

**Proposal-Acceptance**

**MSV Bus Style**

**Preliminary Pricing**

Hive 13 Proposal Date: August 14, 2013

2929 Spring Grove Ave Craig Smith

Cincinnati, OH 45225

One (1) MSV 2014 Thomas chassis ….……………....….**$230,000.00 to $250,000.00 estimate**

Approximate Production Time………210 to 240 days

**OPTIONAL ITEMS: (please indicate requested options with an “x”)**

* One-quarter graphics wrap package………………………………………………………………………..$6,522.00
* One-half graphics wrap package……………………………………………………………………….……..$8,800.00
* Full graphics wrap package…………………………………………………………………………..………..$10,078.00

**TOTAL…………………………………………………………………………………………………….$\_\_\_\_\_\_\_\_\_\_**

**TERMS AND CONDITIONS:**

1. Our detailed proposal does not include taxes, tags or fees.
2. Payment Terms: 20% upon award; 30% upon arrival of Chassis; Balance upon completion and acceptance
3. This proposal is valid for 30 days.

Customer Matthews Specialty Vehicles



Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Name: Dennis Hoag

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Title: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Title: Sales Director

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: August 14, 2013



**Bus Style**

**Series 4000**

**Mobile Classroom**

**BASIC VEHICLE DIMENSIONS**

Width: Interior 90"

 Exterior 96”

Height: Interior 78”

Exterior 11’ 4”

Length: Exterior 39’ 9”

Wheelbase: 231”

Turning Radius 34’ 9”

**CHASSIS SPECIFICATIONS**

**MANUFACTURER**

Thomas Built Bus

**TYPE**

Heavy-duty front engine, transit type shall be provided.

**AIR CLEANER**

Shall be heavy-duty replaceable type. Shall be mounted outside the passenger compartment with proper ducting to provide adequate engine aspiration. Location of the air intake shall be above the radiator for cleanest possible air. The air cleaner shall be readily accessible for servicing. The air cleaner shall include a progressive locking air restriction indicator. Donaldson replaceable single-stage air cleaner or equal.

**ALTERNATOR**

Shall be Leece Neville 12 volt of not less than 200 amps and provide at least 50% of the rated charge at engine idle. Mounting shall be heavy-duty 2-leg type as specified in SAE-J-80.

**AXLES**

Front: Detroit 13,200 lb capacity integral arm steer axle. Forged steel I-Beam type with greasable tie rod ends and 80" nominal track width. King pin size 1.794" diameter with sealed bushing and tapered roller thrust bearings. Turning angle shall be minimum 45 degrees to allow maximum maneuverability.

Rear: Detroit 23,000 lbs. capacity single reduction, spiral bevel gearing shall be provided.

**BATTERIES**

Provide two (2) 12-volt conventional, BCI Group 31 batteries with threaded stud terminals. Batteries will have minimum 760 cold cranking amps each at 0 degrees Fahrenheit; 200 minutes minimum reserve capacity at 80 degrees Fahrenheit. Separate battery for generator shall be provided.

**BRAKES**

Heavy-Duty Air Brakes: Service Brakes dual air brake system designed to meet all requirements of FMVSS-121 in effect at time of manufacture. Front chamber 24 sq in. Rear chamber 30 sq. in. S cam type. Automatic slack adjusters. Brake size front 16 ½”x 6" x ¾” Lining area- 410 sq. in. each. Brake size rear 16 ½” x 8 5/8” x ¾” Lining area- 590 sq. in. each. Total lining area 1,000 sq. in. Parking brake will be 30 sq. in. Spring type, combination rear service and parking brake. Activated by a dash mounted control valve. Parking brake will be 30 sq. in. Spring type, combination rear service and parking brake.

Anti-lock Braking System: Bendix 4-channel ABS with indicator light on dash. Front wheel speeds are sensed individually and the front brake, application pressure modulator is governed by the wheel approaching lock-up to minimize steering input. Rear wheel speeds are sensed individually and rear brake, application pressure modulation is governed by individual wheel speeds to maximize braking effort. The system is activated by the ignition switch and actuated by brake application. Every time the ignition switch is turned on, the system runs an automatic function check.

Air/Brake System: Dual airflow with a Wabco 18.7 CFM compressor. The air compressor will be gear driver and water-cooled. The air compressor inlet is from the engine intake manifold. The airlines consist of flexible tubing to meet the requirements of SAE standard J844 or J844 Type 38 where conditions do not exceed temperatures of 200ºF. The airlines are color-coded for easy identification as follows: Green = primary brake lines, Red = secondary brakes, Brown = parking brake, Yellow = compressor governor signal and Black = accessories. The air reservoirs include one (1) wet tank at 1500 cu. in. and two (2) dry tanks at 3000 cu. in. There are automatic air tank drains with heater. There is a spring set release with 30 sq. in. chambers and a dash mounted control valve.

Air Dryer: Bendix AD9 air dryer with heater. Desiccant air dryer removes moisture from brake system.

**COOLING SYSTEM**

Radiator 796 sq. in. core area radiator with betaweld construction, serpentine fins (3 rows with 16 FPI), 24 in. 10 blades nylon fan shall be provided. Electrically operated fan clutch shall be provided. The betaweld radiator core prevents “solder bloom” common to soldered cores and offers added durability of the core. The integral deaeration top tank and overflow bottle provides complete coolant deaeration recommended by engine manufacturer. This results in longer engine life.

**DRIVE LINE**

Spicer Life SPL size to be determined by engine transmission application. Guards for each driveshaft are included.

**ELECTRICAL SYSTEM**

12-volt negative ground with 150-amp circuit breaker with master disconnect shall be provided.

**ELECTRICAL CONTROLS & INSTRUMENTS**

*Dash Mounted*

* Directional signals indicator lamp
* Dual reading gauges – US Primary/Metric Secondary
* Engine coolant temperature gauge
* Fuel level gauge
* Headlight switch
* High/low beam indicator
* Ignition key operated engine shutoff
* Low air pressure warning light (air brake only)
* Oil pressure gauge
* Speedometer/odometer – 7 digit (including 10ths)
* Voltmeter
* 300 amp ammeter
* Transmission temperature gauge
* Momentary electric fast idle switch
* “Check Engine” engine fault code warning lamp
* “Engine Warning” fault code warning lamp
* High coolant temperature/low oil pressure warning buzzer and “EPS Stop Engine” warning lamp
* “Air Intake Heater” engine grid heater lamp

*Steering Column Mounted*

* + Self-canceling combination turn signal
	+ High beam switch
	+ Horn
	+ Four-way flasher

**ENGINE**

Cummins 260 Horsepower Engine

Model ISB-260

Displacement 409 Cu. In. (6.7L)

Rated Horsepower 260 HP (172 KW) at 2600

Governed Speed 2600

Rated Torque 620 lb-ft (705 NM) at 1600

Configuration 4-Cycle In-line 6 Un-sleeved with EGR

After Cooler Air to Air

Fuel Ultra Low Sulfur #2 Diesel

Crankcase Capacity 15 qt. (14.2 L)

Weight 1150 lb. (523 kg) with flywheel housing and air compressor

Idle Speed 800 RPM

Air Compressor Wabco 18.7 CFM

Alternator Drive Polyvee Belt

Starter Denso 3 KW gear reduction type

2013 E.P.A. /C.A.R.B. Certified

Fuel water separator with heater shall be provided

Cruise Control shall be provided.

Block Heater:

750 watt, 120 volt Kim single element immersion type, block heater with electrical cord with sealed male 3-prong plug for the block heater. The electrical cord provides electrical connection inside the engine compartment or receptacle.

**ENGINE COMPARTMENT**

Shall be a durable, lightweight fiberglass engine cover hinged for access to the engine. There shall be a separate access door located in the cover for access to all engine fluid fill and checks without opening the engine cover. The engine cover shall not exceed 6” from the body floor at the rear and shall not extend more than 36” from the dash to provide improved visibility and maximum aisle space. The engine cover shall provide a highly effective seal with thermal and acoustic insulation.

**EXHAUST SYSTEM**

Tailpipe terminates under bumper, left side rear. Exhaust system features an ATD (After Treatment Device) and Selective Catalytic Reduction (SCR) system:

* Self insulated
* One (1) differential pressure
* Two (2) temperature sensors
* Diesel Exhaust Fluid (DEF) tank

A mitigator is included to reduce exhaust temperatures. The exhaust system is constructed of 409 stainless steel, insulated or thermal wrapped from the turbo to the ATD. From the ATD to the tailpipe, it is aluminized steel.

A Selective Catalytic Reduction (SCR) system is installed after the ATD to achieve near-zero emissions without any compromise of fuel economy, reliability, or durability. The SCR system reduces Oxides of Nitrogen (NOx) and Particulate Matter (PM) into harmless nitrogen gas and water vapor. DEF consumption will be approximately 2% of fuel consumption. Vehicle will be equipped with a “low fluid” lamp which will indicate to the driver when the DEF level is getting low.

**FRAME**

Mainframe shall be 10” web with 3” flanges and 1/4” thickness, with minimum section modulus of 10.04 cu. in. Resisting bending moment shall be 501,500 in.-lb. minimum, with yield strength of 50,000 lbs. Heavy duty “C” channel cross members shall be used. Front and rear inner chassis bumpers shall be bolted to chassis frame rails for added front and rear protection and reinforcement.

**FUEL SYSTEM**

Shall meet FMVSS 301. Fuel fill is located on the right side of the unit. An unheated fuel/water separator shall be provided. There shall be nylon fuel lines in chassis with wire braid reinforced hoses from engine to chassis. Fuel lines will be color-coded orange for easy identification.

**FUEL TANK**

60-gallon fuel tank mounted between rails, equipped with a protective cage shall meet FMVSS 301.

13-gallon DEF tank will be mounted outside the passenger side frame rail.

**G.V.W.R.**

33,000 lbs.

**HORN**

Dual electric horn shall be provided.

**OIL FILTER**

Full flow spin-on oil filter shall be provided with replacement element.

**SHOCK ABSORBERS**

Front: Two (2) hydraulic direct-acting double action, 1-3/4” bore.

Rear: Two (2) hydraulic direct-acting double action, 1-3/4” bore.

**SPRINGS/SUSPENSION**

Front: 3-1/2” x 56” multi-leaf; rating 6,600 lbs.; 13,200 lb. Capacity.

Rear: 3” x 56” double slipper variable rate radius leaf; rating 23,000 lb. capacity.

**STEERING**

Power Ross TAS-65 integral steering gear with 20.42:1 ratio shall be provided. The steering includes a single adjustable drag link. The steering wheel is an 18” diameter soft-touch 2-spoke steering wheel with tilt/telescoping steering column. There is a 45-degree nominal turning angle with 11R22.5 tires. Polyethylene boot secured to the floor that surrounds the steering column to provide sealing between the floor and the steering column.

**TIRES**

Six (6) 11R22.5 14 ply radial tires shall be provided.

**TRANSMISSION**

Allison Series 2500 PTS 5-speed automatic transmission with transmission oil cooler, filter and illuminated cable actuated shift control. Transmission is electronically controlled with lockup in the top four (4) gears.

**WHEELS**

Steel disc type with one-piece size to fit tire shall be provided. Stainless steel wheel inserts to be provided.

**WIRING**

Color-coded and numbered wiring shall be provided. Wiring harness must be enclosed in protective convoluted conduit. All wiring and plumbing must be routed down center under side of chassis for ease of access. All lines and hoses in harness to be grommeted and securely fastened to chassis cross members.

**BODY SPECIFICATIONS**

**BATTERY MOUNTING**

Skirt-mounted battery box.14” high x 25” wide x 16” deep. Box includes non-roller bearing slide-out tray. Located behind the front axle, left side.

**BUMPER**

The front and rear bumpers shall be pressed deep concave steel, 3/16” thick x 9.75” high. The rear bumper shall be reinforced, wrapping around the back corners, extending at least 12”, fitting snugly to the body to prevent hand holds. Section modulus factor is .8080 cu. in. Front bumper included two (2) folding cowl steps.

**COLOR**

Solid white exterior polyurethane paint shall be provided.

**CONSTRUCTION**

The bus body shall be constructed of prime commercial quality steel or other material with strength at least equal to steel. The bus body shall be constructed to meet or exceed all state and federal school bus requirements in effect at the time of manufacture. Internal skeletal structure shall be welded. Screws, rivets or huck bolts are not acceptable.

Roof Bows: The roof bow, frame assembly shall consist of 14 gauge hat section bows extending from the bottom of skirting on one side to the other. Bow frames shall be continuous, one-piece, 14 gauge rolled channel hat sections 1-7/8” deep, mounted on 28-3/4” centers to provide a roll bar type protection.

Floor: The floor shall be constructed of 14-gauge Galvalume “c” channels forming an “I” beam cross member every 9 inches. These “I” beam cross members shall be equal to a 9-gauge thickness at the floor sill, shall extend the full width of the floor except in the wheelhouse area and shall be designed to not to trap moisture. All floor cross members shall be welded to 16 gauge steel floor channel bumpers, which extend the entire length of the body floor on each side. This floor bumper shall also serve as the interior seat rail, to be used for mounting seats. This floor bumper shall be welded at each point of intersection with the body bows. There shall be a 2-1/4” x 2-1/4” tubing reinforcement added to the front and rear of the wheelhouse area. Reinforcements in these areas increase the durability and longevity of the bus body. The steel floor shall be covered with 5/8” thick plywood.

Frame: Body frames shall be 1-piece 14-gauge hat sections, 1-7/8” deep and extend below the skirt bottom on both sides of the vehicle. All frame structure to be welded to form an integral unit.

Panels - Exterior: *Horizontal* smooth 16 gauge steel side sheets shall be provided. Interior: 22 gauge smooth steel panels shall be provided. *No exceptions.*

Roof: The roof panels shall be double-lapped, 20-gauge, zinc coated steel, riveted to each flange of the body bow frame. The roof sheets shall be one-piece design placed laterally from side to side. All roof sheets shall be sealed to prevent leaks. The roof shall be reinforced with two 16-gauge roof crash rails applied internally, welded to the roof bows, to provide an extra measure of strength in the overhead areas. Exterior panels shall be primed both sides before assembly for rust prevention.

**COWL STEPS**

Two (2) heavy duty-folding steps located on the front bumper. One-inch protection closed, four inch in open position. Slotted tread in 2-1/8” x 4-3/8” step base for sure foot.

**DASHBOARD**

Dashboard shall be angled for maximum visibility.

**DOORS**

Front: Manually operated outward opening, aluminum sedan door, located at the right side center. Door size is 30 5/16” wide with a clear opening of 29 3/8” wide. Door includes stationary glass mounted in the upper section of the door: laminated, tinted to 70% light transmission, 28.95” wide x 41.61” high. Tinted stationary glass mounted in the lower section of the door.

Door to be equipped with Parker or equal door closer. Paddle Slam type latches and lock to be provided with an additional built-in deadbolt lock (Add-on additional residential deadbolt locks are not acceptable). Stainless steel grab handles to be provided on the interior and exterior of the door. Doors to be keyed alike.

Rear: Manually operated outward opening, aluminum sedan door, located at the right side rear. Door size is 30 5/16” wide with a clear opening of 29 3/8” wide. Door includes stationary glass mounted in the upper section of the door: laminated, tinted to 70% light transmission, 28.95” wide x 41.61” high. Tinted stationary glass mounted in the lower section of the door.

**DRIP MOLDING**

Formed in roof panels the entire length of vehicle. Drip rail located over driver’s window and entrance door(s).

**ELECTRICAL**

Access: Main body wiring harness shall be fully accessible via removable raceways, removable shelves and access panels on driver’s side of vehicle.

The wiring harness shall be protected by automatic reset circuit breakers.

Wiring shall be color-coded, numbered and flame retardant.

The main vehicle electrical junction box shall be located below the driver’s window. A wiring diagram shall be attached to the backside of the electrical access door.

Maintenance Manual: Detailed electrical trouble-shooting owner/operator, maintenance manual to be provided.

**ENGINE COMPARTMENT**

Shall include a durable, lightweight fiberglass interior engine cover, bolted in place to prohibit heat and noise intrusion to the interior of the bus. There shall be a separate access door located in the cover for access to all engine fluid fill and checks without opening the main cover. The engine cover shall be sealed with thermal and acoustic insulation. The top of the engine cover shall include a step tread for durability.

Removable engine console with seat for additional seating in the canteen area.

**FUEL TANK OPENING**

Exterior fuel tank opening shall have spring-loaded door with lock. Interior access plate shall be readily available for servicing.

**GRILLE**

Stamped metal openings to provide adequate airflow to engine cooling systems. Grille will be easily removable with no tools.

**HEATER & DEFROSTERS: FRONT**

Minimum 91,000 high-pressure coil-type center front heater with defroster and booster pump. Booster pump located beneath the driver’s island.

**INSULATION**

Ceiling, sides and rear panels shall be insulated with a minimum 2" thick blanket-type, thermal-bonded polyester fiber insulation to properly deaden sound, reduce vibration, and provide a thermal barrier. Insulation R-value is six (nominal). The insulation shall be fire-resistant of type approved by Underwriters Laboratories, Inc. The floor is covered with ½” pebble grain “slip resistant” surface, sound abatement material with open cell de-coupler. ½” thick sound abatement material attached to the driver’s platform running from left side interior wall to the left side of engine cover and from the interior front panel to the rear of driver’s platform. ¼” sound abatement material is attached to the steering column. The material is 9 ½” high from the left interior wall over to the accelerator where it increases in height to 14”.

**LIGHTS/EXTERIOR**

* Headlights: Dual seal beam halogen and LED daytime running lights
* LED Front & Rear Directional: Four (4) LED amber directional lights: two (2) 7" round front and two (2) 5 ¼" x 8 ¼" rectangular rear, surface mounted, sealed type lights with a universal-type sealed connector plug.
* LED Clearance/Marker Lights with protective aluminum guards. This includes intermediate side marker lights. Two (2) front corners; two (2) rear corners; two (2) midship side roof.
* LED Back-up Lights: Two (2) LED surface-mounted, sealed-type, 5 ¼" x 8 ¼" rectangular white rear back-up lights with universal-type sealed connector plug.
* LED Stop/Tail Lights:
	+ - * Two (2) flush-mounted, 5 ¼" x 8 ¼" rectangular red LED stop/tail lights
			* Three (3) LED lamp assemblies with horizontal orientation
			* Two (2) license plate lights, one (1) each side
			* Universal-type sealed connector plug

All lights must comply with FMVSS 108.

**MIRRORS**

Interior: 6” x 30” safety glass with rubber edges.

Exterior: Heated remote-controlled transit mirrors. Mirror heads are made of ABS plastic. Flat mirror size is 7” x 9.75”. Convex mirror size is 6” x 3.75”. Total head size is 8” x 15”. Mounting arms and bases are cast aluminum, painted black. Both upper flat and lower convex mirrors can be controlled independently.

**MUD FLAPS**

Rubber mud flaps front and rear shall be provided.

**RUBBER FENDERETTES**

Front and rear, 16 gauge metal fenderettes extend 1 ½” away from body side sheet. They are continuous from bottom skirt to bottom of skirt

**RUST PROOFING**

All panels to be primed on both sides after fabrication and prior to assembly for rust protection and paint adhesion.

**SEATING**

Driver’s seat with adjustable high back. Meets FMVSS 202 requirements for head restraints. Meets FMVSS 207 for seating systems. Also meets FMVSS requirements for head impact (will work in combination with any barrier height).

**STEPWELL**

Front Stepwell shall consist of three (3) steps covered with non-skid rubber treads with white nosing bonded to 22-gauge steel backing and applied to steps. Height and depth of risers to be 9-1/4” each. 12-volt lighting to be provided.

Rear Stepwell shall consist of three (3) steps covered with non-skid rubber treads with white nosing bonded to 22-gauge steel backing and applied to steps. Height and depth of risers to be 9-1/4” each 12-volt lighting to be provided.

**AUXILIARY STEP (ELECTRIC)**

Install a electrical operated auxiliary step will be installed on the rear entrance door.

**STORAGE COMPARTMENTS** Exterior: Storage compartments with door and locks. Will have storage for generator, batteries and shoreline. One additional storage compartments will be installed.

**SUNVISORS**

6” x 30” plastic sun visor with finished edge mounted to windshield header shall be provided for the driver.

**SWITCH PANEL**

Mounted to the left of the driver with switches for body electrical equipment, the control panel shall be indirectly illuminated by the headlight switch rheostat.

**TOW HOOKS**

Two (2) tow eyes/hooks shall be provided at the front of the vehicle, and two (2) tow eyes/hooks shall be provided at the rear of the vehicle.

**UNDERCOATING**

Floor, skirts and wheelhouses shall be undercoated with asphalt emulsion water-based material or equal.

**WINDOWS**

Driver’s Area: double sliding aluminum sash with latch. Tempered glass.

**WINDSHIELD**

4-piece flat tinted glass shall be set in rubber. Each front glass shall be a minimum of 42” wide x 40” high. The windshield shall be designed for maximum driver visibility in all directions. Windshield shall be as low as possible to allow maximum downward view in front of vehicle. The total daylight opening of the windshield shall be 3,462 sq. in. minimum. Tinted safety plate with laminated glass. Two (2) stainless steel assist handles: one (1) mounted over the center of the right side glass and one (1) mounted over center of the left side glass. Two (2) folding steps mounted on the front bumper. Windshield complies with FMVSS 205. Pull down windshield shades will be installed.

**WINDOW COVERINGS**

Window shades shall be installed on all windows and to be Phifer SheerWeave style 4000, 4100 or 4400. Color to be chosen by customer.

**WINDSHIELD WASHER**

Electric-operated with wiper arm, spray reservoir windshield washer shall be provided. Capacity shall be one (1) gallon. Bottle located in the front area behind left side hinged access panel.

**WINDSHIELD WIPERS**

Two (2) bottom-mounted electrically operated with parallelogram type arms with variable speed and intermittent feature. Wiper blades are approximately 24” long and arms are approximately 28” long. Access to wiper motors to be provided through hinged exterior access panels.

**CONVERSION PACKAGE**

**AUDIO/VIDEO EQUIPMENT**

Radio:

Install an AM/FM/CD with six (6) interior speakers.

**CEILING**

20 ga. Embossed steel headliner painted white.

**ELECTRICAL SYSTEM**

AC Electrical System:

Shall be a 120/240 VAC system rated for anticipated conversion load. System shall include a 125A rated distribution panel configured with UL listed type magnetic/hydraulic circuit breakers with LED indicators to show activation. Circuit breakers shall be sized per component manufacturer’s recommendation or to 125% of anticipated load.

System shall be wired using EPM 12 gauge, 3-conductor (12/3), 600V rated, UL approved, multi-stranded boat cable. All wiring shall be color-coded: black = hot, white = neutral and green = ground. Additionally, wiring shall be labeled with machine-generated, self-laminating labels, listing circuit number and/or designation at all termination points. All wiring shall adhere to applicable NEC and FMVSS regulations.

Wiring shall be supported on 12” centers with insulated, non-conductive clamps. Wire bundles shall be tied with trimmed nylon ties. Extreme care shall be taken to prevent chafing, abrasion, and exposure to high heat. Wiring run n external areas shall be encased and liquid tight conduit to further protect against damage.

One (1) exterior GFCI outlet in weatherproof covers shall be located on the vehicle.

Minimum of nine (9) interior 120VAC outlets shall be installed.

**DC Electrical System:**

Shall be a 12VDC, negative ground system rated for anticipated conversion load. System shall include distribution panel(s) using Type 1 automatic reset circuit breakers unless connected component manufacturers specifications require other. All added circuits shall be protected from over current by circuit breakers rated for a minimum of 125% of anticipated load. Circuit breaker functions shall be clearly designated by printed labels. Wiring shall be labeled with machine-generated, self-laminating labels, listing circuit number and/or designation at all termination points.

Auxiliary battery system shall include one (1) Interstate Group 31 and one (1) group 24 deep-cycle batteries specifically for the generators mounted in an exterior compartment (or suitable alternative) and one (1) 65-amp Battery conditioner/charger wired to the generator and/or shore cord. Battery charger must be fully regulated to prevent battery overcharging.

Jump switch/charging system shall include provisions for automatic and manual battery bank merging to provide redundant battery power for vehicle and generator starting. System shall provide battery isolation during operation periods when the vehicle engine is not running to prevent depletion of both battery systems.

**Wiring Requirements:**

All high-current battery cabling shall utilize full-length cable runs sized to load; splices are not acceptable. Terminal ends shall be crimped with manufacturer recommended tooling and sealed using color-coded wrap.

All added wiring for 12VDC load runs shall be AWG 8, 10, 12 and 14, and conform to MIL-W-1678D type D. Wire terminals used shall conform to MIL-T-7928. Terminals shall be insulated with insulation grip, Type II, Class 2, and crimped with tolling recommended by manufacturer.

All added wiring shall be supported on 12” centers and bundles shall be tied with trimmed nylon ties. Entire system shall be installed to modern US automotive standards using best practices available at time of installation. Plastic grommets and/or dielectric sealants shall be used to protect wiring and/or looms where they pass through sheet metal, bulkheads or structural supports. Convoluted polyethylene tubing shall be used to protect against chafing and abrasion where required. Extreme care shall be exercised to provide for easy serviceability of the system in future years. Extreme care shall be taken to avoid the engine manifold, engine exhaust, muffler or any high-heat items that may subject the wiring to severe overheating during long periods of operation. These shall be the minimum acceptable wiring standards.

**ELECTRICAL SHORELINE CONTROLS**

Heavy-duty rubber covered 120/240-volt shoreline cord to be provided, 25' length. Transfer switch to prevent simultaneous use of generators and shoreline cord will be located in interior front electrical panel.

**FLOORPLAN**

Custom floorplan designed and engineered using Computer Aided Drafting (CAD) technology. Floorplan will be provided on Size B paper and designed in 3/8” scale. (D size ½” scale also available). Vendor must include samples of these drawings showing their capability to meet these requirements.

**FLOOR COVERING**

Commercial-grade vinyl or PVC floor covering will be installed. Customer to choose color from manufacturer’s selections after award of bid.

**GENERATOR**

One (1) 20 KW Cummins-Atlantic Quiet Diesel generator. Generators are enclosed in their own sound proof compartment. Generator fuel line will be tied into the existing chassis fuel tank. This fuel line will be installed approximately ¼ off the bottom of the fuel tank. This is to assure the chassis fuel tank cannot be run out of fuel totally.

The generator shall be mounted beneath the vehicle utilizing a “slide-out” mounting frame system with a front access door set. General generator installation shall be in full accordance with manufacturer’s recommendations including any air flow restrictions associated with the installation method.

**GENERATOR COMPARTMENT**

Compartment will be designed and built to accommodate the required generator. The generator compartment shall not intrude above the body floor, and will be located left and right side under floor. The compartment will be securely tied into body framework to avoid damage to the compartment and the equipment by road vibration and road surface faults. Generator shall have double swing-out doors for ease of access. The doors will have ventilation panels installed as required to move air over and around the generator, away from air inlets, and meeting manufacturer’s requirements. The compartment and doors shall be dimensioned to provide adequate access to the gen-set compartments for servicing and ventilation. All Generator exhausts to exit driver’s side. The generator compartment must be insulated to maximum possible for elimination of heat, noise and fumes to the coach area through walls and/or flooring without interfering with necessary airflow. Insulation of foil type will surround all possible areas of the generator compartment. The door latch will be a heavy-duty Trimark door latch with positive acting latches located at both the top and the bottom of the door to ensure a positive seal.

**GENERATOR CONTROLS**

Generator start, water and oil meter, stop preheat switch and hour meter shall be located in the front interior of vehicle.

**HVAC**

Air Conditioning:

Four (4) 14,800 BTU (each) with 5600 BTU heat strips roof mounted air conditioners 110 volt will be installed. Roof sections to be reinforced where air conditioners are mounted.

Heating:

Three (3) 1500 watt heaters with internal thermostats mounted according to final floorplan.

**LEVELING SYSTEM**

One (1) Quadra heavy-duty fully automatic one-touch leveling system. The system shall use 26”

two-way straight acting jacks. Individual power units are attached to each individual jack.

**LIGHTING**

Interior – 12-volt dome light mounted on the ceiling full length of vehicle. Including driver's dome light with separate switch.

110-volt double tube fluorescent light fixtures installed the full length of both sides. Cabinets and interior design could alter the amount or location of lights.

Two (2) 12-volt entries and exit mounted scene lights mounted next to entry/exit doors.

**PAINT AND GRAPHICS**

Vehicle comes with factory color base white. Vendor will supply sample graphic packages showing basic graphics to a full vinyl wrap package. Graphics must be 3M™ Scotchprint™ and installed by a 3M™ Scotchprint™ Graphics Certified installer. Installer must be a member of the United Application Standards Group (UASG). When you choose 3M's matched component products to produce Scotchprint® Graphics, you'll know that every component has been designed, developed, tested and manufactured for superior performance and total compatibility. The result is a range of perfectly balanced products that print, cut and apply consistently. With 3M matched component products you can create graphics that meet your needs, from short-term promotional to long-term durable applications. Vehicle will be painted in a based color of white. Customer to choose graphics package from option list. The final graphics design package to be determined after award of bid.

**SAFETY/SECURITY**

Backing Camera & Monitor:

One (1) AudioVox Back-up camera with monitor will be installed.

Fire Extinguisher:

One (1) 5 lb. fire extinguisher shall be provided.

First Aid Kit:

One (1) First Aid Kit shall be provided.

Triangle Flares:

One (1) set of Triangle Flares shall be provided.

Back-up Alarm:

The bus shall be equipped with an automatic back-up alarm installed behind the rear axle. This audible alarm shall be rated at 112 dba in accordance with SAE-J-994b.

Carbon Monoxide Detector:

One (1) Carbon Monoxide detector to be included.

Smoke Detector:

One (1) Carbon Monoxide detector to be included.

**WALLS**

Install pre-laminated panels to the walls. Seams will be trimmed with white "T" Molding. All seams should be evenly spaced (1/8") and screws along the seams should be covered by the "T" molding. Color to be determined by customer after award of bid.

**WIRE CHASE**

Removable laminate wire chases will be installed according to final floorplan to allow customer to access all wiring and communication cables for future expansion or trouble shooting.

**WOODWORKING - CONSTRUCTION**

All cabinets to be made of 3/4" Cabinet grade Luan plywood covered with high-impact laminate. Heavy-duty PVC edge banding on all counter tops and upright dividing panels. Edge banding may be color coordinated to match customer’s countertop selection (Owner will select colors after award of bid) Cabinet construction will be flush style European type, with Fultered heavy-duty, 150 lb., 20” full extending drawer slides and Southco #C233313 flush mounted latches. Cabinets will be constructed as per customer’s final floorplan. All cabinets and drawers to be laminated on both interior and exterior to enable sanitary cleaning.

Interior woodworking and cabinetry shall be constructed from pre-engineered components produced by a CNC router, with accuracy to design of +/-.0001”. Component design files shall be kept by the vendor for a minimum of 15 years to allow for identical field replacement should such become necessary. All cabinet components shall be identified with a UPC bar code and written description to additionally facilitate this requirement.

All exposed edges shall have a 3mm, hardened PVC edgeband applied to ensure durability and superior aesthetical qualities. Banding shall be applied using AD-20, EVA Ethylene – Vinylacetate based adhesive and using only machinery.

Cabinetry and storage will be constructed according to approved custom designed customer floorplan.