



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

## **MSV SERIES 4000-102 CUSTOM COACH SPECIFICATIONS**

### **BASIC VEHICLE DIMENSIONS**

Width:	Interior	96"
	Exterior	102"
Height:	Interior	83.5"
	Exterior	12' 8"
Length:	Exterior	37'
Wheelbase:		193"

### **CHASSIS SPECIFICATIONS**

#### **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: 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: 19,000 lb. 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



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

minutes minimum reserve capacity at 80 degrees Fahrenheit. Separate battery for generator shall be provided.

## **BRAKES**

**Air Brakes System:** 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 adjuster (Meritor). Brake size front 16 ½" x 5" x 7/8" Lining area- 314 sq. in. each. Brake size rear 16 ½" x 7 7/8" Lining area- 440 sq. in. each. Total lining area 754 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 driven 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 200°F. 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. Dual airflow with a Bendix Tu-Flo 550 13.2 CFM air compressor.

## **COOLING SYSTEM**

Radiator 796 sq. in. core area radiator with beta weld 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 beta weld radiator core prevents "solder bloom" common to soldered cores and offers added durability of the core. The integral deaeration top tank and overflow bottle



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

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 digits (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



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

- 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



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

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. A heated 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.



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

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

32,200 lb. chassis shall be provided. As final stage manufacturer chassis will be down-rated to less than 26,000 lbs. if the final layout and design meets the requirements. Vendor shall provide estimated weight calculations during pre-construction process.

### **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: Freightliner "Airliner" rear air suspension; rating 20,000 lb. Capacity.

- Two air springs
- Two parabolic leaf spring trailing arms with rubber bushings
- Two heavy duty shock absorbers
- Single load sensitive height control valve to maintain constant frame height

### **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) 12R22.5 16 ply radial tires shall be provided.

### **TRANSMISSION**



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

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**

Aluminum disc wheels.

## **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 crossmembers.

## **BODY SPECIFICATIONS**

The Vendor must be able to perform the following at a minimum:

- Custom built body that meets the body builder's manual.
- Custom built cabinetry all wood products must be completely Formaldehyde-Free, non-toxic, LEED and CARB compliant. A copy of the OSHA 8-h, PEL for Workplace from an independent testing agency proving compliance must be provided with the bid.
- Electrical department with certified electricians on staff
- Metal fabrication department with certified welders on staff.
- Upholstery department
- All workmanship, welding, and construction shall be in the best manner of the trade. Workmanship shall be subject to inspection and approval by the customer.

## **BATTERY MOUNTING**

Skirt-mounted battery box. This compartment will incorporate chassis, house, and generator batteries. Box includes an all-aluminum roller bearing slide-out tray. Battery tray will have the capability of latching when extended and retracted. The tray will include a full width pull handle with an integrated latch NO EXCEPTIONS. Box must be back vented to allow off-gassing of batteries. Batteries will be secured in the box using an adjustable aluminum angled bracket.

## **BUMPERS**

Front: The front bumper is an integral part of the front fiberglass cap and reinforced with 2" x 2" steel tubing and ¼" x 4" plate steel connected directly to the frame rails. (NO EXCEPTIONS).

Rear: The rear bumper is 2" x 6" x .25" thick steel tubing as an integrated part of the fiberglass cap. The bumper will be mounted directly to the frame rails and painted to match the body.



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

## CONSTRUCTION

MSV custom fiberglass and aluminum body; body framework will be a welded aluminum design. Sidewall horizontal and vertical structure will be 2" x 2" x .125" aluminum tubing. All horizontal and vertical structures to be welded top and bottom. All vertical tubing will be spaced on 16" centers. Insulation will be 2" Expanded Polystyrene (EPS). Interior sub wall to be a water/moisture resistant composite panel or approved equal (finished wall will be added). The exterior will be sheeted with .125" fiberglass gel-coating skin. Exterior panel's smooth fiberglass will go through a lamination process. Lower skirt panels will be constructed of .063" aluminum sheeting with a low-profile rub rail between the upper body panel and lower skirt panel.

The roof will be constructed of 2" x 2" x .125" aluminum tubing on 16" centers with a truss system forming a contour exterior. Insulation will be 3" Expanded Polystyrene (EPS). Interior sub wall to be a water/moisture resistant composite panel or approved equal (finished wall will be added). The exterior will be .063" aluminum sheeting. The frame, aluminum sheeting will go through a lamination process.

The floor will be constructed of 2" x 4" x .25" aluminum tubing on the perimeter with 2" x 2" interior aluminum tube framing. Insulation will be 2" Expanded Polystyrene (EPS). .040" aluminum sheeting will be installed on both the underside and interior floor structure. Composite-grade sub-floor will be installed.

### Mounting:

Seven (7) 0.25" tubular steel trusses will be used. The body's longitudinal substructure shall be bolted to the chassis with high density vibration resistant plastic between truss and body. Locations shall be determined by final design weight of the body structure, the weight ratings of the mounts and the chassis manufacturer's recommendations found in his body builder's manual.

### Cap:

The front of the vehicle shall have a custom fiberglass cap. Cap will be specifically constructed to match the contours on the chassis to form a continuous aerodynamic structure. "Box Trucks" and/or fiberglass pieces, wind dams or fairings not specifically designed to fit the chassis are not acceptable.



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

#### Lighting:

All lights must comply with FMVSS 108. All exterior lighting will be D.O.T. approved.

#### **DASHBOARD**

Dashboard shall be angled for maximum visibility.

#### **DOORS**

Driver doors to be approximately 32.5" wide x 70.5" high, forward stainless-steel full-length piano hinge, outward opening sedan door. Doors include split sash glass mounted in the upper section of the door: laminated, tinted to 70% light transmission, 23.75" wide x 34.5" high. Steps to be custom recessed into side body custom designed for this chassis/body combination. A 36" vertical, one-piece grab rail will be installed on the exterior of the body to access in entering the vehicle. A diagonally placed, one-piece grab rail will be installed on the interior of the door to assist with entry and egress of vehicle.

Front entrance door to be approximately 33" wide x 91" high outward opening type door. Door includes split sash glass mounted in the upper section of the door: laminated, tinted to 70% light transmission, 26.25" wide x 32.5" high. Tinted solid stationary glass mounted in the lower section of the door, 26.25" wide x 32.5" high, this is safety feature to be able to view patrons and roadside curb. Included will be a two-step stepwell with riser height is 9.5" tread depth is 10". A heavy-duty dual electric auxiliary step will be installed.

Center door to be approximately 32" wide x 80" high, forward stainless-steel full-length piano hinge, outward opening sedan door. The door includes tinted solid stationary glass mounted in the upper and lower section of the door. The center entrance door shall have exterior fold down steps with gas shocks to assist in fold out and fold up of the steps. An exterior fold out handrail shall be installed, handrail shall provide entry and egress assistance to patrons. A diagonally placed, one-piece grab rail will be installed on the interior of the door to assist with entry and egress of vehicle. This design provides a flat floor and eliminates the hazard of an interior step-well. The fold down steps shall be stowed in an underbelly storage compartment with adequate structural reinforcement to support the weight of occupants entering and exiting the vehicle. (NO EXCEPTIONS)

All doors to be equipped with pneumatic door closers. The pneumatic closer will assist in closing the door as well as hold the door open at a 90-degree angle. All doors shall feature a heavy-duty Trimark positive acting latch utilizing a threaded rod and dual nader-style pins, with a continuous tubular neoprene gasket to ensure a positive seal and prevent leaks. Doors will



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

consist of extruded aluminum frame with smooth exterior sheeting and interior removable aluminum access panel for door latch lubrication and adjustment. (NO EXCEPTIONS) All doors will include LED stepwell lights.

## **ELECTRICAL**

Access: Main body wiring harness shall be fully accessible via removable raceways. The wiring harness shall be protected by automatic reset circuit breakers.

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

All wires passing through metal openings are protected by a grommet. All wiring is color coded and numbered.

## **FUEL TANK OPENING**

Exterior fuel tank opening shall have cast products door with lock. The interior access plate shall be readily available for servicing.

## **HEATER & DEFROSTERS: FRONT**

35,000 BTU heat/defrost/air conditioner.

## **LIGHTS/EXTERIOR**

- (2) Headlight, 90mm, H9 low beam projection lamp
- (2) Headlight, 90mm, H9 high beam projection lamp
- (2) Backup, 12" white, clear lens, 12SMD
- (4) Brake light, S/T/I, Red, 18", 18SMD
- (8) Marker/Clearance Lights, PC2, 3/4" Amber, 1SMD
- (9) Marker/Clearance Lights, PC2, 3/4" Red, 1SMD
- (5) Marker/Clearance Lights, Teardrop, Amber, 14SMD
- (2) Marker Lights, 2" Round, 9 Diode, Amber, clear lens
- Two (2) license plate lights
- Universal-type sealed connector plug

All lights must comply with FMVSS 108

## **MIRRORS**

(2) Cast aluminum mirrors with ABS mirror body. Mirrors shall include integrated sideview camera.



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
[www.MSVehicles.com](http://www.MSVehicles.com)

Mirror head shall feature independently adjustable flat and convex glass (108 sq. in. flat glass, 35 sq. in. convex glass).

## **SEATING**

Driver shall be deluxe adjustable high back, armrest and includes 6-position adjustment, or approved equal. Tilt adjustment control is mounted on the right side of the driver's seat. Seat cushion has four (4) position adjustments, forward and aft adjustment by fingertip control. Seats shall feature integrated shoulder belt.

Passenger Freedman Flip-Seat will be installed just aft of the front stepwell.

## **STORAGE COMPARTMENTS**

Compartments to be installed for storage of generator, batteries, and shoreline. Two additional exterior compartments will be installed based on available space and final design.

One curbside compartment will include an Electric cooler on slide out tray.

These compartments will be securely tied into body framework to avoid damage to the compartments and the equipment by road vibration and road surface faults. The latches will be locking Tri-Mark latches, keyed alike. All doors shall feature a heavy-duty Tri-Mark positive acting latch utilizing a threaded rod and dual nader-style pins, with a continuous tubular neoprene gasket to ensure a positive seal and prevent leaks. Doors will consist of extruded aluminum frame with smooth exterior sheeting and interior removable aluminum access panel for door latch lubrication and adjustment. Compartments will be sweep out design with ventilation. All doors include stainless steel full length piano hinges. All doors to be equipped with wind straps. LED compartment lights will be included. All storage compartments will include Spray liner coating.

## **WHEEL WELL MOLDING**

Exterior wheel well splash moldings shall be furnished at the axles and shall be pre-molded and contoured to conform to the wheel well cutouts.

## **WINDSHIELD**

One-piece curved tinted glass windshield. The windshield shall be designed for maximum driver visibility in all directions. Windshield to be 5,500 sq. in or 98.75" x 48" tinted laminated safety glass.

Windshield will include shades for the front windshield.



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

Two (2) 12V fans shall be installed as defrost fans, and a control switch shall be in the driver's area.

### **WINDSHIELD WASHER**

Electric-operated wiper arm spray reservoir windshield washer shall be provided. Capacity shall be one (1) gallon.

### **WINDSHIELD WIPERS**

Wexco single motor, dual arm system. Two (2) bottom-mounted electrically operated with parallelogram type arms with variable speed and intermittent feature. Arm length 24", Blade length 31.5"

### **CONVERSION PACKAGE**

#### **AUDIO/VIDEO/COMMUNICATION**

Customer Supplied Radios

- One (1) 20" antenna raceway installed on roof of vehicle.
- Install two (2) customer supplied radios in vehicle.

One (1) Winegard Omni-directional Local TV Access Antenna

One (1) Winegard Stationary Satellite TV Antenna System

- One (1) DirecTV H24 HD Satellite Receiver-Commercial

Matrix Switcher

- One (1) Matrix Switcher, Flich-Free Modular Matrix Switcher. Number of Inputs and Outputs will be determined during the pre-construction meeting.

Exterior Cameras

- REI HD5 500GB DVR w/ 4 HD cameras

One (1) 19" rack mount shall be installed, final design to be determined during the pre-construction meeting. Custom shelves, with fan and mounting plates shall be provided. Wiring for equipment in this rack shall be of sufficient length for easy mobility of the rack system.

CAT 6 Networking:

Five (5) CAT6 outlets shall be installed, locations reflected in approved CAD drawings.

- 6 port rack mount patch panel.

Wi-Fi:

- Cradlepoint R1900 (dual) 5G Wi-Fi package



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

Monitors: (All monitors will be networked with HDMI cabling)

One (1) 60" Samsung (or approved equal) flat-screen LCD TV shall be installed in exterior curb-side compartment with soundbar. Compartment doors will include dry erase marker board.

One (1) 40" Samsung (or approved equal) flat-screen LCD TVs installed in the private meeting room.

Four (4) 32" Samsung (or approved equal) flat-screen LCD TVs installed. Two (2) at the front workstations and two(2) in the rear conference room.

One (1) 65 Dell Pro 65 Plus 4K Touch Monitor - P6524QT

#### General

- Product Type LED-backlit LCD flat panel display
- Power Consumption Operational 370 Watt
- Power Consumption (On mode) 101 W
- Diagonal Class 65"
- Diagonal Size 64.53"
- Commercial Use Yes - interactive
- Combined With Touchscreen (multi touch)
- Video Interface HDMI
- HDMI Ports Qty 3 ports
- PC Interface DisplayPort, USB, USB-C
- Picture Enhancements 72% Color Gamut NTSC
- Dimensions
  - o Width 59.8 in
  - o Depth 3.1 in
  - o Height 35.2 in
  - o Weight 99.65 lbs.

#### Display

- LCD Display Technology IPS
- Pixel Pitch 0.372 mm
- Color Support 1070000000 colors
- Resolution 3840 x 2160
- Display Format 4K UHD (2160p)
- Image Aspect Ratio 16:9
- Frame Rate & Enhancement Technology 60 Hz Refresh Rate
- LCD Backlight Technology LED backlight
- Coating Anti-glare, 7H Hard



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

- Image Contrast Ratio 1300:1
- Dynamic Contrast Ratio 1300:1
- Brightness 350 cd/m<sup>2</sup>
- Viewing Angle 178°
- Viewing Angle (Vertical) 178°
- Touchpoints Qty 20
- Response Time 9 ms
- Additional Features Security lock slot (cable lock sold separately), built-in USB hub

#### Media Player

- USB Port Yes
- USB Ports Qty 8

#### Audio System

- Speaker System 2 speakers
- Output Power / Total 40 Watt
- Speakers 2 - 20 Watt

#### Connections

##### Connector Type:

- USB-C 3.0
- 3 x USB 3.1 upstream
- 4 x USB 3.1 downstream
- DisplayPort
- 3 x HDMI
- Audio line-out
- RJ45 for remote management
- RS-232

#### **AWNING**

One (1) Powered electric Awning will be installed according to final floor plan. Customer to choose color from manufacturer's selections after award of bid.

#### **CABINERY - CONSTRUCTION**

##### **All Aluminum Cabinets for Mobile Applications**

Cabinets will be constructed of 100% aluminum sheet and extrusions and will be specifically designed for installation for mobile applications. Antibacterial laminate counter tops will be installed. Drawers will be all aluminum construction and be fully integrated into the cabinet with no visible frame or surrounding box.



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

Drawers will feature full width extruded pull handles and integrated self-latching mechanisms, and most unlock and open using one hand at any location on the pull handle width. Cabinets and drawers will meet or exceed the specifications listed below.

## **MATERIALS**

### Aluminum Sheet

- All aluminum sheet metal to be new 5052 – H32 alloy

### Aluminum Extrusion

- All aluminum extrusions are to be prime billet 6063-T5 or T6 alloy architectural surface quality. Principle walls to be no less than .090" thick

### Fasteners

- All fasteners are zinc plated, stainless steel, or aluminum. All nuts are Nyloc / Spin Lock self-locking
- Rivets of any type are not to be used

### Hardware Components

- Latches are cast zinc with polyester powder coat finish
- Hinges are continuous extruded all aluminum
- Shelf Brackets are zinc-plated steel – only brackets that allow self-mating in the same mounting slot allowing back-to-back shelf locations are permitted
- Countertops are industrial grade – Aluminum or Stainless Steel
- Drawer latches are solid molded glass reinforced Nylon
- Drawer slides are all steel, double carriage ball bearing full extension slides capable of withstanding 234 lbs. loading per drawer. Slides will disconnect allowing drawer removal
- Door back bonding tape adhesive is VHB structural tape

### Finishes

- All sheet components are coated with baked on polyester powder coat, only after forming and fabrication.
- Extrusions to receive 204-R1 Class 2 Architectural clear anodized finish.

### Fabrication

- Frames
  - Frames are fabricated from .090 wall extrusions with square cut and coped ends to conceal cut aluminum edges. Miter/folded joints are not to be used. Joints are secured with self-locking nut and fasteners must be self-locking.



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
[www.MSVehicles.com](http://www.MSVehicles.com)

- Door hinges are secured to frame with self-locking nut and bolt hardware owner can re-alignable and replaceable without drilling or fabrication work
- Frames are pre-punched with all required assembly and mounting slotted holes. No field drilling or cutting shall be required to facilitate cabinet assembly.

#### Doors

- All sheet components are CNC punched from new sheet material
- Doors are formed to a 1" thickness from a single sheet of aluminum. Doors with cut frames around perimeter are not permitted. Materials are .063" thick at overhead and wall cabinets, and .080" thick at base and closet cabinets. (Door may be fabricated of thicker materials as size dictates.) Doors to be square and flat to 1/16" tolerance.
- All doors to have .040" prefinished aluminum sheet back continuously bonded to face sheet with VHB structural bonding tape
- Overhead doors have a mechanical folding hold open mechanism to automatically hold door to an approximate 85-degree opening
- All doors have available full-length pivoting handles with self-latching, independently sprung latch mechanism. Doors must be unlatching by pulling only - no separate tabs, latches or handles are permitted.
- Upper cabinet doors will have flip-up panels per final design.

#### Drawers

- All sheet components to be CNC punched from new sheet material
- Drawers are all .080" aluminum construction with welded corners
- Drawers are encased in .080" aluminum insert case designed to mount into cabinet faces and integrate with no visible frame around drawers
- Drawer to have full width extruded aluminum pivoting handle actuating twin self-actuating latches
- Drawer must unlatch and open by pulling at any location on the full width handle with one hand. Two-hand operation is not allowed. No separate tabs or levers may be used to latch drawers.
- Exterior drawer finish to be powder-coated to match surrounding cabinet
- Drawers must be fabricated in specified fractional sizes to fit any cabinet

#### Cabinet Shell

- End and center panels to be fabricated of .063" aluminum sheet at overhead and wall cabinets; .080" thickness at closet and base cabinets. All punching, drilling, and forming to be done prior to finishing. All components must be CNC punched
- All cabinets to receive mounting angle bracket at perimeter
- All panels are finished on all exposed surfaces, inside and outside, after fabrication.
- Upper cabinets will include a removable access panel to access upper wire chase
- Radius corners will be used, and no sharp edges will be permitted



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

## Misc

- Shelves are constructed of .090" mill aluminum and all sides are hemmed over to prevent sharp edges from being exposed. Shelves must include adjustable mounting bracket and securing screw. Shelf slots to be punched in side panels or attached internal bracing. Shelves must be placed across from each other on both sides of a panel in the same mounting slots via self-mating brackets.

Bulkheads to be pocket door configuration to allow for easily entry and egress without disrupting flow of traffic within the unit.

## CEILING

Acoustic cord Headliner to be installed throughout the vehicle with easily accessible wire chases along perimeter of ceiling. Customer to choose color from manufacturers' selections.

## CLOCKS

Two (2) Digital CDMA (one master, one slave) shall be installed according to final floor plan. Digital clocks shall show hours and minutes in 4" red LEDs with CDMA time receiver and serial transmit to send time.

## COUNTER TOPS

1/2" thick solid surface counter tops shall be installed. Counter overhang will be 1 1/2' thick layered solid surface with a shaped top edge and at least a 1/8" radius on bottom edge.

## DELIVERY

A trained driver shall deliver vehicle. The representative will train staff on vehicle, bumper to bumper. Staff members shall be trained to operate every component of the vehicle and train other staff, if necessary. The driver must be full-time employed with vendor, drive-away and contract driver services are not acceptable, a. e person must be fully familiar and capable of training staff on every component of vehicle.

## ELECTRICAL SYSTEM

AC Electrical System:

Shall be a 120/240 VAC system rated for anticipated conversion load. System shall include 125A rated distribution panel configured with UL LED listed type magnetic/hydraulic circuit breakers.

The system shall be wired using UL approved, tinned copper 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.



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

Wiring shall be supported on 20" to 24" 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 in external areas shall be encased in conduit to further protect against damage.

Ten (10) 120-volt interior outlets will be installed per final design.

Five (5) 120-volt / USB interior outlets will be installed per final design.

Two (2) GFCI exterior with weather resistance cover shall be installed.

**\* ALL LOCATIONS SHALL BE DETERMINED DURING PRE-CONSTRUCTION MEETING \***

**DC Electrical System:**

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 two Interstate Group 31 deep-cycle battery, one Group 31 generator dedicated battery, and one 100A, three-stage, fully regulated battery charger wired to the 110/240 VAC distribution panel, powered by the generator and/or shore cord mounted in an exterior compartment (or suitable alternative). Battery charger must be fully regulated to prevent battery overcharging.

The charging system shall include provisions for automatic and manual battery bank merging to provide redundant battery power for vehicle and generator starting. The 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 cables 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.



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

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. The 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 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.

#### **FLOOR COVERING**

Install commercial-grade Altro or Lonco floor covering on top of ½" composite subfloor. Customer will choose from a selection of colors upon award.

#### **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. CAD technology will be capable of both two-dimensional line drawings.

Electrical (as built) schematics/drawings will be provided upon delivery of vehicle.

#### **GENERATOR**

14 kW Tier 4 Diesel Generator to be installed. The 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 run out of fuel totally. Exhaust to be routed to the rear of the vehicle.

The generator shall be mounted beneath the vehicle utilizing a "drop-down tray" mounting frame system with a front access door set. Access to the sides and rear of the generator shall be via removable sound attenuation panels. General generator installation shall be in full accordance with the manufacturer's recommendations including any air flow restrictions associated with the installation method.

#### **GENERATOR COMPARTMENT**

An aluminum compartment will be designed and built to accommodate the required generator. 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. The generator shall have double swing-out doors for ease of access. The doors will have ventilation panels of louvered metal



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

installed as required to move air over and around the generator, away from air inlets, and meeting manufacturer's requirements. The generator compartment must be insulated to the maximum possible for elimination of heat, noise, and fumes to the coach area through walls and/or flooring without interfering with necessary airflow. Insulation will surround all possible areas of the generator compartment. The latches will be locking Tri-Mark latches, keyed alike.

### **GENERATOR CONTROLS**

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

### **GRAPHICS and PAINT**

Custom paint color Black.

Reflective vinyl graphics package per customer design.

### **HVAC**

Air Conditioning:

Four (4) 15,000 BTU roof mounted air conditioners, 110 volt. Roof section to be reinforced where air conditioners are to be mounted. All rooms shall be ducted AC

Heaters:

Four (4) Electric fan forced air heaters with variable control 1000 to 1500 watts. Each heater shall have separate wall mounted controller.

Thermostat:

One (1) AC thermostats for AC Systems. Heaters shall be controlled with four (4) individual wall mount thermostats.

Chassis Air Conditioning:

OEM Chassis AC system shall be provided.

### **LADDER**

One (1) 15" wide custom powder coated ladder shall be installed on rear of vehicle for roof access.

### **LAYOUT (per attached preliminary design)**

Each section to be separated at each end by sliding pocket doors with windows in each door.

### **DRIVER'S AREA**

- Driver seat
- Passenger flip seat
- Restroom:
  - Toilet



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

- Toilet paper dispenser
- Sink
- Paper towel dispenser
- Soap dispenser
- 12-volt fan
- Mirror
- Galley to include base cabinet and upper cabinet where the appliances listed below will be installed:
  - One (1) Dometic .9 cu. ft. (black) microwave approved equal.
  - One (1) 5.5 undercounter 120-volt refrigerator
  - Coffee maker
- Base and upper storage cabinets

#### CENTER ENTRANCE SECTION

- Electrical distribution panel cabinet.
- Electronics Cabinet – as described in the Communication Section
- Two (2) workstations shall be designed for maximum comfort during long deployments and have the following attributes:
  - High quality office chair at each desk (bungee for securing chair during travel)
  - One (1) 32" Monitor
  - (1) CAT6 and 120V / USB outlets at each workstation
  - Base cabinet with drawers and upper storage cabinets

#### REAR HALLWAY SECTION

- (3) Pocket doors
- Meeting Room
  - 40" monitor
  - (1) CAT6 and 120V / USB outlets
  - (2) High quality office chair at each desk (bungee for securing chair during travel)
  - Fold-down table

#### REAR COMMAND Conference Table

- Two (2) 32" Widescreen Flat Panel LCD Televisions installed and networked on the rear wall
- One (1) 65" LCD television Smart technology touch screen installed on the rear wall
- (2) CAT6, 12vdc and 120V outlets at each workstation
- Conference Table:
  - (2) Pop up style conference table power and data stations
  - Six (6) high-end steno chairs with bungee securing for transport



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
www.MSVehicles.com

- Side walls: The upper 50% of the walls will include a removable Dry-Erase Marker Board

## **LEVELING SYSTEM**

Quadra leveling/stabilizing system or approved equal.

## **LIGHTING, INTERIOR**

Interior recessed 12V Tecniq Orion Red/White LED 6" Ceiling Lights will be installed on the interior of the vehicle.

Five(5) interior 12V Tecniq Siloh 4" LED RED/WHITE installed, on under each of the upper cabinets.

## **LIGHTING, EXTERIOR (all emergency lights will be blue flasher with clear lens)**

Six (6) Whelen M9 Scene Lights or approved equal, will be mounted on the exterior of the vehicle.

Twelve (12) Whelen 700 Series LED (blue) lights with clear lens installed on the exterior of the vehicle, locations determined during the preconstruction meeting.

All emergency lighting shall be connected through a multi-plexed interface system. Features backlit buttons and LED status check at base station.

One (1) Whelen LED green command beacon.

## **SAFETY EQUIPMENT**

One (1) back-up alarm

One (1) 360 Exterior monitoring system

Two (2) carbon monoxide detector shall be installed according to the final floor plan.

Two (2) Smoke detector shall be installed according to the final floor plan.

Two (2) 5 lb. fire extinguisher

One (1) first aid kit

One (1) set of triangle flares.

## **SHORELINE**

There shall be a heavy duty 120/240-volt, 50 amp. 25' Twist Loc shoreline cord provided.

## **SIREN/PA**

Install Federal Signal Touchmaster Delta Siren with 100W speaker or approved equal.

## **SURVEILLANCE CAMERA WITH MAST**



211 American Avenue Greensboro, North Carolina 27409  
Toll Free: (877)905-4678 Local: (336)297-9600  
[www.MSVehicles.com](http://www.MSVehicles.com)

Vehicle shall have a rear mounted mast - Will-Burt 6-25 Heavy duty Mast for surveillance camera installation. Mast shall be 6' stow height/25' deployed and have the following camera mounted on top:

Mast must have a separate air system from the chassis, for quicker and more effective deployment of mast tubes/cylinders.

Install one (1) Side Winder 1.5 PTZ camera system. All wiring camera cables and antenna cables run in Mast Nycoil.

### **WALLS**

Install laminate walls. Seams will be trimmed with brushed aluminum. Color to be determined by customer after award of bid. All electrical outlets and light switches must be flush mounted in wall. The use of raceways and wire mold is not acceptable.