBA unit simply needs to be pushed against the pivot arm to engage the patented auto- locking system. Once the lock is engaged, the top clamp shall surround the top of the SCBA tank for a secure fit in all directions

The SecureAll™ shall include a release handle which shall be integrated into the seat cushion for quick and easy release. This shall eliminate the need for straps or pull cords to interfere with other SCBA equipment.

**HEAVY DUTY SHOCK ABSORBER**

A heavy duty shock shall be added to the air ride seat.

**SEAT MATERIAL**

The seats shall include a covering of high strength, wear resistant fabric made of durable ballistic polyester.

A PVC coating shall be bonded to the back side of the material to help protect the seats from UV rays and from being saturated or contaminated by fluids.

**OFFICER’S SEAT BOX STORAGE COMPARTMENT**

There shall be a storage area under the officer’s seat. The compartment shall be 19.75 inches wide, 17.50 inches long, and 6.25 inches high. The access opening shall be 9.00 inches wide and 4.50 inches high.

**REAR FACING OUTER SEAT**

Two (2) rearward facing outer crew seat shall be a H. O. Bostrom Tanker 400CT ABTS (All Belts To Seat/Integrated Seat Belts) series with Flip/Up cushion. The seat shall have contoured, high-density cushions with lumbar support and occupancy sensor in the seat cushion.  The seat cushion shall be spring biased to fold to vertical position when occupant weight is removed. The seat shall include a SCBA storage area with integral headrest.

The seat shall be equipped with a red integrated 3-point shoulder harness and lap belt and an emergency locking retractor. The seat belt shall include a buckle latched switch. The seat belt shall include a rotating bezel guide at the upper shoulder point and shall be routed through the seat frame and covering to protect webbing.

Belt Orientation- LH & RH to Door

**SCBA SEAT**

The seat shall be an HO Bostrom Tanker 450 series seat. The seat shall include an SCBA storage area with one piece flip-up headrest with spring return. The seat shall include two part bolster padding with removable insert to accommodate SCBA's with rigid waist belts.

**SEAT BACK**

A SecureAll™ SCBA locking system which shall be one bracket model and store all U.S. and International SCBA brands and sizes while in transit or for storage within the seat back. The bracket shall be easily adjustable for all SCBA brands and cylinder diameters. All adjustment points shall utilize similar hardware and adjustments shall be made with one tool.

* The bracket shall be adjustable to compensate for different cylinder lengths without the use of tools. The adjustment shall be made by raising a lever and moving the top clamp vertically
* A center guide fork shall keep the SCBA tank in place for a safe and comfortable fit in the seat back cavity. The SCBA unit simply needs to be pushed against the pivot arm to engage the patented auto- locking system. Once the lock is engaged, the top clamp shall surround the top of the SCBA tank for a secure fit in all directions

The SecureAll™ shall include a release handle which shall be integrated into the seat cushion for quick and easy release. This shall eliminate the need for straps or pull cords to interfere with other SCBA equipment.

**REAR FACING OUTER SEAT MOUNTING**

Each rear facing outer seat shall be mounted facing the rear of the cab.

**SEAT MATERIAL**

The seats shall include a covering of high strength, wear resistant fabric made of durable ballistic polyester.

A PVC coating shall be bonded to the back side of the material to help protect the seats from UV rays and from being saturated or contaminated by fluids.

**SEAT FRAME FORWARD FACING ENCLOSED**

The forward facing center seats shall include an enclosed seat box which is located and installed on the rear wall.

The seat box shall be constructed of no less than 5052-H32 .19" thick aluminum plate.

**SEAT FRAME FORWARD FACING ACCESS**

The seat frame shall include two (2) cutouts one on each side of the seat box for access. Each cutout shall be in the outboard position facing the rear crew doors.

**SEAT COMPARTMENT FINISH**

The seat frame shall be finished in a high performance polyurethane coating. The color shall be black.

**EXTERIOR GRAB HANDLES**

One (1) 18” anti-slip exterior assist handle shall be mounted behind each of the cab doors. The grab handle shall be constructed of aluminum and be 1.25” diameter with a knurled finish enabling non-slip assistance with a gloved hand and mounted on stanchions.

 **CAB FASCIA**

* A super structure which is fully welded to the cab, for a seamless and integration
* Thermoformed headlamp bezels, constructed of impact resistant, polycarbonate composite which is vacuum metalized to eliminate pealing and bubbling of a chrome type film or plating
* Traditional style headlight bezels with 4 x 6 high intensity headlights which shall add a classic look to the fascia while improving visibility
* The turn signal lights shall be located in the lower outboard portion of the head lamp bezel and a warning light in the lower inboard position

**FRONT GRILLE**

A prominent front grille shall punctuate the aggressive design of the cab with its outboard wing style warning light bezels and heavy framework. The front grille shall feature:

* Fabricated construction for superior strength and durability
* Up to a minimum of four (4) warning light locations along the mid bar for a variety of warning light combinations

**LIGHT BEZEL**

The front grille shall include wing light bezels. The bezels shall be constructed of a stainless material.

**FRONT GRILLE INLAY**

The front grille shall include a honeycomb inlay of stainless steel, painted black, which shall provide air flow to through the grille and provide a sporty, muscular appearance to the front of the apparatus.

The horizontal bars shall be overlaid with polished stainless steel strips.

**FLUID FILLS**

The engine oil, coolant, transmission, and power steering fluid fills shall be located under the cab. The windshield washer fill shall be accessible through the front left side mid step.

**HEADLIGHTS**

A quadruple headlight assembly shall be provided in the fascia to enhance the look. The top two (2) bezels shall include head lamps while the lower bezels shall house a turn signal in the outboard position and a warning light in the inboard position.

**FRONT TURN SIGNALS**

Two (2) Whelen Series 600 LED square, front turn signal assemblies shall be included on the front fascia directly below the headlights, one each side of the cab grille. Each turn signal shall be mounted in an attractive façade style bezel which is an integral part of the fascia.

**SIDE MARKER LIGHTS**

Two (2) Weldon amber LED round, side marker light assemblies shall be mounted on the side of the cab ahead of the driver door, adjacent to the front head lamp bezel.

**HEADLIGHT AND MARKER LIGHT ACTIVATION**

The head light and marker lights shall be activated through a switch on the driver's panel.

**FRONT MARKER LAMPS**

The cab front shall include five (5) LED amber marker lamps above the windshield in accordance with the Department of Transportation requirements.

**CAB FENDERS**

The cab wheel wells shall include full width, 14 gauge 304 polished, stainless steel cab fenders to resist corrosion and enable easier cleaning maintenance. The inner liner, measuring 18" wide shall be constructed of plastic with an outer fenderette measuring 2.5" wide.

**FRONT MUD FLAPS**

The cab and chassis shall be provided with rubber front mud flaps.

**CAB TILT SYSTEM**

The cab shall be a full tilt style. A hydraulic cab lift system shall be provided consisting of an electric powered hydraulic pump, dual lift cylinders, and necessary hoses and valves.

The dual lift cylinders shall lift the cab 45 degrees from a horizontal plane facilitating easy engine maintenance and possible removal.

The tilt angle shall allow access to the engine and area under the cab without contacting any components mounted to the gravel shield.

The cab shall be locked down by a two (2)-point automatic spring-loaded hook mechanism that actuates after the cab has been lowered.

The cylinders shall include blocking valves which prevent motion when no control buttons are pushed. In the event of a hydraulic system failure, the valves shall retain the fluid in the cylinders.

A redundant mechanical stay arm shall automatically be engaged once the cab has been fully raised. Before lowering the cab, this device must be disengaged using the stay arm control located on the driver’s side rear of the cab.

All mounting points shall be bolted directly to the frame rail.

The cab lift safety system shall be interlocked with the parking brake. The cab tilt mechanism shall be active only when the parking brake is set and the battery master switch is in the on position. If the parking brake is release, the cab tilt mechanism shall be disabled. The stay arm shall be safety yellow for high visibility so that it is easy to see whether the arm is in place or not. No Exception

A warning light shall illuminate in the cab instrument panel to indicate whenever the cab is not fully latched in the locked down position, and the parking break is release.

**CAB TILT LOCK DOWN INDICATOR**

The cab dash shall include a message located within the dual air pressure gauge which shall alert the driver when the cab is unlocked and ajar. The alert message shall cease to be displayed when the cab is in the fully lowered position and the hold down hooks are secured and locked to the cab mounts.

In addition to the alert message an audible alarm shall sound when the cab is unlocked and ajar and the parking brake is released.

**REARVIEW MIRRORS**

Ramco model CRM-1350-PCHR bus style mirrors shall be provided. The mirror heads shall be injection molded chrome plated ABS plastic and shall measure 9.75" wide x 13.5" high. The mirrors shall be mounted one (1) on each the driver and officer doors of the cab with polished die-cast aluminum arms.

The mirrors shall feature an upper heated remote controlled flat glass and a lower heated remote controlled convex glass. The mirror control switches shall be located within easy reach of the driver. The mirrors shall be manufactured using the finest quality non-glare glass and shall feature a rigid mounting reducing vibration. The mirrors shall be corrosion free under all weather conditions.

**REARVIEW MIRROR REMOTE ACTIVATION**

The driver's panel shall include activation for the rearview mirrors remote function. The driver panel shall also include a switch activating the mirrors to be heated.

**CAB PAINT LOWER**

Cab paint shall be determined from manufacture due to being of a DEMO unit.

**CAB UNDERCOAT**

The cab shall have an undercoat applied prior to the cab being set on the running gear. The under coat shall be a waterborne, one-component, air dry undercoat formulated to prevent chipping, cracking and marring of painted or unpainted surfaces after exposure to high impact sand, gravel or other abrasive materials. It shall also have high corrosion resistance.

**FRONT AXLE**

A Meritor MFS Easy Steer non-drive axle or comparable shall be incorporated as the front axle for the chassis. The axle shall feature:

* A capacity of 20,000 pounds
* A 3.74” drop and a 71” king pin intersection (KPI)
* A conventional style hub with a standard knuckle

**FRONT WHEEL BEARING LUBRICATION**

The front axle wheel bearings shall be lubricated with oil. The oil level can be visually checked via clear inspection windows in the front axle hubs.

**FRONT SUSPENSION**

* Shall meet all requirements set by manufacture due to being demo unit.

**FRONT SHOCK ABSORBERS**

Two (2) Bilstein or comparable inert, nitrogen gas filled shock absorbers shall be provided and installed as part of the front suspension system. The shocks shall be a monotubular design and fabricated using a special extrusion method, utilizing a single blank of steel without a welded seam, achieving an extremely tight peak-to-valley tolerance and maintains consistent wall thickness. The monotubular design shall provide superior strength while maximizing heat dissipation and shock life.

The ride afforded through the use of a gas shock is more consistent and shall not deteriorate with heat, the same way a conventional oil filled hydraulic shock would.

The Bilstein or comparable front shocks shall include a digressive working piston assembly allowing independent tuning of the compression and rebound damping forces to provide optimum ride and comfort without compromise. The working piston design shall feature fewer parts than most conventional twin tube and “road sensing” shock designs and shall contribute to the durability and long life of the Bilstein shock absorbers.

Proposals offering the use of conventional twin tube or “road sensing” designed shocks shall not be considered.

**POWER STEERING GEAR WITH ASSIST**

The power steering gear shall be a TRW model TAS 85 and shall include the following:

* A balanced, hydraulic, positive displacement, sliding vane power steering pump which is gear driven from the engine
* One-piece, 2" diameter drag link for maintaining consistent wheel alignment resulting in less maintenance.
* The steering gear shall be mounted on a plane that is at a 9-degree angle in relationship to the center plane of the chassis. This mounting technique is designed to reduce the operating angle of input steering shafts. A more direct, responsive, and smoother handling vehicle will result from these unique design characteristics.

A certified torque and geometry study by TRW shall be available upon req

**CHASSIS ALIGNMENT**

The chassis frame rails shall be measured to insure the length is correct and cross checked to make sure they run parallel and are square to each other. The front and rear axles shall be laser aligned. The front tires and wheels shall be aligned and toe-in set on the front tires by the apparatus manufacturer.

Alignment documentation shall be available upon request.

**FRONT AXLE CRAMP ANGLE**

The chassis shall have a front axle cramp angle of 46 degrees to the left and right.

The manufacturer shall provide third party verification of cramp angle upon request from the fire department.

**FRONT TIRES**

* Shall be determined by manufacture due to demo unit.

**FRONT WHEEL**

The front wheels shall be Alcoa hub piloted, 22.50 inch X 12.25 inch polished aluminum wheels. The hub piloted mounting system shall provide easy installation and shall include two-piece flange nuts. The wheels shall feature one-piece forged strength and a polished finish that lasts.

**FRONT BRAKES**

Drum or disk brakes set forth by manufacture due to demo unit.

**STEERING COLUMN AND WHEEL**

The cab shall include a steering column. The steering column shall feature an 18”, four (4) spoke steering wheel located at the driver’s position; a five (5) position tilt and 2.25” telescopic adjustment. The steering wheel shall be provided with a black vinyl cover with foam padding and a horn button, self-canceling turn signal switch, four-way hazard switch and headlamp dimmer switch.

The chassis shall include dual electric 12-volt horn with a minimum 110 decibels.

**REAR AXLE**

A single Meritor RS-25-160 driving axle or comparable shall be incorporated as the rear axle for the chassis. The axle shall feature:

* Rated capacity of 27,000 pounds
* Heavy duty Hypoid gearing for longer life, increased strength and quieter operation
* Industry-standard wheel ends for compatibility with both disc and drum brakes, and unitized oil seal technology to keep lubricant in and help prevent contaminant damage
* Rigid differential case for high axle strength and reduced maintenance
* Rugged Dependability

* Rectangular shaped, hot formed housing with a standard wall thickness at spring seat of .63” for extra strength and rigidity
* Precision forged, single differential gearing

**REAR AXLE DIFFERENTIAL LUBRICATION**

The rear axle differential shall be lubricated with oil.

**REAR WHEEL BEARING LUBRICATION**

The rear axle wheel bearings shall be lubricated with oil.

**REAR SUSPENSION**

The single rear axle shall feature a Reyco 79KB vari-rate or comparable, self-leveling captive slipper type conventional multi-leaf spring suspension, with 57.50 inch X 3.00 inch springs. One (1) adjustable and one (1) fixed torque rod shall be provided.

The rear suspension capacity shall be rated at 27,000 pounds based on the capacity of the brakes and rear tires.

**REAR BRAKES**

Shall be of disk or drum style determined by manufacture due to demo unit.

**REAR SHOCK ABSORBERS**

Shock absorbers shall be supplied by the suspension manufacturer and installed on the rear axle suspension.

**REAR TIRES**

* Shall be determined by manufacture due to demo unit.

**REAR WHEEL**

The rear wheels shall be Alcoa hub piloted, heavy duty, 22.50 inch x 8.25 inch aluminum wheels. Each outer wheel shall have a polished aluminum finish on the exterior surface and each inner wheel shall have a machine finish. The wheels shall be forged from a single piece of aluminum which shall be corrosion resistant, engineered to be lightweight and provide exceptional performance. The hub piloted mounting system shall provide easy installation and shall include two-piece flange nuts.

**VALVE STEM EXTENSION - SINGLE AXLE**

To allow for easy checking and inflation of the rear inner tire it shall be equipped with a multi-layer valve stem extension, the layers shall be as follows: starting from the inner to out layer, stainless steel metal core, air tube, stainless steel jacket, protective color.

**VEHICLE TOP SPEED**

The top speed of the vehicle shall be programmed at approximately 68 MPH +/-2 MPH at governed engine RPM.

**BRAKE SYSTEM**

A rapid build-up air brake system shall be provided. The air brakes shall include a two (2) air tank, three (3) reservoir system with a minimum of 4152 cubic inch of air capacity. A floor mounted treadle valve shall be mounted inside the cab for graduated control of applying and releasing the brakes. A spring brake valve shall be installed to provide a controlled service brake application during an unlikely event including primary air supply loss. The system shall include an anti-compounding feature. All air reservoirs provided on the chassis shall be labeled for identification.

The rear axle spring brakes shall automatically apply in any situation when the air pressure falls below 25 PSI and shall include a mechanical means for releasing the spring brakes when necessary. An audible alarm shall designate when the system air pressure is below 60 PSI.

A four (4) sensor, four (4) modulator Anti-lock Braking System (ABS) shall be installed on the front and rear axles in order to prevent the brakes from locking or skidding while braking during hard stops or on icy or wet surfaces. This in turn shall allow the driver to maintain steering control under heavy braking and in most instances, shorten the braking distance. The electronic monitoring system shall incorporate diagonal circuitry which shall monitor wheel speed during braking through a sensor and tone ring on each wheel. A dash mounted ABS lamp shall be provided to notify the driver of a system malfunction. The ABS system shall automatically disengage the auxiliary braking system device when required. The speedometer screen shall be capable of reporting all active defaults using PID/SID and FMI standards.

The Meritor Wabco ABS system shall come with a three (3) year/300,000 mile parts and labor warranty.

**AIR TANK BRACKETS & STRAPS**

The air tank(s) shall be mounted to the frame rail with brackets that are hot dipped galvanized thereby creating a barrier and cathodic protection from corrosion, and eliminating the requirement for finish paint and the subsequent requirements for touch up paint and/or total repaint after a period of time due to nicks, chips and corrosion. Powder coated or painted air tank brackets shall not be accepted. No exception.

All of the air tank straps shall be plastic coated stainless steel cable. No Exception.

 **PARK BRAKE**

Upon application of the push-pull valve in the cab, the rear brakes will engage via mechanical spring force. This is accomplished by dual chamber rear brakes, satisfying the FMVSS parking brake requirements.

Park brake system shall include an anti-compounding feature.

**PARK BRAKE CONTROL**

A Meritor-Wabco manual hand or comparable control push-pull style valve shall operate the parking brake system. The control shall be yellow in color.

The parking brake actuation valve shall be mounted on the driver's side dash to the right of the steering column within easy reach of the driver.

**AIR DRYER**

The brake system shall include a Wabco System Saver 1200 Plus air dryer or comparable with an integral 100 watt heater with a Metri-Pack sealed connector. The system shall have an integrated purge volume and integrated governor.

The system shall have the following features:

* Premium desiccant provides greater water adsorption
* Replaceable spin on cartridge for simple maintenance
* Compact light weight design
* Pressure relief safety valve
* Turbo cut-off valve for boosted compressor applications
* Service components are external for easy replacement
* Common service components proven for reliability and quality
* Integrated with the air governor.

**MOISTURE EJECTORS**

An automatic moisture ejector with a manual drain provision shall be installed on the wet tank of the air supply system. Manual pet-cock type drain valves shall be installed on all remaining reservoirs of the air supply system.

**AIR SUPPLY LINES**

A dual air system plumbed with color coded reinforced nylon tubing air lines shall be installed on the chassis. The primary (rear) brake line shall be green, the secondary (front) brake line orange, the parking brake line yellow and the auxiliary (outlet) will be black; in accordance with SAE standards. No Exception.

Brass push-lock type fittings shall be used on the nylon tubing. All drop hoses shall include fiber reinforced neoprene covered hoses.

**FRAME**

The chassis frame shall consist of two (2) “C” style parallel rails, constructed of high strength low alloy and shall feature the following:

* A Stenx **MODEL 110XF**  10.19” high by 3.63” deep cold rolled steel frame or equivalent.
* .38” thick flange
* Inner channel measuring 9.31" high x 3.25" deep x .25" thick
* The 10.19” frame height shall be maintained throughout the entire length of the frame to allow for maximum storage capacity for the entire apparatus.
* If frame rails that are larger than those specified are to be utilized, the maximum height of each frame rail shall not exceed 10.25” at any point on the frame rail. This will ensure the lowest possible vehicle center of gravity allowing maximum stability as well as providing the lowest body height possible.
* Frame rail shall have a consistent frame web throughout the entire length.
* The entire frame rail design shall be manufactured in the United States of America and readily available on the aftermarket.
* Grade 8 Structural fasteners, Huck bolts shall not be acceptable. No Exception.
* The hardware used for the chassis shall be are to be corrosion resistant.

The frame ratings shall be as follows:

* 110,000 PSI minimum yield strength high strength low alloy steel
* Minimum Resisting Bending Moment (RBM) of 2,810,000 inch pounds per rail

To avoid frame cracking and failure over time, the top flange of the frame adjacent to the engine installation shall have a tapered design. Notches for engine components shall not be accepted due to fatigue and the potential for cracking. No Exceptions

**UNDER FRAME REINFORCEMENT**

An under slung frame reinforcement shall be installed below the frame rails in the transmission area to increase the vertical rigidity of the frame.

The under frame reinforcement provides:

* Enhanced handling
* Improved ride quality
* Increase resistance to frame and cross member fatigue
* Enhanced vehicle stability providing improved safety to occupants

**CROSS MEMBERS**

* 50,000 psi minimum yield strength steel plate cross members
* Manufacturer's lifetime warranty to match frame warranty. No Exceptions.
* Installed with one-piece cross member gusset to maximize vertical strength and minimize cross member flex

Crossmembers can be inverted when required to allow for PTO drive line installation without the need for notching or modifying the cross members in anyway. No Exceptions.

**FRAME FINISH**

The frame shall be powder coated to resist weather, dirt and other corrosive material.

**ENGINE**

A Cummins ISL 9.0 liter, four-cycle diesel fueled, turbo charged engine shall feature the following:

* One of the highest power to weight ratios in its class
* Heavy-duty replaceable wet liners, roller followers, by-pass oil filtration with replaceable spin on cartridge and targeted piston cooling for longer service in tough work environments.
* Improved cooled EGR system
* 43 Cubic inches of displacement
* High pressure common rail fuel system producing a precise quantity of fuel at ultra high pressures
* Fully integrated, robust electronic engine controls
* Electric fuel lift pump. No Exceptions.

The engine shall be coupled with a Holset VGT™ (Variable Geometry Turbocharger).

The engine shall be filled with Citgo brand Citgard 500 (or equivalent) SAE 15W40 CJ4 low ash engine oil for proper engine lubrication.

The engine shall be EPA certified to meet the 2013 emissions standards without compromising performance, reliability or durability using cooled exhaust gas recirculation and selective catalytic reduction technology.

The engine shall include an original equipment manufacturer installed oil drain plug.

The engine shall include programming which will govern the top speed of the vehicle.

**ENGINE PLACEMENT**

The engine shall be a maximum of 36" from the center line of the front axle to the front face of the engine block. The engine valve cover shall be a maximum of 23" from the top of the frame.

The engine placement shall provide optimal weight distribution to the front axle to enhance vehicle handling. More weight out in front of the front axle can cause a “fulcrum effect” and cause unsafe “bump steer” conditions.

The engine shall be mounted in a position that provides for the lowest possible height of the interior engine tunnel. An engine tunnel height from the floor of the chassis cab shall be no more than 21” high inside the cab.

**AIR COMPRESSOR**

The air compressor provided for the engine shall be a Wabco® SS318 single cylinder pass-through drive type compressor which shall be capable of producing 18.7 CFM at 1200 engine RPMs. The air compressor shall feature a higher delivery efficiency translating to more air delivery per horsepower absorbed. The compressor shall include an aluminum cylinder head which shall improve cooling, reduce weight and decrease carbon formation. Superior piston and bore finishing technology shall reduce oil consumption and significantly increasing the system component life.

**AIR GOVERNOR**

An air governor shall be provided to control the cut-in and cut-out pressures of the engine mounted air compressor. The governor shall be calibrated to meet FMVSS requirements. The air governor shall be integrated in the air dryer assembly.

**HORSEPOWER**

The engine shall have 400 horsepower at 2100 RPM, with a governed speed of 2200 RPM.

The engine shall have 1250 foot pounds of torque at 1400 RPM.

**ENGINE FAN DRIVE**

The engine cooling system fan shall incorporate a thermostatically controlled, one (1) piece nine (9) blade Horton clutched type fan drive, and shroud.

When the clutched fan is disengaged it shall facilitate improved vehicle performance, cab heating in cold climates, and fuel economy. The fan clutch design shall be fail safe so that if the clutch drive fails, the fan shall engage to prevent engine overheating due to the fan clutch failure.

The clutch fan shall automatically engage in pump mode (when applicable).

**AUXILIARY ENGINE BRAKE**

A Cummins engine compression brake, for the six (6) cylinder engine, shall be provided. The engine compression brake shall:

* Activate upon 0% accelerator when in operation mode and activate the vehicle’s brake lights.

**TRANSMISSION PRE-SELECT**

When the auxiliary brake is engaged, the transmission shall automatically shift to second gear to decrease the rate of speed. The transmission shall assist the secondary braking system, thereby slowing the vehicle.

**AUXILIARY ENGINE BRAKE CONTROL**

An auxiliary engine brake control device shall be included. The electronic control device shall monitor various conditions and shall activate the engine brake only if all of the following conditions are simultaneously detected:

* A valid gear ratio is detected.
* The driver has requested or enabled engine compression brake operation.
* The throttle is at a minimum engine speed position.
* The electronic controller is not presently attempting to execute an electronically controlled final drive gear shift.

The auxiliary brake shall be controlled through an on/off switch and individual low/medium/high selector switches on the Driver's panel.

**ENGINE PROGRAMMING HIGH IDLE SPEED**

The Engine high idle will be set at 1250 RPM. The high idle will be operational only when the parking brake is set and the truck transmission is in neutral.

**ENGINE HIGH IDLE CONTROL**

The vehicle shall be equipped with an automatic high-idle speed control. It shall be pre-set so when activated, it will operate the engine at the appropriate RPM to increase alternator output and optimize output of the HVAC system.

This device shall operate only when the master switch is activated and the transmission is in neutral with the parking brake set. The device shall disengage when the operator depresses the brake pedal, or the transmission is placed in gear, and shall be available to manually, through a switch, or automatically re-engage when the brake is set, or when the transmission is placed in neutral.

**ENGINE AIR INTAKE**

The engine air intake system shall include an ember separator air intake filter which shall be located behind the fascia.

The filter shall protect the downstream air filter from embers using a combination of unique flat and crimped metal screens constructed into a corrosion resistant steel frame.

This multilayered screen shall be designed to trap embers or allow them to burn out before passing through the pack, while creating only minimal air flow restriction through the system.  Periodic cleaning or replacement of the screen shall be all that is required after installation.

The intake shall also feature a cyclone style water separator to remove unwanted moisture from incoming air.

The engine shall include an air intake filter which shall be bolted to the frame and located under the front of the cab. This dry type filter shall ensure dust and debris is safely contained inside the disposable housing, eliminating the chance of contaminating the air intake system during air filter service via a leak-tight seal.

The filter must have a capacity of no less than 950 cubic feet of air per minute.  The filter paper media must be of a flame retardant treated material.  An electric air filter restriction indicator shall also be included with the system.

**ENGINE EXHAUST SYSTEM**

The exhaust system shall include a diesel particulate filter (DPF), a diesel oxidation catalyst, and a selective catalytic reduction catalyst (SCR) to meet current EPA standards.

The selective catalytic reduction catalyst shall utilize a diesel exhaust fluid solution consisting of urea and purified water to convert nitrogen oxide into nitrogen, water, and trace amounts of carbon dioxide. The solution shall be injected into the system through the decomposition tube between the DPF and SCR.

The system shall utilize 0.065 inch thick stainless steel exhaust tubing between the engine turbo and the DPF.

The DPF, the decomposition tube, and the SCR canister through the end of the tailpipe shall all be connected with zero leak gasketed clamps. The discharge shall terminate horizontally on the right side of the vehicle ahead of the rear tires with an exhaust gas diffuser.

The diffuser shall lower exhaust gas temperatures during the regeneration cycle.

**DIESEL EXHAUST FLUID TANK**

There shall be a molded cross linked polyethylene tank for the Diesel Exhaust Fluid (DEF). The tank shall have a capacity of not less than five (5) usable gallons (18.92 Liters) and shall be mounted on the left hand side of the chassis frame in front of the batteries below the frame.

The DEF tank shall be designed with capacity for expansion in case of fluid freezing. Engine coolant, which shall be thermostatically controlled, shall be run through lines in the tank to help prevent the DEF from freezing and to provide a means of thawing the fluid if it should become frozen.

**DIESEL EXHAUST FLUID TANK**

There shall be an access door provided in the top rear step of left side crew area for access to the DEF tank.

**ENGINE EXHAUST ACCESSORIES**

An exhaust temperature mitigation device shall be shipped loose for installation by the body manufacturer on the vehicle. The temperature mitigation device shall lower the temperature of the exhaust by combining ambient air with the exhaust gasses at the exhaust outlet.

**ENGINE EXHAUST WRAP**

The exhaust tubing between the engine turbo and the diesel particulate filter (DPF) shall be wrapped with a thermal cover in order to retain the necessary heat for DPF regeneration. The exhaust wrap shall also help protect surrounding components from radiant heat which can be transferred from the exhaust.

**DIESEL PARTICULATE FILTER CONTROLS**

Provide DPF system status annunciation indicator lights, lights shall be installed on driver dash to alert driver when regeneration is needed and when DPF is in an active re-generation cycle.

Warning systems shall provide DEF low level warning.

Driver's dash shall be provided with two (2) controls for the Diesel particulate filter; one (1) manual regeneration switch to activate a regeneration cycle manually when passive burn is unobtainable due to driving conditions; and one (1) Regen "Inhibit Switch".

The switches shall be located in a covered location.

**ENGINE COOLING SYSTEM**

The radiator and the complete cooling system shall meet or exceed NFPA and engine manufacturer cooling system requirements.

The system shall include and feature the following:

* A vertically stacked charge air cooler providing the maximum cooling capacity for the engine. Proposals offering horizontally stacked charge air cooler shall not be acceptable. No Exceptions
* The charge air cooler and radiator shall measure not less than 1214 square inches
* A surge tank with a low coolant probe and capable of removing entrained air from the cooling system, with built in sight glass
* Radiator re-circulation shields to prevent heated air from re-entering the cooling system and affecting performance
* Mounts allowing the entire radiator to drop through the frame for service when needed - No Exceptions
* Engine placement shall provide a minimum of 8” between the engine fan and radiator to maximize the airflow and cooling of the engine.
* A Spin on Element water filter with corrosion inhibitor shall be provided for the cooling system. No Exception.
* The coolant filter shall be provided with two (2) shut off valves, one (1) one inlet and one (1) outlet. No Exception.
* Cooling system shall be tested and certified by the engine manufacturer

**COOLANT HOSES**

The cooling systems hose shall be formed silicone hose and formed aluminized steel tubing and include stainless steel crimp style stepless ear clamps.

**ENGINE COOLANT**

The cooling package shall include Extended Life Coolant (ELC). The use of ELC provides longer intervals between coolant changes over standard coolants providing improved performance. The coolant shall contain a 50/50 mix of ethylene glycol and de-ionized water to keep the coolant from freezing to a temperature of -34 degrees F.

Supplemental coolant additives (SCA) are not required as this is part of the extended life coolant makeup.

**ADDITIONAL COOLANT SHUT OFF VALVE**

An additional coolant shut off valve with connection shall be installed in the chassis coolant lines with a connector. This shall allow for the installation of an additional heater such as a pump compartment heater without draining the coolant system.

**ENGINE PUMP HEAT EXCHANGER**

A single bundle type coolant to water heat exchanger shall be installed between the engine and the radiator. This pump heat exchanger shall circulate water from the fire pump to the heat exchanger thereby reducing the temperature of the coolant for the engine. The heat exchanger shall be designed to prohibit water from the pump from coming in contact with the engine coolant.

**TRANSMISSION**

The drive train shall include an Allison model EVS 3000 torque converting, automatic transmission which shall include electronic controls. The transmission shall feature two (2) 10-bolt PTO pads located on the converter housing.

The transmission shall include two (2) internal oil filters and Allison approved transmission fluid which shall be utilized in the lubrication of the EVS transmission. An electronic oil level sensor shall be included with the readout located in the shift selector.

The transmission shall include prognostic diagnostic capabilities. These capabilities shall include the monitoring of the fluid life, filter change indication, and transmission clutch maintenance.

The transmission gear ratios shall be:

1st 3.49:1

2nd 1.86:1

3rd 1.41:1

4th 1.00:1

5th 0.75:1

6th 0.65:1 (if applicable)

Rev 5.03:1

**TRANSMISSION COOLING SYSTEM**

The transmission shall include a water to oil cooler system located in the cooling loop between the radiator and the engine. The transmission cooling system shall meet all transmission manufacturer requirements. The transmission cooling system shall feature continuous flow of engine bypass water to maintain uninterrupted transmission cooling.

**TRANSMISSION DRAIN PLUG**

The transmission shall include an original equipment manufacturer installed magnetic oil drain plug.

**AUTOMATIC NEUTRAL**

The transmission shall be provided with an automatic neutral. When the parking brake is applied the transmission automatically returns to neutral.

**TRANSMISSION FLUID**

The transmission shall include two (2) internal oil filters and Allison approved transmission fluid which shall be utilized in the lubrication of the EVS transmission. An electronic oil level sensor shall be included with the readout located in the shift selector.

**TRANSMISSION SHIFT SELECTOR**

An Allison GEN V pressure sensitive range selector touch pad shall be provided and located on the tunnel to the right of the driver.

The shift selector shall provide an indicator on the digital display and shall alert the driver/operator when a specific maintenance function is required.

**PTO LOCATION**

The transmission driven power take off (PTO) shall be mounted in the 1:00 o’clock position.

**TRANSMISSION MODE PROGRAMMING**

The transmission, upon start-up, will select the fifth speed operation without the need to press the mode button.

**TRANSMISSION PROGRAMMING**

The EVS group package number 127 shall contain the 198 vocational package for the fire service for this apparatus as a Pumper. This package shall incorporate an automatic neutral with selector override. This feature commands the transmission to neutral when the park brake is applied, regardless of drive range requested on the shift selector which requires re-selecting the drive range to shift out of neutral for the override.

This package shall be coupled with the use of a split shaft PTO and incorporate pumping circuits. The transmission will detect the pump engaged signal and automatically select or deselect fourth gear lock-up. These circuits shall be used allowing the vehicle to operate in the fourth range lockup while operating the pump mode due to the 1 to 1 ratio through the transmission, therefore the output speed of the engine is the input speed to the pump. The pump output can be easily calculated by using this input speed and the drive ratio of the pump itself to rate the gallons of water the pump can provide.

A nine (9) pin diagnostic connector will be provided next to the steering column.

The trans module shall contain the following circuits:

Function ID Description Wire assignment

C PTO Request 142

J Fire Truck Pump Mode (4th Lockup) 122 / 123

C Range Indicator 145 (4th)

G PTO Enable Output 130

 Signal Return 103

**DRIVELINE**

All drivelines shall be heavy duty metal tube and equipped with Spicer 1710 series universal joints.

The shafts shall be dynamically balanced prior to installation to alleviate future vibration. In areas of the driveline where a slip shaft is required, the splined slip joint shall be coated with Glide Coat®.

**FUEL SYSTEM**

The fuel tank shall have a capacity of fifty (50) gallons/one hundred eighty-nine (189) liters and shall measure 35.00 inches in width X 15.00 inches in height X 24.00 inches in length. The tank shall offer:

* A vent port which will facilitate venting to the top of the fill neck for rapid filling without any “blow-back”
* Two (2) 2” NPT fill ports for left and right hand fill with a .5” NPT drain plug centered side to side 9" from the front of the tank
* A roll over ball check vent for temperature related fuel expansion and draw
* A design including dual draw tubes and sender flanges
* A baffled design and shall be constructed of steel
* A black Powder Coated exterior to ensure corrosion resistance

The fuel tank shall be mounted below the frame, behind the rear axle. There shall be two (2) three-piece strap hanger assemblies with “U” straps bolted midway on the fuel tank, allowing the tank to be easily lowered and removed for service purposes.

The strap hanger material shall be stainless steel. No Exceptions.

For isolation of vibration and movement, rubber isolating pads shall be provided between the tank and the hanger strap assemblies. The tank straps shall be attached to rubber coated cross members which help isolate the tank from frame flex.

Strap mounting studs through the rail, hidden behind the body shall not be acceptable.

All fuel lines shall be connected with steel fittings with all fittings pointed towards the right side (curbside) of the chassis.

The chassis fuel lines shall feature an additional 4’ of length provided so the tank can be easily lowered and removed for service purposes which shall be coiled and secured at the top of the tank.

**FUEL FILTER/WATER SEPARATOR**

The fuel system shall have a Fleetguard FS1065 fuel filter/water separator as a primary filter. The fuel filter shall have a drain valve.

A water in fuel sensor shall be provided and wired to an instrument panel lamp and audible alarm to indicate when water is present in the fuel/water separator.

A secondary fuel filter shall be included as approved by the engine manufacturer.

**FUEL LINES**

The fuel system supply and return lines installed from the fuel tank to the engine shall be black aramid braided lines with a fiber outer braid. The fuel lines shall connected with reusable steel fittings. Fuel line is compatible with bio-fuel blends.

**FUEL COOLER**

The cross flow air to fuel cooler shall be all aluminum and shall be provided to lower fuel temperature allowing the vehicle to operate at higher ambient temperatures. The fuel cooler shall be located behind the battery box, under the frame.

The fuel cooler shall incorporate a fan for improved heat transfer.

The fuel cooler shall be mounted to the frame using hot dipped galvanized brackets. Powder coated or painted brackets shall not be acceptable. No exception.

**ALTERNATOR**

The charging system shall include a 275 amp Delco Remy 40SI 12 volt alternator.   The alternator shall feature:

* Premium brushless design providing added durability and life
* Provide the highest efficiency resulting in less horsepower requirements
* Remote sense technology in extending the life of the battery
* 70% efficiency
* 3 Year warranty

**ELECTRICAL SYSTEM**

There shall be a 12 volt direct current single starting electrical system providing power to all components for the cab and chassis. The system shall feature:

* 300 degree Fahrenheit high temperature, flame retardant loom
* All SAE wiring color coded and labeled as to its function
* Wiring which is cross link with 311 degree Fahrenheit insulation
* A suppressed system in accordance with SAE J551

The primary power distribution will be located forward of the officer's seating position and be easily accessible while standing on the ground for simplified maintenance and troubleshooting. Additional electrical distribution centers will be provided throughout the vehicle to house the vehicle's electrical power, circuit protection, and control components. The electrical distribution centers will be located strategically throughout the vehicle to minimize wire length. For ease of maintenance, all electrical distribution centers will be easily accessible. All distribution centers containing fuses, circuit breakers and/or relays will be easily accessible.

Circuit protection devices, which conform to SAE standards, will be utilized to protect electrical circuits. All circuit protection devices will be rated per NFPA requirements to prevent wire and component damage when subjected to extreme current overload.

General protection circuit breakers will be a combination of automatic and manual reset breakers. This will provide a durability and capacity maximization of the electrical system. When required, automotive type fuses will be utilized to protect electronic equipment. Control relays and solenoid will have a direct current rating of 125 percent of the maximum current for which the circuit is protected per NFPA.

**EMI/RFI PROTECTION**

To prevent erroneous signals from crosstalk contamination and interference, the electrical system will meet, at a minimum, SAE J551/2, thus reducing undesired electromagnetic and radio frequency emissions. An advanced electrical system will be used to ensure radiated and conducted electromagnetic interference (EMI) or radio frequency interference (RFI) emissions are suppressed at their source.

The apparatus will have the ability to operate in the electromagnetic environment typically found in fire ground operations to ensure clean operations. The electrical system will meet, without exceptions, electromagnetic susceptibility conforming to SAE J1113/25 Region 1, Class C EMR for 10KHz-1GHz to 100 Volts/Meter. The vehicle OEM, upon request, will provide EMC testing reports from testing conducted on an entire apparatus and will certify that the vehicle meets SAE J551/2 and SAE J1113/25 Region 1, Class C EMR for 10KHz-1GHz to 100 Volts/Meter requirements. Component and partial (incomplete) vehicle testing is not adequate as overall vehicle design can impact test results and thus is not acceptable by itself.

EMI/RFI susceptibility will be controlled by applying appropriate circuit designs and shielding. The electrical system will be designed for full compatibility with low-level control signals and high-powered two-way radio communication systems. Harness and cable routing will be given careful attention to minimize the potential for conducting and radiated EMI/RFI susceptibility.

**ELECTRICAL HARNESSING INSTALLATION**

To ensure rugged dependability, all wiring harnesses installed by the apparatus manufacturer will conform to the following specifications:

SAE J1128 - Low tension primary cable

SAE J1292 - Automobile, truck, truck-tractor, trailer and motor coach wiring

SAE J163 - Low tension wiring and cable terminals and splice clips

SAE J2202 - Heavy duty wiring systems for on-highway trucks

NFPA 1901 - Standard for automotive fire apparatus

FMVSS 302 - Flammability of interior materials for passenger cars, multipurpose passenger vehicles, trucks and buses

SAE J1939 - Serial communications protocol
SAE J2030 - Heavy-duty electrical connector performance standard
SAE J2223 - Connections for on board vehicle electrical wiring harnesses NEC - National Electrical Code
SAE J561 - Electrical terminals - Eyelet and spade type
SAE J928 - Electrical terminals - Pin and receptacle type A

For increased reliability and harness integrity, harnesses will be routed throughout the cab and chassis in a manner which allows the harnessing to be laid into its mounting location. Routing of harnessing which requires pulling of wires through tubes will not be allowed.

Wiring will be run in loom or conduit where exposed, and have grommets or other edge protection where wires pass through metal. Wiring will be color, function and number coded. Wire colors will be integral to each wire insulator and run the entire length of each wire. Harnessing containing multiple wires and uses a single wire color for all wires will not be allowed. Function and number codes will be continuously imprinted on all wiring harness conductors at 3.00" intervals. All wiring installed between the cab and into doors will be protected by an expandable rubber boot to protect the wiring. Exterior exposed wire connectors will be positive locking, and environmentally sealed to withstand elements such as temperature extremes, moisture and automotive fluids.

Electrical wiring and equipment will be installed utilizing the following guidelines:

* All wire ends not placed into connectors will be sealed with a heat shrink end cap. Wires without a terminating connector or sealed end cap will not be allowed.
* All holes made in the roof will be caulked with silicon. Large fender washers, liberally caulked, will be used when fastening equipment to the underside of the cab roof.
* Any electrical component that is installed in an exposed area will be mounted in a manner that will not allow moisture to accumulate in it. Exposed area will be defined as any location outside of the cab or body.
* For low cost of ownership, electrical components designed to be removed for maintenance will be quickly accessible. For ease of use, a coil of wire will be provided behind the appliance to allow them to be pulled away from the mounting area for inspection and service work.
* Corrosion preventative compound will be applied to non-waterproof electrical connectors located outside of the cab or body. All non-waterproof connections will require this compound in the plug to prevent corrosion and for easy separation of the plug.
* Any lights containing non-waterproof sockets in a weather-exposed area will have corrosion preventative compound added to the socket terminal area.
* All electrical terminals in exposed areas will have protective Coating applied completely over the metal portion of the terminal.
* Rubber coated metal clamps will be used to support wire harnessing and battery cables routed along the chassis frame rails.
* Heat shields will be used to protect harnessing in areas where high temperatures exist. Harnessing passing near the engine exhaust will be protected by a heat shield.
* Cab and crew cab harnessing will not be routed through enclosed metal tubing. Dedicated wire routing channels will be used to protect harnessing therefore improving the overall integrity of the vehicle electrical system. The design of the cab will allow for easy routing of additional wiring and easy access to existing wiring.
* All braided wire harnesses will have a permanent label attached for easy identification of the harness part number and fabrication date.
* All standard wiring entering or exiting the cab will be routed through sealed bulkhead connectors to protect against water intrusion into the cab.

**BATTERY CABLE INSTALLATION**

All 12-volt battery cables and battery cable harnessing installed by the apparatus manufacturer will conform to the following requirements:

SAE J1127 - Battery Cable
SAE J561 - Electrical terminals, eyelets and spade type
SAE J562 - Nonmetallic loom
SAE J836A - Automotive metallurgical joining
SAE J1292 - Automotive truck, truck-tractor, trailer and motor coach wiring
NFPA 1901 - Standard for automotive fire apparatus
Battery cables and battery cable harnessing will be installed utilizing the following guidelines:

* All battery cables and battery harnesses will have a permanent label attached for easy identification of the harness part number.
* Splices will not be allowed on battery cables or battery cable harnesses.
* For ease of identification and simplified use, battery cables will be color coded. All positive battery cables will be red in color or wrapped in red loom the entire length of the cable. All negative battery cables will be black in color.
* For increased reliability and reduced maintenance, all electrical buss bars located on the exterior of the apparatus will be coated to prevent corrosion.

**ELECTRICAL COMPONENT INSTALLATION**

All lighting used on the apparatus will be, at a minimum, a two (2) wire light grounded through a wired connection to the battery system. Lights using an apparatus metal structure for grounding will not be allowed.

An operational test will be conducted to ensure that any equipment that is permanently attached to the electrical system is properly connected and in working order. The results of the tests will be recorded and provided to the purchaser at time of delivery.

**12V POWER POINTS**

There shall be two (2) 12v power points provided. They shall be mounted in the driver’s side of the dash. They shall be within easy reach of the driver; and shall be wired directly to the battery

**12V POWER POINTS**

There shall be two (2) 12v power points provided. They shall be mounted in the officer’s side of the dash. They shall be within easy reach of the officer; and shall be wired directly to the battery.

**DRIVER SWITCH PANEL**

The driver panel to the right of the Driver’s position shall include the following:

* In the upper most row it shall have the HVAC Controls, which shall include three (3) controls, the fan speed, comfort and defrost control, and temperature control. In the far right position shall be the seat belt indicator.
* In the middle section there shall be eight (8) backlit switches, the switch on the far right side shall be a high idle switch.
* In the bottom row there shall be six (6) switches. These switches shall be configured in the following order starting with the switch closest to the driver, headlight switch, dimmer switch, wiper control, engine brake on/off switch, with 2 blank switches on the far right side for customer application.

**MASTER WARNING SWITCH**

A master switch shall be included in the main rocker switch panel. The switch shall be a rocker type, red in color and labeled “Master” for identification. The switch shall feature control over all devices wired through it. Any warning device switch left in the “ON” position shall automatically power up when the master switch is activated.

**CAB INSTRUMENTATION**

The instrumentation panel within the cab shall feature a Pacific Insight gauge panel which shall include three (3) 5"diameter information centers, telltale indicator lamps, control switches, alarms, and a LCD diagnostic panel.

The gauges shall be easy to read including red backlighting.

The instrument panel shall contain the following gauges and indictors:

The middle information center shall include:

* A programmable speedometer to read either 0 to 140 MPH or 0 to 140 KM/H
* An amber telltale lamp indicating the Check Engine
* An amber telltale lamp indicating MIL Engine Emissions System Malfunction
* A red telltale lamp indicating Stop Engine
* A tachometer gauge with 0-3,000 RPM

The right hand side information center shall include:

* A gauge to display the engine oil pressure with high and low level indicators and stop engine alarm
* A fuel level gauge with a low fuel indicator and alarm
* An LED bar displaying 4 stages of the level for the Diesel Exhaust Fluid (DEF) with a refill indicator
* A voltage gauge with low voltage indicator
* A water temperature gauge with high water temp indicator and alarm

The left hand side information center shall include:

* A primary air PSI gauge including low air and high air warning displays
* A secondary air PSI gauge with low and high air warning indication

An LCD diagnostic display, located in the left hand side information center shall include digital readouts for the following:

* Odometer
* Transmission oil temp
* Engine oil temp
* Speedometer
* Engine hours
* Engine and transmission code
* Exhaust temp
* Engine coolant temp
* Engine oil PSI
* Turbo boost PSI
* Primary air pressure
* Secondary air pressure
* Engine load %
* Engine torque
* Battery volts
* Fuel level %
* Vehicle speed
* RPM
* DEF level
* Instant fuel economy
* Average fuel economy
* Engine hours
* Capable to record three trips, each shall be include:

· Trip distance

· Fuel economy

· Fuel used

· Idle fuel used

* The LCD screen shall also provide diagnostic capability

To promote safety, the following telltale indicator lamps will be integral to the gauge assembly and are located below the middle information center. The indicator lamps will be "dead-front" design that is only visible when active. The colored indicator lights will have descriptive text or symbols. The following indicator lamps shall be located on the Telltale panel:

  **BLUE** Indicator Lights

High Beam Headlight

  **GREEN** Indicator Lights

* Right Turn Indicator
* Left Turn Indicator
* Battery On (Always On)

 **YELLOW** Indicator Lights

* Particle Filter Regeneration (DPF)
* Regeneration Inhibit (Switch Engaged)
* Air Intake Restriction
* High Exhaust System Temperature (HEST)
* Wait to Start (when applicable)
* ATC (Automatic Traction Control) (when applicable)
* Water in Fuel

**RED** Indicator Lights

* Low Engine Coolant Level
* Air Bag Warning (when applicable)
* Check Transmission
* High Transmission Temperature
* ABS
* Parking Brake

**ALARMS**

Audible steady tone warning alarm: A steady audible tone alarm will be provided whenever a warning message is present.

Alarm silence: Any active audible alarm will be able to be silenced with a button on the right side of the LCD screen.

**INDICATOR LAMP AND ALARM PROVE-OUT**

Telltale indicators and alarms will perform prove-out at initial power-up to ensure proper performance.

**DIAGNOSTIC PANEL**

A diagnostic panel shall be accessible while standing on the ground and located inside the driver's side door, left of the steering column. The diagnostic panel shall allow diagnostic tools such as computers to connect to various vehicle systems for improved trouble shooting providing a lower cost of ownership. Diagnostic switches shall allow engine and ABS systems to provide blink codes should a problem exist.

The diagnostic panel shall include the following:

* Engine diagnostic port
* Transmission diagnostic port
* ABS diagnostic port
* SRS diagnostic port (when applicable)
* V-Mux USB diagnostic port (when applicable)
* Engine diagnostic switch (blink codes flashed on check engine telltale indicator)
* Diesel particulate filter regeneration switch (when applicable)
* Diesel particulate filter regeneration inhibit switch (when applicable)

**BACKLIGHTING COLOR**

The instrumentation gauges and the switch panel legends shall be backlit using LED backlighting.

**VEHICLE DATA RECORDER**

Apparatus shall be equipped with a Class1 “Vehicle Data Recorder (VDR) that is connected to the power train CAN (Controller Area Network) bus consisting of transmission (TCM), engine control (ECM) and anti-lock brake (ABS) modules mounted on the apparatus. The VDR will function per NFPA 1901-2009 sections 4.11 (Vehicle Data Recorder) utilizing the power train s J1939 data.

The VDR data shall be downloadable by USB cable to a computer using either Microsoft ™ or Apple ™ Operating Systems using Class 1/ O.E.M. supplied reporting software. The latest version of the software shall be available by contacting Class 1.

The apparatus shall be equipped with a Class1 Seat Belt Warning System” (SBW) that is connected to the power train CAN (Controller Area Network) bus consisting of transmission (TCM), engine control (ECM) and anti-lock brake (ABS) modules mounted on the apparatus. The SBW will function per NFPA 1901-2009 14.1.3.10 (Seat Belt Warning) using the Class1 “Seat Belt Input Module” for seat occupied and belt status information.

The SBW system shall have the ability to use either normally open (NO) or normally closed (NC) switches (user selectable by “dip switches” at ground potential) for operation.

**BATTERIES**

The single start electrical system shall include four (4) 1070 CCA batteries.

The batteries shall feature:

* A 210 minute reserve capacity
* 4/0 dual path starter cables per SAE J541
* Heat shrink and sealant encapsulated ends on the cables
* Maintenance free

**BATTERY COMPARTMENTS**

A well ventilated battery storage compartment shall house the batteries on the officer and driver side of the chassis and shall be located so as to offer easy access to the batteries when the cab is tilted.

 The battery compartment shall feature a painted battery box with cover.

**BATTERY CABLES**

The starting system shall include cables which shall be protected by a 275 degree F, minimum high temperature flame retardant loom.

The cables shall be in a loom to help keep out dirt, dust and debris.

**BATTERY JUMPER STUD**

The starting system shall include battery jumper studs.

These studs shall be located in the forward most portion of the driver's side lower step.

The studs shall allow the vehicle to be jump started, charged, or the cab to be raised in an emergency in the event of battery failure.

**IGNITION**

A master battery system with a keyless start ignition system shall be provided. Each system shall be controlled by a marine grade two position switch, of which shall be mounted on the left side of the steering wheel adjacent to the driver's knee.

A push button type starter button shall be provided on the driver dash to the left of the steering wheel.

The starter button shall only operate when both the master battery and ignition switches are in the “ON” position.

**POWER & GROUND STUD**

An electrical distribution panel shall include two (2) power studs. The studs shall be a minimum of 1/4" and each of the power studs shall be circuit protected with a fuse of the specified amperage. One (1) power stud shall be capable of carrying up to a 40 amp battery direct load. One (1) power stud shall be capable of carrying up to a 15 amp ignition switched load. The two (2) power studs shall share one (1) 1/4" ground stud.

**GROUND LIGHTS**

Each door shall include a Whelen 3SC0CDCR LED NFPA compliant ground light mounted to the underside of the cab step below each door.

Each light shall include a polycarbonate lens, a housing which is vibration welded and a bulb which shall be shock mounted for extended life.

**GROUND LIGHT ACTIVATION**

The ground lights shall activate when the park brake is engaged.

**CAB STEP LIGHTING**

One (1) LED light shall be mounted to the riser of the middle cab step, a total of eight (8) step lights for the cab, in accordance with NFPA.

Each light shall include a polycarbonate lens and shall be contained in a housing which is vibration welded with a bulb which shall be shock mounted. Each step light shall not be any larger than 3" in diameter.

**STEP LIGHT ACTIVATION**

The step lighting shall be activated by opening any of the cab doors on the respective side.

**ENGINE COMPARTMENT LIGHTING**

Two (2) LED lights shall be mounted to the engine compartment in such a fashion as to provide as much light as possible to the engine compartment area. The engine compartment lighting shall activate with the tilting of the cab.

**INTERIOR OVERHEAD CAB LED LIGHTING**

Each cab door shall include a dual red and white LED lamp. There shall be one (1) light centered over each of the Driver and Officer’s seat and one centered over each crew door.

The clear lamp shall illuminate with the opening of each respective door with both the red and clear portions of the lamp activated by individual lighted switches on each lamp.

**DO NOT MOVE APPARATUS LIGHT**

The front headliner of the cab shall include a flashing red Whelen round LED light with a red lens clearly labeled "Do Not Move Apparatus".

The flashing red light shall be 3.00 inches in diameter and shall be located centered left to right for greatest visibility.

The light shall be interlocked for activation when either a cab door is not firmly closed or an apparatus compartment door is not closed, and the parking brake is released.

**BACK-UP ALARM**

An ECCO model 575 backup alarm shall be installed at the rear of the chassis with an output level of 107 dB. The alarm shall automatically activate when the transmission is placed in reverse.