

**APPENDIX "A"**  
**COST MODEL**

**REVISED COST MODEL  
MICHIGAN HYBRID SMALL BUS SPECIFICATION  
7 Years/200,000 Miles  
14 Passenger Non-lift/Lift Buses with Alternate Seating  
071I9200181 – Addendum #1 (Attachment #1)**

**Version Date: 6/23/2009**

**Instructions:** Complete each section of the following cost model document. If applicable, provide as much detail as possible, in the evaluation portion, by listing product and model names, sizes, materials used, type, etc. Return completed document with your bid package as this document will be primarily referenced during the evaluation process.

<b>Body Manufacturer:</b>	<b>Startrans Bus</b>
<b>Vendor Company Name:</b>	<b>Midwest Transit Equipment Inc. of Michigan</b>
<b>Vendor Address:</b>	<b>2080 S. Michigan Rd. Eaton Rapids, MI 48827</b>
<b>Preparer's Name:</b>	<b>Thomas Boldwin</b>
<b>Michigan Inspection Facility:</b>	<b>Midwest Transit Equipment, Inc.</b>
<b>Address of Inspection Facility:</b>	<b>2080 S. Michigan Rd. Eaton Rapids, MI 48827</b>

<b>I COST MODEL</b>					
	<b>Quant ity</b>	<b>Description</b>	<b>MiDEAL and Michigan Public Transit Authorities Unit Price (No Fee)</b>	<b>Extended Total (No Fee)</b>	<b>NASPO Member States Unit Price  (Includes 1% Fee)</b>
		<b>158" Wheelbase Bus – Vinyl Seat Covers</b>			
<b>A</b>	5	14 passenger bus without lift, vinyl seat covers	<b>\$100,901.00</b>	<b>\$ 504,505.00</b>	<b>\$101,910.01</b>
<b>B</b>	10	5+2 passenger bus with front passive lift, vinyl seat covers	<b>\$106,003.00</b>	<b>\$1,060,030.00</b>	<b>\$107,063.03</b>
<b>C</b>	10	4+2 passenger bus with rear passive lift, vinyl seat covers	<b>\$106,122.00</b>	<b>\$1,061,220.00</b>	<b>\$107,183.22</b>
		<b>158" Wheelbase Bus – Fabric Seat Covers</b>			
<b>D</b>	5	14 passenger bus without lift, fabric seat covers	<b>\$101,131.00</b>	<b>\$ 505,655.00</b>	<b>\$102,142.31</b>
<b>E</b>	10	5+2 passenger bus with front passive lift, fabric seat covers	<b>\$106,188.00</b>	<b>\$1,061,880.00</b>	<b>\$107,249.88</b>
<b>F</b>	10	4+2 passenger bus with rear passive lift, fabric seat covers	<b>\$106,322.00</b>	<b>\$1,063,220.00</b>	<b>\$107,285.22</b>
	<b>50</b>	<b>Total Contract Units</b>			

<b>COST MODEL (continued)</b>					
<b>G</b>		<b>Options – Alternate Quote Prices</b>	<b>MiDEAL and Michigan Public Transit Authorities Unit Price (No Fee)</b>	<b>Extended Total (No Fee)</b>	<b>NASPO Member States Unit Price (Includes 1% Fee)</b>
<b>G1</b>	40	Air Conditioning System roof mount	\$ 4,775.00	\$ 191,000.00	\$ 4,822.75
<b>G2</b>	40	Manual entrance door (deduct)	\$ (340.00)	\$ (13,600.00)	\$ (366.60)
<b>G3</b>	5	Driver-Side Running Board	\$ 100.00	\$ 500.00	\$ 101.00
<b>G4</b>	50	Auxiliary air heater system-gas	\$ 2,250.00	\$ 112,500.00	\$ 2,272.50
<b>G5</b>	15	Power seat base for driver's seat	\$ 241.00	\$ 3,615.00	\$ 243.41
<b>G6</b>	5	Destination Sign	\$ 3,850.00	\$ 19,250.00	\$ 3,888.50
<b>G7</b>	5	Ceiling Handrails	\$ 240.00	\$ 1,200.00	\$ 242.40
<b>G8</b>	5	Exterior Heated Remote Mirrors	STD	STD	STD
<b>G9</b>	25	Donation box	\$ (500.00)	\$ (12,500.00)	\$ (495.00)
<b>G10</b>	25	Farebox Electrical Prep	\$ (715.00)	\$ (4,375.00)	\$ (707.85)
<b>G11</b>	20	Rear emergency exit window	\$ (310.00)	\$ (6,200.00)	\$ (306.90)
<b>G12a</b>	10	Paint - One stripe	\$ 225.00	\$ 2,250.00	\$ 227.25
<b>G12b</b>	10	Paint - Roof second color	\$ 550.00	\$ 5,500.00	\$ 555.50
<b>G12c</b>	10	Paint - Different Full body	\$ 2,000.00	\$ 20,000.00	\$ 2,020.00
<b>G13</b>	20	Folding Platform Passive Lift	\$ 165.00	\$ 3,300.00	\$ 166.65
<b>G14</b>	20	Rear five place passenger seat	\$ 300.00	\$ 6,000.00	\$ 303.00
<b>G15</b>	20	Two-way radio prep package	\$ 315.00	\$ 6,300.00	\$ 318.15
<b>G16a</b>	10	Radio - AM/FM/CD stereo system w/ two (2) speakers	\$ 325.00	\$ 3,250.00	\$ 328.25
<b>G16b</b>	10	Radio - AM/FM/CD/PA stereo system w/ two (2) speakers	\$ 500.00	\$ 5,000.00	\$ 505.00
<b>G16c</b>	10	Public Address System Only w/ two (2) speakers	\$ 325.00	\$ 3,250.00	\$ 328.25
<b>G16d</b>	10	Extra speakers to a total of four (4)	\$ 60.00	\$ 600.00	\$ 60.60
<b>G17</b>	5	Raised Floor (No Wheel Wells)	\$ 500.00	\$ 2,500.00	\$ 505.00
<b>G18</b>	20	Smooth Anti-slip Flooring	\$ 350.00	\$ 7,000.00	\$ 353.50
<b>G19</b>	10	Entrance Stepwell Heater	\$ 135.00	\$ 1,350.00	\$ 136.35
<b>G20</b>	5	Restraint - Storage Under Foldaway Seat Wheelchair Position	\$ 40.00	\$ 200.00	\$ 40.40
<b>G21a</b>	5	Seating – Forward Facing Standard Double Seat	\$ 320.00	\$ 1,600.00	\$ 323.30
<b>G21b</b>	5	Seating – Forward Facing Double Fold-A-Way	\$ 500.00	\$ 2,500.00	\$ 505.00
<b>G21c</b>	5	Seating – Double w/Single ICS	\$ 700.00	\$ 3,500.00	\$ 707.00
<b>G21d</b>	5	Seating – Double w/Two ICS (38" wide)	\$ 860.00	\$ 4,300.00	\$ 868.60
<b>G21e</b>	5	Seating – Cloth Seat Covers per Passenger	\$ 15.00	\$ 75.00	\$ 15.15
<b>G21f</b>	5	Seating – Seatbelts per passenger	\$ 100.00	\$ 500.00	\$ 101.00
<b>G21g</b>	5	Seating – Grab Handles	\$ 25.00	\$ 125.00	\$ 25.25
<b>TOTAL EVALUATION PRICE OF A, B, C, D, E, F, and, G ABOVE</b>				<b>\$5,627,000.00</b>	

**REVISED CC-1 MODEL**  
**MICHIGAN HYBRID SMALL BUS SPECIFICATION**  
 7 Years/200,000 Miles  
**14 Passenger Non-lift/Lift Buses with Alternate Seating**  
**07119200181 – Addendum #1 (Attachment #1)**

**EVALUATION FORM**

<b>II BODY SPECIFICATIONS</b>	
<b>Item</b>	<b>Product Name and Model</b>
<b>A</b>	<b>STARTRANS SENATOR</b>
General design and construction	<p><b>Size, Material, and/or Type</b></p> <p>The general design and construction of the proposed bus is designed using only prudent, proven engineering principles with all work performed by professional establishments. The bus will meet all Federal and State of Michigan requirements and regulations. Bus is designed to offer driver comfort for both female and male in the 5th to 95th percentiles and all controls meet FMVSS 101 where applicable. Manufacturing and assembly processes of the bus are of highest industry standards. All add on components are installed per manufacturers guidelines. Welding is done in accordance with ASTM and AWS standards. Proper pre weld preparation is performed and once finished, all rough and burred areas are smoothed out and then treated with a corrosion inhibiting primer/paint. All attachment hardware used will be of appropriate size and strength and of a type that is resistant to rust. The bus body is a steel cage construction with FRP high gloss gelcoat exterior and interior walls and ceiling. The sub floor is comprised of a matrix of steel of 10, 12 and 14 gauge. The side wall caging consist of a matrix of 14 and 16 gauge steel. Roof caging consist of a matrix of 14 and 16 gauge steel grid work. See detailed specs included in attached proposal documents</p>
<b>B</b>	<b>STARTRANS SENATOR</b>
Body structure and exterior panels	<p>The side wall structure consist of a steel cage and fiberglass laminated together to form a one piece seamless wall and roof. The wall and roof panels are vacuum pressed. See detailed specs included in attached proposal documents.</p>
<b>B1</b>	<b>STARTRANS SENATOR</b>
Rollover frame, steel cage type	<p>The bus body is a steel cage construction with FRP high gloss gelcoat exterior and interior walls and ceiling. The sub floor is comprised of a matrix of steel of 10, 12 and 14 gauge. The side wall caging consist of a matrix of 14 and 16 gauge steel. Roof caging consist of a matrix of 14 and 16 gauge steel grid work. See detailed specs included in attached proposal documents</p>
<b>B1a</b>	<b>STARTRANS SENATOR</b>
Body section thickness	<p>1/4" thickness. Wall has 3/4" polyurethane foam interior with each side having a minimum of 1/4" matrix of resin and fiberglass.</p>
<b>B2</b>	<b>STARTRANS SENATOR</b>
Rollover frame, steel cage type	<p>See B1</p>

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<b>B2a</b>	Body section thickness	See B1a
<b>B3</b>	Exterior panels	High gloss bright white gelcoat to match OEM chassis color
<b>B4</b>	Interior panels	High gloss bright white gelcoat.
<b>B5</b>	Interior length	Street side 168" and curb side 158"
<b>B6</b>	Interior width	91.5" at floor line and 92.5" at seat level.
<b>B7</b>	Interior height	80.5" at center aisle
<b>B8</b>	Exterior length	276" over standard bumpers
<b>B9</b>	Exterior width	98" at wheel flares
<b>B10</b>	Exterior height	114" excluding roof hatch. Add 3" for hatch
<b>B11</b>	Rubrails	Heavy duty transit rubber type 1 1/2" x 1/2" minimum
<b>B12</b>	Body overhang	76 3/8" from center of rear axle
<b>C</b>	Passenger door	Electric split type double leaf swing w/rubber cushion edging with full view safety glass. Framing of door is 304 stainless steel.
<b>C1</b>	Opening Size	32" wide by 84.5" high from first step
<b>D</b>	Stepwell	304 stainless steel
<b>E</b>	Interior – Color	Interior of walls are light grey high gloss gelcoat FRP. Vinyl trim pieces are used at transition points where needed.
<b>F</b>	Flooring	Floor decking is 3/4" marine grade plywood covered with oil and slip resistant commercial 1/8" smooth material under seats and in wheelchair areas with and 3/16" ribbed material in aisle, entrance, step tread thickness. Rubber is extended up the sidewall to the seat track rail. Yellow step nosing and standee line are included. All flooring is sealed to prevent moisture penetration.
<b>G</b>	Emergency exits	Consist of a standard rear exit door of 32" x 58" with upper and lower windows set in a powder coated 304 stainless steel frame and incorporates an audible alarm in the driver's area to alert of a locked or door being opened condition when the ignition is on. In addition, there are emergency egress side windows that meet all FMVSS requirements.
<b>H</b>	Gauges	All gauges are supplied by OEM chassis manufacturer and as a minimum consist of a, voltmeter, oil pressure gauge, engine coolant temperature gauge, fuel gauge speedometer and tachometer. All gauges are located within easy view of the operator.
<b>I</b>	Fare box	Is a Main Farebox model M-4 with 2 vaults. Mounted per procuring agencies directions
<b>J</b>	Bumpers	Front bumper is chrome plated OEM and rear bumper rubber energy absorbing.
<b>K</b>	Mud Flaps	Consist of front flaps behind wheels and rear mud flaps in front and behind wheels with inverted "T" brackets with anti sail brackets. Also includes rubber fender splash guards on front and rear wheel openings.
<b>L</b>	Towing	Rear tow hooks sufficient in strength to tow 1 1/2 times the GVWR of the bus mounted and adequately secured to eh chassis frame rails

**REVISED C-C-T MODEL  
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<b>M1</b>	Undercoating	Z-tech	Applied to underneath of bus in areas where allowed by OEM manufacturer and warranted for the same time as the body structure
<b>M2</b>	Rustproofing	Metalok	All boxed steel tubing used in the floor structure and sidewalls from top of the windows down are treated internally with rustproofing material. All exposed substructure is also treated with a rust preventative coating.
<b>N1</b>	Interior mirrors		Consist of a minimum 4" x 14" flat glass with rounded corners.
<b>N2</b>	Sunvisors	Ford	OEM chassis supplied at drivers area
<b>O</b>	Exterior Mirror	Rosco	Constructed of high impact plastic with upper flat glass and lower convex. One mounted to drivers door and eh right side is fender mount. Mirrors are remote and heated. Remote mirror only is not available. An 8" minimum cross over mirror is supplied an mounted to the left front of the bus.
<b>P1</b>	Seats – Driver	Freedman Seating	High back recliner with lumbar support and three point seat belt/shoulder belt. No welt on the front of the seat with grey cloth covers to match seat material specs.
<b>P2</b>	Seats – Passenger	Freedman Seating	Will be mid high back style meeting all FMVSS requirements and include yellow energy absorbing vandal resistant top mounted seat back hand rails at each seat position except seats with back against the wall. All seats have under seat retractable seat belts. Additional documentation as required is included in the bid binder. Also the first double seat on the passenger side of the bus (where permissible by floor plan) will have an integrated child restraint style seat. All seats meet flammability and smoke requirements. Two universal 6" x 6" "Buckle Up" decals will be supplied. Where required aisle facing seats that are not against a modesty panel will have an armrest. Standard seat cover is vinyl CMI D-90.
<b>P3</b>	Seats – Fold-up	Freedman Seating	For lift equipped buses, fold a way seats with seat belts are included at the wheelchair positions per the floor plans submitted in this proposal which mirror those floor plans issued by MDOT through Addendum #1. For floor plan "B", there is a two passenger aisle facing mid high flip seat in front of the lift.
<b>Q</b>	Handrails, stanchions		Will include high visibility yellow handrails and stanchions in the entrance area, behind driver with all others being brushed stainless steel. All stanchions and handrail mounting points will have reinforcement plates welded or imbedded in the structure. Padded modesty panels and plex1 shields are also included where required by bid specs.
<b>R</b>	Interior lighting	Hella	Interior passenger compartment lighting, will be LED style offering minimum of 2 foot-candles of illumination at reading level. Stepwell and overhead entrance lighting will be LED and offer no less than two foot-candles of illumination at entrance step tread. Interior lights are door activated. Lift platform lighting is also included as well as outside entrance lights to meet ADA
<b>S</b>	Exterior lighting	Trucklite	All exterior lighting meets FMVSS and ADA requirements. All exterior lights, with the exception of OEM chassis supplied lighting (headlights/park/turn), are LED type and meet the size and style as set forth in the specifications.
<b>T</b>	Safety equipment	AC fire extinguisher, James King Co, triangle reflectors	Includes a 5 pound, 2A-10BC dry chemical fire extinguisher with metal head, charge gauge and metal mounting bracket and a set of bi-directional emergency reflector triangles that meet FMVSS requirements. Location subject to procuring agencies approval.
<b>U1</b>	Heating / ventilating – Front System	Ford	OEM chassis supplied and consist of a heater/defroster/air conditioning/fresh air system in dash type.

**REVISED COCOT MODEL  
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<b>U2</b>	Heating / ventilating – Rear System	<b>ProAir</b>	65,000 BTU floor mounted heater. Manual shut off valve are installed as close to engine as possible easily accessible to operator and may require the use of an access door.
<b>V</b>	Windows	<b>Hehr</b>	Passenger compartment windows, with the exception of lift and rear emergency door, will be T-slider style safety glass meeting all FMVSS requirements with tint to meet specifications. Where needed by body plan, solid filler windows may be used. Windshield and drivers door roll down window are OEM chassis supplied, tinted/shaded and meet applicable FMVSS requirements.
<b>W</b>	Paint	<b>Dupont</b>	The OEM cab is factory painted and is a bright white color. The body since it is an FRP type construction, is impregnated with bright white coloring to match the OEM chassis. Any metal that requires painting or powder coating, also matches the cab/body color. Body is free of dents to wrinkles and paint/frp is impervious to diesel fuel, gasoline or commercial cleaning agents. Any paint applied is a multi stage process that meets the bid requirements.
<b>X</b>	Insulation		Walls, ceiling, passenger floor areas, drivers floor area are insulated to a minimum of an R factor of 5. Firewall and engine cover design and insulation is OEM. Insulation is non-formaldehyde, fire resistant, non-hygroscopic and resistant to fungus.
<b>Y</b>	Lift (platform type), passive	<b>Braun Century 2</b>	Lift area is designed to meet all applicable FMVSS and ADA requirements as pertaining to vehicles in excess of 22 feet. Dual panel manual lift doors with outside locking handle are supplied that are set in a 304 stainless steel door frame. Doors are held in an open position by gas struts, and have a window in each panel. Lift that meets all applicable AD and FMVSS requirements. Technical specs are enclosed.

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**EVALUATION FORM**

III WHEELCHAIR SECUREMENT AREA		Product Name and Model	Size, Material, and/or Type
A	Wheelchair securement	Q-Straint Q-8100 A1L	Four point wheelchair securement system with heavy duty automatic retractor belts that meet all FMVSS and ADA requirements. Retractor mechanisms are attached to flush mounted floor tracking that is no less than 30" wide at each position. First wheelchair position behind driver is 54" in length minimum. No anchorage points are located any closer than 8" from a stationary wall or obstruction. System has been tested to a 30MPG/20G sled test and meets J2249 requirements
B	Wheelchair restraints	Q-Straint Q-8100 A1L	Consist of an adjustable lap and shoulder belt. Shoulder belt to have vertical adjustment
C	Restraint storage	Q-Straint	Belt pouch storage bag for each wheelchair position. Mounting location to be approved by procuring agency.
<b>IV CHASSIS SPECIFICATIONS</b>			
A	Chassis	Ford	E450, 14,050 GVWR
B	Tilt wheel/power steering	Ford	Tilt and power steering is included
C	Wheelbase		158"
D	Engine	Ford 99L	5.4L V8, 255HP @4500 RPM with 350 FT. LB Torque at 2500RPM
E	Hybrid System	Azure Dynamics Balance	Parallel, Gasoline electric
E1	Driver Motor	AZD AC90P1F	100KW
E2	Driver Motor Controller	AZD DMOC645-SI	120kW Inverter
E3	Starter	Ford	12 volt supplied by OEM chassis mfg
E4	Low Voltage	Satcon, DC /DC Converter	12 volt, 200 amps
F	Transmission	Ford 44B	5 speed forward with overdrive with transmission cooler
G	Alignment		Full alignment in Michigan just prior to delivery
H	Gross Vehicle Weight Rating (GVWR)	Ford	14,050 lbs.
H1	Front axle rating	Ford	4,600#
H2	Rear axle rating	Ford	9,450#
I	Differential	Ford	4.56 gear ratio. Will allow for traveling speeds at a minimum of 65MPH loaded and to the engine manufacturers recommended engine operating RPM range.
J1	Battery – 12 Volt	Ford Motorcraft	Dual batteries maintenance free OEM. One located under the hood and one under the bus body between the frame rails

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<b>J2</b>	Battery – High Voltage	<b>Cobasys</b>	288 volt, 60kW, 8.5 Ah, NiMH
<b>K</b>	Battery Cables and Grounds	<b>Ford/Startrans/Azure</b>	Per specs with multiple points engine to chassis, between frame rails, body to chassis in 2 places, engine to firewall and other points as needed. Straps are 2/0 stranded type
<b>L</b>	Alternator	<b>Ford</b>	155 amp
<b>M</b>	Brakes	<b>Ford</b>	4 wheel disc with antilock feature
<b>N</b>	Fuel tank	<b>Ford</b>	55 gallon behind axle in between the frame rails
<b>O</b>	Hazard flashers	<b>Ford</b>	Is OEM chassis supplied and incorporated into steering column. Any modification to the flasher system violates Ford QVM program as flashers are tied into ECM. This section modified per addendum #3.
<b>P</b>	Shock absorbers	<b>Ford</b>	1 3/8" as filled shocks front and rear
<b>Q1</b>	Suspension - Front	<b>Ford</b>	Coil springs rated at 5000#
<b>Q2</b>	Suspension - Rear	<b>Ford</b>	Leaf springs rated at 9,500#
<b>R</b>	Stabilizer	<b>Ford</b>	Front stabilizer bar .083" diameter and rear stabilizer 1.125" diameter
<b>S</b>	Wheels	<b>Ford</b>	Steel 16" x 6" white in color
<b>T</b>	Tires	<b>Michelin (typical)</b>	LT225/75Rx16E all season
<b>U</b>	Drive shaft	<b>Ford</b>	Supplied by OEM chassis manufacturer integrated with hybrid system with guards
<b>V</b>	Wipers / Horn	<b>Ford</b>	Intermittent multi speed wipers with dual note horns
<b>W</b>	Radiator and cooling system	<b>Ford</b>	Extra cooling capacity
<b>X</b>	Fluids		Chassis goes through a complete chassis pre delivery inspection at which time all fluids are checked for proper levels. Fluids for radiator, transmission, engine oil and power steering are accessible from under the hood
<b>Y</b>	Engine cover	<b>Ford</b>	Engine cover is part of the OEM chassis. It is designed to reduce engine and road noise and heat from engine.
<b>Z</b>	Exhaust system	<b>Ford/Startrans</b>	Exhaust will exit to the left rear of the bus. System meets or exceeds all FMVSS and EPA requirements. Exhaust system is mounted to provide maximum ground clearance and departure angle at the rear of the bus.
<b>V</b>	<b>OTHER ITEMS</b>		
<b>A1</b>	Safety- Reverse alarm	<b>Velvac</b>	97 DBA per specs
<b>A2</b>	Safety-Rear door alarm	<b>Cole Hersee</b>	Will activate with ignition on when door is locked or latch handle starts to open
<b>A3</b>	Safety-Lift master switch and light	<b>Carling</b>	Master lift switch with green light that illuminates when in the "on" position
<b>A4</b>	Safety-Lift door open indicator	<b>Carling</b>	Dash mounted light (red and labeled) is provided to alert operator when the lift door is open and when the lift is in operation
<b>A5</b>	Safety-Lift interlock	<b>Intermotive</b>	Prohibits bus movement when lift door are open or lift deployed. Has lights to indicate proper

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<b>A6</b>	Safety-Headlight control	<b>Ford</b>	operation steps.
<b>A7</b>	Safety-Sirobe light	<b>Specialty Manufacturing</b>	Daytime running lamps are included that automatically activate whenever the ignition switch is in the "on" position and the headlight switch is in the off position Clear lens with branch guard, approx 4" in height w/switch in drivers area.

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Item	Product Name and Model	Size, Material, and/or Type
<b>B</b>	Electrical	<b>Ford/Startrans</b> Bus has a 12voltsystem comprising of the OEM chassis electrical system which is unaltered. The body manufacturer Startrans installs all associated electrical required for the body build. They install a multiplexing power distribution panel located above the drivers door that supplies all body components. All body manufacturer supplied wiring is number, color and function coded and protected by properly rated circuit breakers to the greatest extent possible. Where needed by some components, blade fuses may need to be used. Supplied with lift and rated at 100 amps
<b>B1</b>	Lift circuit breaker	OEM chassis supplied and mounted in dash are
<b>B2</b>	12-volt power point	All body installed wiring is color, number and function coded with no duplications. An as built wiring diagram is supplied for body wiring. System is designed as plug and play.
<b>B3</b>	Wire coding and harnesses	Is located above driver's door behind a door panel. System is a multiplexing plug and play type. Only the highest quality type materials are used. System has a life time warranty. Two extra fuses of each type are also supplied with bus.
<b>B4</b>	Electrical panel	All wiring added by the body manufacturer is properly routed, fastened and supported to prevent wires being knocked loose or coming loose from vibrations.
<b>B5</b>	Wiring support	All wiring is properly grounded to the frame and chassis where needed and as required in the specifications
<b>B6</b>	Wiring grounds and capacity	All wiring is run through a constant run solenoid that is energized when the ignition is in the "accessories" or "run" position. There is also a master switch in the driver's console that controls the solenoid and overrides individual switches. The solenoid does not control exterior lighting or other chassis functions that require constant power for memory systems.
<b>B7</b>	Constant run solenoid	Circuits are designed, wired, and protected for the electrical demands of the vehicle. Illuminated switch marking are permanent and will not wear off.
<b>B8</b>	Circuit capacity & function	All added wiring is supported and installed in a split open type loom or raceway with adequate length to allow for flexing. Any added wires to OEM existing chassis wiring will meet standards as set forth by OEM chassis manufacturer. All circuits are designed and protected to eliminate feedback to other systems.
<b>B9</b>	Wiring protection	All wiring added to OEM chassis wiring to the rear lights, fuel tank and other accessories is properly supported and protected from ice and snow build up and are located inside the bus to the greatest extent possible. Wiring length is sufficient for easy removal of light fixture for
<b>B10</b>	Wiring routing	

**REVISED CUMMINS MODEL**  
**MICHIGAN HYBRID SMALL BUS SPECIFICATION**  
**7 Years/200,000 Miles**  
**14 Passenger Non-lift/Lift Buses with Alternate Seating**  
**07119200181 – Addendum #1 (Attachment #1)**

<b>B11</b>	Wiring connections		service. All exposed connectors are weather pak type. Scotch lock wire connectors are not used. Wire ends are machine crimped and use matched mating connectors. In line fuses use Weather-Pak holders and are located for easy service. All exterior connectors are also Weather Pak. All exterior ground straps are braided and protected from corrosion by heat shrink insulation. All connection points are protected from the elements.
<b>VI</b>	<b>OPTIONS - ALTERNATE QUOTES</b>		
<b>A</b>	Air Conditioning System roof mount	<b>AC Carrier</b>	Model AC51R3 consisting of an EM1 evaporator and roof mounted KR3 roof condensor
<b>B</b>	Manual entrance door (deduct)	<b>A &amp; M</b>	Replaces standard feature electric door with a manually operated control mounted to the operators right
<b>C</b>	Driver-Side Running Board		Diamond plate aluminum capable of supporting up to 300 pounds
<b>D</b>	Auxiliary air heater system-gas	<b>Webasto</b>	Model TSL17 with/7 day timer.
<b>E</b>	Power seat base for driver's seat	<b>Ford</b>	OEM chassis supplied Ford option #90P
<b>F</b>	Destination Sign	<b>Luminator</b>	Vista LED. Brochure enclosed in section 4
<b>G</b>	Ceiling Handrails		Includes two (2) ceiling mounted handrails made of stainless steel that meets ADA regulations. Handrails are attached to steel reinforcement plates mounted into the ceiling structure. Final location subject to procuring agencies approval.
<b>H</b>	Exterior Heated Remote Mirrors	<b>Rosco</b>	Standard. Heat feature is standard with the remote feature required in base unit
<b>I</b>	Donation box	<b>Main</b>	Donation box Main C91M replaces the standard fare box.
<b>J</b>	Farebox Electrical Prep		Option eliminates standard fare box and includes electrical connections only along with adequately braced stanchion. Location to be approved by the State.
<b>K</b>	Rear emergency exit window		Replaces rear emergency door and associated equipment. Rear window is 22" x 58" offering 1,276 sq. in. of viewing area. Window has inside lever type non corrosive latching device that secure the window tightly and tightly against the frame and meets FMVSS requirements. An audible alarm is included in the driver's area to alert driver of window open situation. Windows are properly marked. A Fresnal wide angle lens is included. A five place rear row will replace a 4 place rear row with inclusion of rear emergency window.
<b>L1</b>	Paint - One stripe	<b>Startrans</b>	Includes an 11" painted belt line stripe. Choice of any standard automotive paint color
<b>L2</b>	Paint - Roof second color	<b>Startrans</b>	Includes painting the entire roof a different color from the body color. Choice of any standard automotive paint color.
<b>L3</b>	Paint - Different Full body	<b>Startrans</b>	Includes painting the body an entirely different color from the standard OEM white. Choice of any standard automotive paint color.
<b>M</b>	Folding Platform Passive Lift	<b>Braun Vista 2</b>	Replaces standard passive lift platform type. See section 11 for brochure and specifications
<b>N</b>	Rear five place passenger seat	<b>Freedman</b>	Replaces 4 place rear row seats with a 5 place rear row when used in conjunction with a rear window in lieu of a rear door. All seats are identical in design and features as to the standard seats required.
<b>O</b>	Two-way radio prep package		Is a pre radio installation feature that provides antenna mounting plates, ground planes, branch deflectors, interior access holes with 6" round access covers, power wiring properly protected and fused at 40 amps

**REVISED CUB MODEL  
MICHIGAN HYBRID SMALL BUS SPECIFICATION**

7 Years/200,000 Miles

**14 Passenger Non-lift/Lift Buses with Alternate Seating  
07119200181 – Addendum #1 (Attachment #1)**

			enclosed in a split loom or flexible conduit meeting all the technical specifications and located per the approval of the procuring agency
<b>P1</b>	Radio - AM/FM/CD stereo system w/ two (2) speakers	<b>Ford</b>	Includes an AM/FM/CD OEM radio with 2-24 watt speakers. Speaker location per procuring agencies approval
<b>P2</b>	Radio - AM/FM/CD/PA stereo system w/ two (2) speakers	<b>Panasonic</b>	Includes AM/FM/CD radio with integrated PA system and 2=24 watt speakers
<b>P3</b>	Public Address System Only w/ two (2) speakers	<b>Mobile page model 470</b>	Includes a separate mobile page system that is not tied into dash radio. With 2 speakers
<b>P4</b>	Extra speakers to a total of four (4)		There is no extra charge for 4 speakers with the AM/FM/CD radio options. There is an additional charge for 2 additional speakers when combined with stand alone PA of \$60.00
<b>Q</b>	Raised Floor (No Wheel Wells)	<b>Startrans</b>	This option is not suggested. IT adds additional weight to the vehicle and could result in declined passenger capacity to meet weight requirements
<b>R</b>	Smooth Anti-slip Flooring	<b>Altro</b>	Smooth slip resistant flooring on floor, steps, risers and entrance area. Steps have contrasting yellow nosing.
<b>S</b>	Entrance Stepwell Heater	<b>Ultra Heat SH267</b>	12 volt entrance step heater mounted to lower step and thermostatically controlled
<b>T1</b>	Restraint – Pocket System Per Location		Removed per addendum 3
<b>T2</b>	Restraint – Additional Systems		Removed per addendum 3
<b>T3</b>	Restraint - Storage Under Foldaway Seat Wheelchair Position	<b>Q-Straint</b>	Includes belt storage pouches attached to bottom of fold a way seats. This would be for additional locations as the base floor plans already include belt pouches which can also be attached to bottom of fold a way seats
<b>U1</b>	Seating – Forward Facing Standard Double Seat	<b>Freedman Seating</b>	Mid high back seat
<b>U2</b>	Seating – Forward Facing Double Fold-A-Way	<b>Freedman Seating</b>	3 step fold a ways
<b>U3</b>	Seating – Double w/Single ICS	<b>Freedman Seating</b>	High back ICS
<b>U4</b>	Seating – Double w/Two ICS (38" wide)	<b>Freedman Seating</b>	High back ICS

**REVISED CUB MODEL**  
**MICHIGAN HYBRID SMALL BUS SPECIFICATION**  
 7 Years/200,000 Miles  
**14 Passenger Non-lift/Lift Buses with Alternate Seating**  
**07119200181 – Addendum #1 (Attachment #1)**

VI	OPTIONS - ALTERNATE QUOTES (Continued)	Product Name and Model	Size, Material, and/or Type
U5	Seating – Cloth Seat Covers per Passenger	LaFrance	Synergy. Choice of available colors. Meets specification
U6	Seating – Seatbelts per passenger	Amsafe	Retractable
U7	Seating – Grab Handles	Freedman	Energy absorbing yellow in color

VII		VENDOR/ MANUFACTURER REQUIREMENTS	Please mark (X) as completed
A		Bus information furnished	X SEE BINDER
B		Manufacturer quality control (name/title)	X SEE SECTION 12 OF BINDER
C		Air conditioning certification	X TO BE SUPPLIED UPON COMPLETION OF PROTOTYPE
D		Heating/Ventilating certification	X TO BE COMPLETED PRIOR TO AND UPON DELIVERY
E		Purchaser inspection	X TO BE COMPLETED PRIOR TO AND UPON DELIVERY
F		Warranty	X SEE SECTION 8 OF BINDER
G1		Miscellaneous - Turning radius wheel to wheel	X SEE SECTION 6 OF BINDER
G2		Miscellaneous- Turning radius wall to wall	X SEE SECTION 6 PF BINDER

VIII		BID DOCUMENTS	Please mark (X) as completed
A		Completed Michigan Bus Specification forms	X SEE SECTION 2 OF BINDER
B		Bus floor plans	X SEE SECTION 6 OF BINDER
C		Entrance door and door opening device design	X SEE SECTION 9 OF BINDER
D		Entrance step configuration design	X SEE SECTION 9 OF BINDER
E		Roof, sidewall, and flooring drawings	X SEE SECTION 9 OF BINDER
F		Manufacturer's chassis description	X SEE SECTION 4 OF BINDER
G		Body to chassis frame mounting	X SEE SECTION 9 OF BINDER
H		Wheelchair lift manufacturers' specifications	X SEE SECTION 11 OF BINDER
I		Body, chassis, and drive train warranties	X SEE SECTION 8 OF BINDER
J		Bus Rolllover protection Test (FMVSS 220) Certification	X SEE SECTION 10 OF BINDER
K		Federal Transit Administration (FTA) Clauses	X SEE SECTION 2 OF BINDER
L		Seat covering material flammability and smoke data	X SEE SECTION 13 OF BINDER
M		Seat frame salt spray test data	X SEE SECTION 13 OF BINDER
N		Seat and seat belt certification	X SEE SECTION 13 OF BINDER

**REVISED C-C-T MODEL**  
**MICHIGAN HYBRID SMALL BUS SPECIFICATION**  
 7 Years/200,000 Miles  
**14 Passenger Non-lift/Lift Buses with Alternate Seating**  
**07119200181 – Addendum #1 (Attachment #1)**

<b>O</b>	Wiring and switch certification	<b>X</b>	<b>SEE SECTION 14 OF BINDER</b>
<b>P</b>	Dealer Agreement	<b>X</b>	<b>SEE SECTION 15 OF BINDER</b>
<b>Q</b>	Bus Testing Certification	<b>X</b>	<b>SEE SECTION 10 OF BINDER</b>
<b>R</b>	<b>EXCEPTIONS</b> List all exceptions in the space below:		
<b>S</b>	<b>BIDDER COMMENTS</b>		

**APPENDIX “A”**  
**FTA CLAUSES**

## **Federally Required Contract Clauses (Rolling Stock)**

### **Appendix A - Governing Documents**

**Bidder Instructions:** Return copies of these pages with your bids. Fill in parts 1, 5, 6, 7, and 20.

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## 1. **BUY AMERICA REQUIREMENTS**

The contractor agrees to comply with 49 U.S.C. 5323(j) and 49 C.F.R. Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 C.F.R. 661.7, and include final assembly in the United States for 15 passenger vans and 15 passenger wagons produced by Chrysler Corporation, and microcomputer equipment and software. Separate requirements for rolling stock are set out at 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11. Rolling stock must be assembled in the United States and have a 60 percent domestic content.

A bidder or offeror must submit to the FTA recipient the appropriate Buy America certification (below) with all bids or offers on FTA-funded contracts, except those subject to a general waiver. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as nonresponsive. This requirement does not apply to lower tier subcontractors.

### **Certification requirement for procurement of steel, iron, or manufactured products.**

#### *Certificate of Compliance with 49 U.S.C. 5323(j)(1)*

The bidder or offeror hereby certifies that it will meet the requirements of 49 U.S.C. 5323(j)(1) and the applicable regulations in 49 C.F.R. Part 661.5.

Date June 12, 2009

Signature \_\_\_\_\_



Company Name Midwest Transit Equipment Inc. of MI

Title Director of Governmental Sales

*Certificate of Non-Compliance with 49 U.S.C. 5323(j)(1)*

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(1) and 49 C.F.R. 661.5, but it may qualify for an exception pursuant to 49 U.S.C. 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 C.F.R. 661.7.

Date \_\_\_\_\_

Signature \_\_\_\_\_

Company Name \_\_\_\_\_

Title \_\_\_\_\_

**Certification requirement for procurement of buses, other rolling stock and associated equipment.**

*Certificate of Compliance with 49 U.S.C. 5323(j)(2)(C)*

The bidder or offeror hereby certifies that it will comply with the requirements of 49 U.S.C. 5323(j)(2)(C) and the regulations at 49 C.F.R. Part 661.11.

Date June 12, 2009

Signature 

Company Name Midwest Transit Equipment Inc. of MI

Title Director of Governmental Sales

*Certificate of Non-Compliance with 49 U.S.C. 5323(j)(2)(C)*

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11, but may qualify for an exception pursuant to 49 U.S.C. 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 CFR 661.7.

Date \_\_\_\_\_

Signature \_\_\_\_\_

Company Name \_\_\_\_\_

Title \_\_\_\_\_

**2. CARGO PREFERENCE REQUIREMENTS 46 U.S.C. 1241/46 CFR Part 381**

**Use of United States-Flag Vessels -** The contractor agrees:

- a. to use privately owned United States-Flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to the underlying contract to the extent such vessels are available at fair and reasonable rates for United States-Flag commercial vessels;
- b. to furnish within 20 working days following the date of loading for shipments originating within the United States or within 30 working days following the date of leading for shipments originating outside the United States, a legible copy of a rated, "on-board" commercial ocean bill-of-lading in English for each shipment of cargo described in the preceding paragraph to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590 and to the FTA recipient (through the contractor in the case of a subcontractor's bill-of-lading.)
- c. to include these requirements in all subcontracts issued pursuant to this contract when the subcontract may involve the transport of equipment, material, or commodities by ocean vessel.

**3. ENERGY CONSERVATION REQUIREMENTS 42 U.S.C. 6321 et seq./49 CFR Part 18**

The contractor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act.

**4. CLEAN WATER REQUIREMENTS 33 U.S.C. 1251**

- (1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.
- (2) The Contractor also agrees to include these requirements in each subcontract exceeding \$100,000 financed in whole or in part with Federal assistance provided by FTA.

**5. BUS TESTING** 49 U.S.C. 5323(c)/49 CFR Part 665

The Contractor [Manufacturer] agrees to comply with 49 U.S.C. A 5323(c) and FTA's implementing regulation at 49 CFR Part 665 and shall perform the following:

- 1) A manufacturer of a new bus model or a bus produced with a major change in components or configuration shall provide a copy of the final test report to the recipient at a point in the procurement process specified by the recipient which will be prior to the recipient's final acceptance of the first vehicle.
- 2) A manufacturer who releases a report under paragraph 1 above shall provide notice to the operator of the testing facility that the report is available to the public.
- 3) If the manufacturer represents that the vehicle was previously tested, the vehicle being sold should have the identical configuration and major components as the vehicle in the test report, which must be provided to the recipient prior to recipient's final acceptance of the first vehicle. If the configuration or components are not identical, the manufacturer shall provide a description of the change and the manufacturer's basis for concluding that it is not a major change requiring additional testing.
- 4) If the manufacturer represents that the vehicle is "grandfathered" (has been used in mass transit service in the United States before October 1, 1988, and is currently being produced without a major change in configuration or components), the manufacturer shall provide the name and address of the recipient of such a vehicle and the details of that vehicle's configuration and major components.

**CERTIFICATION OF COMPLIANCE WITH FTA'S BUS TESTING REQUIREMENTS**

The undersigned [Contractor/Manufacturer] certifies that the vehicle offered in this procurement complies with 49 U.S.C. A 5323(c) and FTA's implementing regulation at 49 CFR Part 665.

The undersigned understands that misrepresenting the testing status of a vehicle acquired with Federal financial assistance may subject the undersigned to civil penalties as outlined in the Department of Transportation's regulation on Program Fraud Civil Remedies, 49 CFR Part 31. In addition, the undersigned understands that FTA may suspend or debar a manufacturer under the procedures in 49 CFR Part 29.

Date: June 12, 2009

Signature: 

Company Name: Midwest Transit Equipment Inc. of MI

Title: Director of Governmental Sales

**6. PRE-AWARD AND POST DELIVERY AUDITS REQUIREMENTS** 49 U.S.C. 5323/49  
CFR Part 663

The Contractor agrees to comply with 49 U.S.C. § 5323(l) and FTA's implementing regulation at 49 C.F.R. Part 663 and to submit the following certifications:

- (1) Buy America Requirements: The Contractor shall complete and submit a declaration certifying either compliance or noncompliance with Buy America. If the Bidder/Offeror certifies compliance with Buy America, it shall submit documentation which lists 1) component and subcomponent parts of the rolling stock to be purchased identified by manufacturer of the parts, their country of origin and costs; and 2) the location of the final assembly point for the rolling stock, including a description of the activities that will take place at the final assembly point and the cost of final assembly.
- (2) Solicitation Specification Requirements: The Contractor shall submit evidence that it will be capable of meeting the bid specifications.
- (3) Federal Motor Vehicle Safety Standards (FMVSS): The Contractor shall submit 1) manufacturer's FMVSS self-certification sticker information that the vehicle complies with relevant FMVSS or 2) manufacturer's certified statement that the contracted buses will not be subject to FMVSS regulations.

**BUY AMERICA CERTIFICATE OF COMPLIANCE WITH FTA REQUIREMENTS  
FOR BUSES, OTHER ROLLING STOCK, OR ASSOCIATED EQUIPMENT**

*(To be submitted with a bid or offer exceeding the small purchase threshold for Federal assistance programs, currently set at \$100,000.)*

Certificate of Compliance

The bidder hereby certifies that it will comply with the requirements of 49 U.S.C. Section 5323(j)(2)(C), Section 165(b)(3) of the Surface Transportation Assistance Act of 1982, as amended, and the regulations of 49 C.F.R. 661.11:

Date: June 12, 2009

Signature: 

Company Name: Midwest Transit Equipment Inc. of MI

Title: Director of Governmental Sales

Certificate of Non-Compliance

The bidder hereby certifies that it cannot comply with the requirements of 49 U.S.C. Section 5323(j)(2)(C) and Section 165(b)(3) of the Surface Transportation Assistance Act of 1982, as amended, but may qualify for an exception to the requirements consistent with 49 U.S.C. Sections 5323(j)(2)(B) or (j)(2)(D), Sections 165(b)(2) or (b)(4) of the Surface Transportation Assistance Act, as amended, and regulations in 49 C.F.R. 661.7.

Date: \_\_\_\_\_

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

Company Name: \_\_\_\_\_

Title: \_\_\_\_\_

\_\_\_\_\_

**7. LOBBYING** 31 U.S.C. 1352/49 CFR Part 19/49 CFR Part 20

**Byrd Anti-Lobbying Amendment, 31 U.S.C. 1352, as amended by the Lobbying Disclosure Act of 1995, P.L. 104-65 [to be codified at 2 U.S.C. § 1601, et seq.]** - Contractors who apply or bid for an award of \$100,000 or more shall file the certification required by 49 CFR part 20, "New Restrictions on Lobbying." Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier shall also disclose the name of any registrant under the Lobbying Disclosure Act of 1995 who has made lobbying contacts on its behalf with non-Federal funds with respect to that Federal contract, grant or award covered by 31 U.S.C. 1352. Such disclosures are forwarded from tier to tier up to the recipient.

**APPENDIX A, 49 CFR PART 20--CERTIFICATION REGARDING LOBBYING**

Certification for Contracts, Grants, Loans, and Cooperative Agreements

*(To be submitted with each bid or offer exceeding \$100,000)*

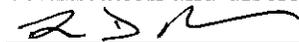
The undersigned [Contractor] certifies, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form--LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, et seq.)]
- (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

[Note: Pursuant to 31 U.S.C. § 1352(c)(1)-(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such expenditure or failure.]

The Contractor, Midwest Transit Equipment Inc. of MI, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. A 3801, *et seq.*, apply to this certification and disclosure, if any.



Signature of Contractor's Authorized Official

Thomas D. Boldwin Name and Title of Contractor's Authorized Official  
Director of Governmental Sales

June 12, 2009 Date

**8. ACCESS TO RECORDS AND REPORTS** 49 U.S.C. 5325/18 CFR 18.36 (i)/49 CFR 633.17

The following access to records requirements apply to this Contract:

1. Where the Purchaser is not a State but a local government and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 18.36(i), the Contractor agrees to provide the Purchaser, the FTA Administrator, the Comptroller General of the United States or any of their authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions. Contractor also agrees, pursuant to 49 C.F.R. 633.17 to provide the FTA Administrator or his authorized representatives including any PMO Contractor access to Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311

2. Where the Purchaser is a State and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 633.17, Contractor agrees to provide the Purchaser, the FTA Administrator or his authorized representatives, including any PMO Contractor, access to the Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311. By definition, a major capital project excludes contracts of less than the simplified acquisition threshold currently set at \$100,000.
3. Where the Purchaser enters into a negotiated contract for other than a small purchase or under the simplified acquisition threshold and is an institution of higher education, a hospital or other non-profit organization and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 19.48, Contractor agrees to provide the Purchaser, FTA Administrator, the Comptroller General of the United States or any of their duly authorized representatives with access to any books, documents, papers and record of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions.
4. Where any Purchaser which is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 U.S.C. 5325(a) enters into a contract for a capital project or improvement (defined at 49 U.S.C. 5302(a)1) through other than competitive bidding, the Contractor shall make available records related to the contract to the Purchaser, the Secretary of Transportation and the Comptroller General or any authorized officer or employee of any of them for the purposes of conducting an audit and inspection.
5. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.
6. The Contractor agrees to maintain all books, records, accounts and reports required under this contract for a period of not less than three years after the date of termination or expiration of this contract, except in the event of litigation or settlement of claims arising from the performance of this contract, in which case Contractor agrees to maintain same until the Purchaser, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto. Reference 49 CFR 18.39(i)(11).
7. FTA does not require the inclusion of these requirements in subcontracts.

**Requirements for Access to Records and Reports by Types of Contract**

Contract Characteristics	Operational Service Contract	Turnkey	Construction	Architectural Engineering	Acquisition of Rolling Stock	Professional Services
<u>I State Grantees</u>						
a Contracts below SAT (\$100,000)	None	Those imposed on state pass thru to Contractor	None	None	None	None
b. Contracts above \$100,000/Capital Projects	None unless <sup>1</sup> non-competitive award		Yes, if non-competitive award or if funded thru <sup>2</sup> 5307/5309/5311	None unless non-competitive award	None unless non-competitive award	None unless non-competitive award
<u>II Non State Grantees</u>						
a Contracts below SAT (\$100,000)	Yes <sup>3</sup>	Those imposed on non-state Grantee pass thru to Contractor	Yes	Yes	Yes	Yes
b. Contracts above \$100,000/Capital Projects	Yes <sup>3</sup>		Yes	Yes	Yes	Yes

Sources of Authority:

<sup>1</sup> 49 USC 5325 (a)

<sup>2</sup> 49 CFR 633.17

<sup>3</sup> 18 CFR 18.36 (i)

**9. FEDERAL CHANGES** 49 CFR Part 18

Contractor shall at all times comply with all applicable FTA regulations, policies, procedures and directives, including without limitation those listed directly or by reference in the Master Agreement between Purchaser and FTA, as they may be amended or promulgated from time to time during the term of this contract. Contractor's failure to so comply shall constitute a material breach of this contract.

**10. CLEAN AIR** 42 U.S.C. 7401 et seq/40 CFR 15.61/49 CFR Part 18

- (1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. §§ 7401 et seq. The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.
- (2) The Contractor also agrees to include these requirements in each subcontract exceeding \$100,000 financed in whole or in part with Federal assistance provided by FTA.

**11. RECYCLED PRODUCTS** 42 U.S.C. 6962/40 CFR Part 247/Executive Order 12873

The contractor agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. 6962), including but not limited to the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247.

**12. NO GOVERNMENT OBLIGATION TO THIRD PARTIES****No Obligation by the Federal Government.**

- (1) The Purchaser and Contractor acknowledge and agree that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of the underlying contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this contract and shall not be subject to any obligations or liabilities to the Purchaser, Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.
- (2) The Contractor agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

**13. PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS AND RELATED ACTS**

31 U.S.C. 3801 et seq. /49 CFR Part 31 18 U.S.C. 1001/49 U.S.C. 5307

- (1) The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § 3801 et seq. and U.S. DOT regulations, "Program Fraud Civil Remedies," 49 C.F.R. Part 31, apply to its actions pertaining to this Project. Upon execution of the underlying contract, the Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract or the FTA assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.
- (2) The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA under the authority of 49 U.S.C. § 5307, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on the Contractor, to the extent the Federal Government deems appropriate.
- (3) The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

**14. TERMINATION** 49 U.S.C. Part 18/FTA Circular 4220.1F

**a. Termination for Convenience (General Provision)** The (Recipient) may terminate this contract, in whole or in part, at any time by written notice to the Contractor when it is in the Government's best interest. The Contractor shall be paid its costs, including contract close-out costs, and profit on work performed up to the time of termination. The Contractor shall promptly submit its termination claim to (Recipient) to be paid the Contractor. If the Contractor has any property in its possession belonging to the (Recipient), the Contractor will account for the same, and dispose of it in the manner the (Recipient) directs.

**b. Termination for Default [Breach or Cause] (General Provision)** If the Contractor does not deliver supplies in accordance with the contract delivery schedule, or, if the contract is for services, the Contractor fails to perform in the manner called for in the contract, or if the Contractor fails to comply with any other provisions of the contract, the (Recipient) may terminate this contract for default. Termination shall be effected by serving a notice of termination on the contractor setting forth the manner in which the Contractor is in default. The contractor will only be paid the contract price for supplies delivered and accepted, or services performed in accordance with the manner of performance set forth in the contract. If it is later determined by the (Recipient) that the Contractor had an excusable reason for not performing, such as a strike, fire, or flood, events which are not the fault of or are beyond the control of the Contractor, the (Recipient), after setting up a new delivery of performance schedule, may allow the Contractor to continue work, or treat the termination as a termination for convenience.

**c. Opportunity to Cure (General Provision)** The (Recipient) in its sole discretion may, in the case of a termination for breach or default, allow the Contractor [an appropriately short period of time] in which to cure the defect. In such case, the notice of termination will state the time period in which cure is permitted and other appropriate conditions

If Contractor fails to remedy to (Recipient)'s satisfaction the breach or default of any of the terms, covenants, or conditions of this Contract within [ten (10) days] after receipt by Contractor of written notice from (Recipient) setting forth the nature of said breach or default, (Recipient) shall have the right to terminate the Contract without any further obligation to Contractor. Any such termination for default shall not in any way operate to preclude (Recipient) from also pursuing all available remedies against Contractor and its sureties for said breach or default.

**d. Waiver of Remedies for any Breach** In the event that (Recipient) elects to waive its remedies for any breach by Contractor of any covenant, term or condition of this Contract, such waiver by (Recipient) shall not limit (Recipient)'s remedies for any succeeding breach of that or of any other term, covenant, or condition of this Contract.

**e. Termination for Convenience (Professional or Transit Service Contracts)** The (Recipient), by written notice, may terminate this contract, in whole or in part, when it is in the Government's interest. If this contract is terminated, the Recipient shall be liable only for payment under the payment provisions of this contract for services rendered before the effective date of termination.

**f. Termination for Default (Supplies and Service)** If the Contractor fails to deliver supplies or to perform the services within the time specified in this contract or any extension or if the Contractor fails to comply with any other provisions of this contract, the (Recipient) may terminate this contract for default. The (Recipient) shall terminate by delivering to the Contractor a Notice of Termination specifying the nature of the default. The Contractor will only be paid the contract price for supplies delivered and accepted, or services performed in accordance with the manner or performance set forth in this contract.

If, after termination for failure to fulfill contract obligations, it is determined that the Contractor was not in default, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of the Recipient.

**g. Termination for Default (Transportation Services)** If the Contractor fails to pick up the commodities or to perform the services, including delivery services, within the time specified in this contract or any extension or if the Contractor fails to comply with any other provisions of this contract, the (Recipient) may terminate this contract for default. The (Recipient) shall terminate by delivering to the Contractor a Notice of Termination specifying the nature of default. The Contractor will only be paid the contract price for services performed in accordance with the manner of performance set forth in this contract.

If this contract is terminated while the Contractor has possession of Recipient goods, the Contractor shall, upon direction of the (Recipient), protect and preserve the goods until surrendered to the Recipient or its agent. The Contractor and (Recipient) shall agree on payment for the preservation and protection of goods. Failure to agree on an amount will be resolved under the Dispute clause.

If, after termination for failure to fulfill contract obligations, it is determined that the Contractor was not in default, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of the (Recipient).

**h. Termination for Default (Construction)** If the Contractor refuses or fails to prosecute the work or any separable part, with the diligence that will insure its completion within the time specified in this contract or any extension or fails to complete the work within this time, or if the Contractor fails to comply with any other provisions of this contract, the (Recipient) may terminate this contract for default. The (Recipient) shall terminate by delivering to the

Contractor a Notice of Termination specifying the nature of the default. In this event, the Recipient may take over the work and complete it by contract or otherwise, and may take possession of and use any materials, appliances, and plant on the work site necessary for completing the work. The Contractor and its sureties shall be liable for any damage to the Recipient resulting from the Contractor's refusal or failure to complete the work within specified time, whether or not the Contractor's right to proceed with the work is terminated. This liability includes any increased costs incurred by the Recipient in completing the work.

The Contractor's right to proceed shall not be terminated nor the Contractor charged with damages under this clause if-

1. the delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include: acts of God, acts of the Recipient, acts of another Contractor in the performance of a contract with the Recipient, epidemics, quarantine restrictions, strikes, freight embargoes; and
2. the contractor, within [10] days from the beginning of any delay, notifies the (Recipient) in writing of the causes of delay. If in the judgment of the (Recipient), the delay is excusable, the time for completing the work shall be extended. The judgment of the (Recipient) shall be final and conclusive on the parties, but subject to appeal under the Disputes clauses.
  - a. If, after termination of the Contractor's right to proceed, it is determined that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the termination had been issued for the convenience of the Recipient.

**i. Termination for Convenience or Default (Architect and Engineering)** The (Recipient) may terminate this contract in whole or in part, for the Recipient's convenience or because of the failure of the Contractor to fulfill the contract obligations. The (Recipient) shall terminate by delivering to the Contractor a Notice of Termination specifying the nature, extent, and effective date of the termination. Upon receipt of the notice, the Contractor shall (1) immediately discontinue all services affected (unless the notice directs otherwise), and (2) deliver to the Contracting Officer all data, drawings, specifications, reports, estimates, summaries, and other information and materials accumulated in performing this contract, whether completed or in process.

If the termination is for the convenience of the Recipient, the Contracting Officer shall make an equitable adjustment in the contract price but shall allow no anticipated profit on unperformed services.

If the termination is for failure of the Contractor to fulfill the contract obligations, the Recipient

may complete the work by contract or otherwise and the Contractor shall be liable for any additional cost incurred by the Recipient.

If, after termination for failure to fulfill contract obligations, it is determined that the Contractor was not in default, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of the Recipient.

**j. Termination for Convenience of Default (Cost-Type Contracts)** The (Recipient) may terminate this contract, or any portion of it, by serving a notice of termination on the Contractor. The notice shall state whether the termination is for convenience of the (Recipient) or for the default of the Contractor. If the termination is for default, the notice shall state the manner in which the contractor has failed to perform the requirements of the contract. The Contractor shall account for any property in its possession paid for from funds received from the (Recipient), or property supplied to the Contractor by the (Recipient). If the termination is for default, the (Recipient) may fix the fee, if the contract provides for a fee, to be paid the contractor in proportion to the value, if any, of work performed up to the time of termination. The Contractor shall promptly submit its termination claim to the (Recipient) and the parties shall negotiate the termination settlement to be paid the Contractor.

If the termination is for the convenience of the (Recipient), the Contractor shall be paid its contract close-out costs, and a fee, if the contract provided for payment of a fee, in proportion to the work performed up to the time of termination.

If, after serving a notice of termination for default, the (Recipient) determines that the Contractor has an excusable reason for not performing, such as strike, fire, flood, events which are not the fault of and are beyond the control of the contractor, the (Recipient), after setting up a new work schedule, may allow the Contractor to continue work, or treat the termination as a termination for convenience.

## **15. GOVERNMENT-WIDE DEBARMENT AND SUSPENSION (NONPROCUREMENT)**

49 CFR Part 29/Executive Order 12549/Executive Order 12689/31 U.S.C. 6101 note (Section 2455, Public Law 103-355, 108 Stat. 3327)

### **Suspension and Debarment**

This contract is a covered transaction for purposes of 49 CFR Part 29. As such, the contractor is required to verify that none of the contractor, its principals, as defined at 49 CFR 29.995, or affiliates, as defined at 49 CFR 29.905, are excluded or disqualified as defined at 49 CFR 29.940 and 29.945.

The contractor is required to comply with 49 CFR 29, Subpart C and must include the requirement to comply with 49 CFR 29, Subpart C in any lower tier covered transaction it enters into.

By signing and submitting its bid or proposal, the bidder or proposer certifies as follows:

The certification in this clause is a material representation of fact relied upon by the **State of Michigan**. If it is later determined that the bidder or proposer knowingly rendered an erroneous certification, in addition to remedies available to the **State of Michigan**, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment. The bidder or proposer agrees to comply with the requirements of 49 CFR 29, Subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

#### **16. PRIVACY ACT REQUIREMENTS 5 U.S.C. 552**

The following requirements apply to the Contractor and its employees that administer any system of records on behalf of the Federal Government under any contract:

- (1) The Contractor agrees to comply with, and assures the compliance of its employees with, the information restrictions and other applicable requirements of the Privacy Act of 1974, 5 U.S.C. § 552a. Among other things, the Contractor agrees to obtain the express consent of the Federal Government before the Contractor or its employees operate a system of records on behalf of the Federal Government. The Contractor understands that the requirements of the Privacy Act, including the civil and criminal penalties for violation of that Act, apply to those individuals involved, and that failure to comply with the terms of the Privacy Act may result in termination of the underlying contract.
- (2) The Contractor also agrees to include these requirements in each subcontract to administer any system of records on behalf of the Federal Government financed in whole or in part with Federal assistance provided by FTA.

**17. CIVIL RIGHTS REQUIREMENTS** 29 U.S.C. § 623, 42 U.S.C. § 2000/42 U.S.C. § 6102, 42 U.S.C. § 12112/42 U.S.C. § 12132, 49 U.S.C. § 5332/29 CFR Part 1630/41 CFR Parts 60 et seq.

The following requirements apply to the underlying contract:

(1) Nondiscrimination - In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, section 202 of the Americans with Disabilities Act of 1990, 42 U.S.C. § 12132, and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, age, or disability. In addition, the Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.

(2) Equal Employment Opportunity - The following equal employment opportunity requirements apply to the underlying contract:

(a) Race, Color, Creed, National Origin, Sex - In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal transit laws at 49 U.S.C. § 5332, the Contractor agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Parts 60 et seq., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Project. The Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(b) Age - In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. § § 623 and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(c) Disabilities - In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, the Contractor agrees that it will comply with the requirements of

U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

(3) The Contractor also agrees to include these requirements in each subcontract financed in whole or in part with Federal assistance provided by FTA, modified only if necessary to identify the affected parties.

#### **18. BREACHES AND DISPUTE RESOLUTION** 49 CFR Part 18/FTA Circular 4220.1F

**Disputes** - Disputes arising in the performance of this Contract which are not resolved by agreement of the parties shall be decided in writing by the authorized representative of (Recipient)'s [title of employee]. This decision shall be final and conclusive unless within [ten (10)] days from the date of receipt of its copy, the Contractor mails or otherwise furnishes a written appeal to the [title of employee]. In connection with any such appeal, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of its position. The decision of the [title of employee] shall be binding upon the Contractor and the Contractor shall abide by the decision.

**Performance During Dispute** - Unless otherwise directed by (Recipient), Contractor shall continue performance under this Contract while matters in dispute are being resolved.

**Claims for Damages** - Should either party to the Contract suffer injury or damage to person or property because of any act or omission of the party or of any of his employees, agents or others for whose acts he is legally liable, a claim for damages therefor shall be made in writing to such other party within a reasonable time after the first observance of such injury or damage.

**Remedies** - Unless this contract provides otherwise, all claims, counterclaims, disputes and other matters in question between the (Recipient) and the Contractor arising out of or relating to this agreement or its breach will be decided by arbitration if the parties mutually agree, or in a court of competent jurisdiction within the State in which the (Recipient) is located.

**Rights and Remedies** - The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law. No action or failure to act by the (Recipient), (Architect) or Contractor shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

**19. DISADVANTAGED BUSINESS ENTERPRISE (DBE) 49 CFR Part 26**

- a. The contractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of this U.S. DOT-assisted contract. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the **State of Michigan** deems appropriate. Each subcontract the contractor signs with a subcontractor must include the assurance in this paragraph (*see* 49 CFR 26.13(b)).
- b. This contract is subject to the requirements of Title 49, Code of Federal Regulations, Part 26, *Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs*. Each subcontract the contractor signs with a subcontractor must include the assurance in this paragraph (*see* 49 CFR 26.13(b)). Accordingly, as a condition of permission to bid, a certification must be completed and submitted with the bid. A bid which does not include certification may not be considered.

**20. DBE TRANSIT VEHICLE MANUFACTURER CERTIFICATION**

Startrans Bus by Supreme Corp (Name of Manufacturer), a TVM, hereby certifies that it has complied with the requirement of Section 26.49 of 49 CFR, Part 26 by submitting a current annual DBE goal to FTA. The goals apply to Federal Fiscal Year 2009 (October 1, 2008 to September 30, 2009) and have been approved or not disapproved by FTA.

Midwest Transit Equipment Inc. of MI (Name of Contract Vendor), hereby certifies that the manufacturer of the transit vehicle to be supplied Startrans Bus by Supreme Corp. (Name of Manufacturer) has complied with the above referenced requirement of Section 26.49 of 49 CFR Part 26.

Signature:



Date:

June 12, 2009

Title:

Vice President of Sales

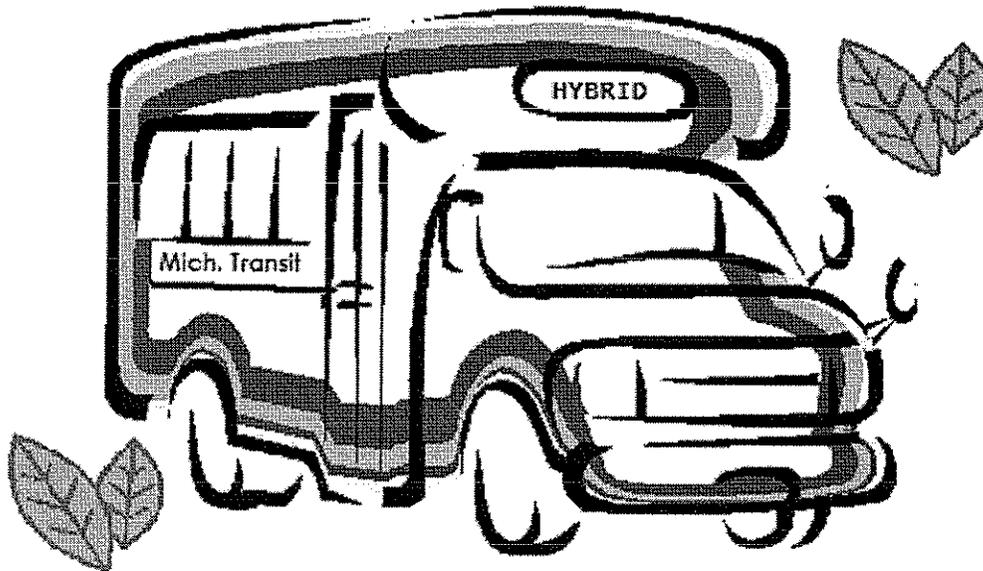
Manufacturer:

Startrans Bus by Supreme Corp.**21. INCORPORATION OF FEDERAL TRANSIT ADMINISTRATION (FTA) TERMS**

FTA Circular 4220 1F

The preceding provisions include, in part, certain Standard Terms and Conditions required by U.S. DOT, whether or not expressly set forth in the preceding contract provisions. All contractual provisions required by U.S. DOT, as set forth in FTA Circular 4220 1F, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Agreement. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any **State of Michigan** requests which would cause the **State of Michigan** to be in violation of the FTA terms and conditions.

**APPENDIX B  
STATE OF MICHIGAN  
PUBLIC TRANSPORTATION**



**HYBRID SMALL BUS SPECIFICATIONS  
7-Years/200,000 Miles  
18 & 24 Passenger Nonlift/Lift Buses with Alternate Seating**



**Bureau of Passenger Transportation  
Bus Acquisition & Intercity Transportation Section**

REVISED 04/30/2009



**STATE OF MICHIGAN**  
**Hybrid Small Bus Specifications**  
**SPECIFICATIONS**  
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**STATE OF MICHIGAN**  
**APPENDIX B - SPECIFICATIONS**  
**7-Years/200,000 Miles**  
**18 & 24 -PASSENGER NON-LIFT HYBRID SMALL BUS**  
**AND LIFT BUS WITH ALTERNATE SEATING**

**I. PURPOSE OF SPECIFICATIONS**

These specifications are setting forth the minimum requirements for a two-axle, transit class commercial non-lift bus or Paratransit type commercial, hybrid bus equipped with a commercial wheelchair lift. The body shall be mounted on a commercial or recreational vehicle (RV) chassis. The small bus must be capable of meeting all seating requirements (see Section X. Bus Seating Requirements). It shall be fully tested at the Penn State bus test facility in Altoona, Pennsylvania to Federal Transit Administration [FTA] minimum service life category of 7-years/200,000 miles. As a minimum, buses must meet all applicable Michigan Motor Carrier Vehicle Codes, all applicable Federal Motor Vehicle Safety Standards (FMVSS) and the Americans with Disabilities Act (ADA).

Any successful bidder supplying these buses shall quick title and deliver the bus and the title to the location specified by the State of Michigan, Bureau of Passenger Transportation. Chassis serial number, body number, axle ratio, gross vehicle weight rating (GVWR), seating capacity and paint codes shall be imprinted on a permanent decal(s) or stamped on a metal plate(s) and affixed in the driver's area of the bus (location to be approved by the State).

The bidder shall have a factory dealer with repair facilities and personnel in Michigan or the bidder may be an out-of-state factory dealer with repair facilities (including a bus lift) and personnel in Michigan. Any in-state facility shall be capable of handling final inspection and corrections required by the State prior to acceptance of the buses after a contract is awarded. A copy of the dealer agreement between the Bus Manufacturer and the designated dealer will be required as part of the bid. Also, repair facilities shall be established throughout the State to provide chassis and body service support to transit agencies to minimize agency travel to reach the nearest repair facility. The successful bidder must be capable of providing parts and service for a period of seven years after the buses have been placed in service throughout the State of Michigan. The successful bidder must be able to supply body replacement parts within five working days of a request by a transit agency unless the bidder notifies the transit agency that the part is not available for shipment and provides the shipping date when the part will be available.

Regardless of options and seating plan ordered, the successful bidder shall be responsible for certifying that all buses delivered: 1) shall not exceed 95% of front spring and 95% of rear spring capacity rating at ground without exceeding GVWR of chassis as bid (determined by engineering calculated loaded vehicle axle weights), and 2) single wheelchair securement area buses shall not exceed 21' 11" in length measured bumper to bumper excluding the energy absorbing portion of the bumper (distance of travel allowed for compression of the bumper without body deformation). Manufacturers shall comply with the chassis company's quality vehicle manufacturing program such as Ford's Quality Vehicle Modifier (QVM).

In these specifications any required approvals shall be made by the State. Wherever brand, manufacturer, or product names are used, they are included only for the purpose of establishing a description of minimum quality of the item. This inclusion is not to be construed as advocating or prescribing the use of any particular brand or item or product. For this bid requests/questions can be submitted, in writing, and be considered as approved equals and exceptions to the bid specifications. An addendum/written response will be made for all bidders prior to the bid due date. The State must be able to determine whether the bidder's offered product is or is not equal to the product described in the specifications from information (technical data, test results, and the like) contained in the bid or provided in bidder's written

requests/questions. All detailed descriptions and specifications provided in the bid must match the product offered for use in the bid.

## **II. BODY SPECIFICATIONS**

### **A. General Design and Construction**

**SAFETY:** The chassis and body shall be designed using only prudent, proven engineering principles with all work performed only by professional established firms. The bus purchased shall comply with all State regulations and requirements applicable to the design and manufacture of motor vehicles for the State of Michigan.

**DRIVER SIZE and COMFORT:** Design criteria of bus purchased shall be for all females from the 5th percentile, to males of the 95th percentile, to be equally as comfortable in using all controls required to safely drive and maneuver the bus. All driver controls shall comply with FMVSS 101, with hand and foot controls required to operate the bus safely, including the placement of exterior/adjustable mirrors, positioned to meet this safety requirement.

**QUALITY of WORKMANSHIP:** All labor employed in both the manufacturing and assembly processes of the bus purchased shall be to the highest industry standards. The entire bus shall be within all established engineering tolerances set by all parties involved in the design and production of the bus. All added components shall be installed and positioned according to the component manufacturer's installation procedures which shall be available upon request.

**WELDING:** All welding procedures used throughout the construction of the bus (including materials, qualifications and training of personnel) shall be in accordance with the standards of the American Society for Testing and Materials (ASTM) and the American Welding Society (AWS). Contact surfaces of all material to be welded shall be clean, and free of grease, paint, rust and scale. After welding, all rough edges and surfaces on parts shall be ground smooth and coated with a corrosion inhibiting primer and paint.

**ATTACHMENT HARDWARE:** All rivets, screws, bolts, nuts, washers and/or other types of fasteners used in the construction process shall be of appropriate size and strength rating for the application. They shall be sprayed with or dipped in a rust-resistant coating material, be plated, be stainless steel, or otherwise be made of rust-resistant type material all of which will pass the 1000 hour ASTM D117 Salt Spray test and the 1000 hour ASTM D2247 Humidity Resistance test. Fasteners used by the respective component manufacturers in their assemblies are acceptable as part of the assembly. The use of self-tapping screws shall be limited to flooring attachment and to steel. Self-tapping screws shall not be utilized in any fiberglass attachment.

### **B. Body Structure and Exterior Panels**

All steel used in the body and floor structure shall be stored out of the elements to prevent early corrosion.

#### **1. Metal Rollover Frame, Cage-type Construction**

- a. The bus shall have a heavy-duty, unit-body structure type. The body structure (rollover frame, cage type of gauge #16 steel, 0.060" or equal, minimum) shall be of durable steel or aluminum construction, and adequately reinforced at all joints and points of stress, with sufficient strength to comply with the FMVSS 220 rollover protection test. All body and floor structural members (tubes, channels,

etc.) shall be Gas Metal Arc Welded (GMAC) or equal at each joint. Each bidder shall provide certification with the bid that the bus, as bid, meets the FMVSS 220 rollover protection test (see Section VIII).

- b. The bus shall be designed to withstand road shocks, stop and start operations, seasonal weather and road extremes, and other conditions found in Michigan transit bus service. The body shall be securely fastened to the chassis frame structure using a method of uniform attachment consisting of strategically placed rubber isolators/cushions with connector bolts that permit body flexing independent of chassis flexing. Roof, side, front, and back panels shall be secured to the body vertical and horizontal frame members, and these, when fastened to the floor structural members, result in a permanent, fully-integrated structural unit adequately reinforced at all points where stress concentration may occur. The body floor sub-frame assembly, including lower skirt reinforcements, shall be gauge number 14 (.075" thickness) minimum galvanized steel (mill applied), gauge number 16 stainless steel, gauge number 12 aluminum, or cold or hot rolled steel with corrosion resistant coating, each of which shall have equal mechanical and corrosion resistance properties as gauge number 14 galvanized steel as a minimum. Wheelwells shall have minimum yield strength of gauge number 14 (.075" thickness) galvanized steel, gauge number 16 (.060" thickness) stainless steel, or gauge number 12 (.10" thickness) aluminum properly welded or secured with approved corrosion resistant fasteners to the floor structure. The entire body cage and frame including floor structure shall be properly coated with a corrosion resistant coating or a non-water permeable primer/paint. All box type tubing used in the floor structure shall have the interior of the tube coated with corrosion resistant material as outlined in Rustproofing/Undercoating Section II., M. All components treated to resist corrosion shall be properly cleaned to remove greases, oils, and residues before application of the corrosion resistant material. Passage holes provided for wiring and hoses shall be thoroughly sealed to prevent dust and moisture intrusion and be sufficiently protected to ensure against wear from friction and the elements. When completed, all body side sections and roof sections including structure shall be at a minimum 1¼" thick. Where body segments are joined they shall be properly sealed to prevent intrusion of drafts, fumes, dust, and water to the interior of the bus body.
- c. All exterior side and roof panel material shall be gauge number 20 (.035 thickness) galvanealed steel, or metal of equal mechanical properties, minimum. If fiberglass, it shall have as a minimum, the mechanical properties equal to gauge number 20 (.035" thickness) steel according to American Society of Mechanical Engineers (ASME) industry standards and must have State approval. The corners, transitions, front panels, and other locations requiring additional strength shall use steel or other metal with mechanical properties to match the structural integrity requirements. Reinforcements shall be installed around all window openings in order to transfer stress around the opening. All door openings shall have full structural framing (tube) or imbedded reinforcements equal to the structural members of the body that will adequately support concentrations of stress around openings. All exposed door frame structure shall be made of 304 stainless steel, acid-etched, coated with zinc based primer and powder coated OEM white (including the fasteners). Where a stiffener or a backer material (substrate) is used for the exterior panels, it shall be bonded with waterproof adhesive to the exterior panel; it shall be a water resistant material that will not wick water; and it must be thoroughly sealed from the elements when installed so that the substrate will not be exposed to or absorb moisture and cause corrosion to the interior of the panel or

any body structure. Exterior panel substrate shall not be of wood composition, plywood or a pressed wood product. Where body segments are joined they shall be properly sealed to prevent intrusion of drafts, fumes, dust, and water to the interior of the bus body.

- d. All interior panels and trim may be made of scuff-resistant laminate/FRP or molded ABS finished material. Trim/interior panels shall have as a minimum the physical properties of gauge number 24 (.024" thickness). Trim/interior panel threaded fasteners or rivets shall secure trim/panels to body framing structure. Where fasteners are in the panels only, a reinforcing nut or reinforcing panel shall be installed for added strength and fastener retention.
- e. Exterior lower skirt panels may be metal or fiberglass and shall be sufficiently stiff to prevent vibration, drumming, or flexing while the bus is in service. Body front and/or rear endcaps may be molded fiberglass panels installed with required structural framing or a FRP composite structure. Highly corrosion resistant metal lower-skirt panels shall consist of compatible materials not subject to electrolysis and shall be sufficiently fastened and braced to prevent damage from ice and snow build-up. Metal lower skirt panels shall be properly coated to resist corrosion (exterior and interior), see Section II., Part M., Undercoating. Lower skirt panels may be one piece in length at manufacture but shall be repairable in sections. Lower skirt panels shall not use a wood substrate material for a panel stiffener. Where exterior panels are lapped, the upper or forward panels shall act as a watershed. Exterior panels that are cut shall have the cut edge sealed (paint or special sealing compound). Sealing and fastening of panel joints, including front and rear cap-to-body joints, shall prevent entrance of moisture and dirt. Joint sealing shall be made through use of a non-shrinking bonding sealant, and joint sealing shall not be solely dependent on an exterior trim strip or a trim cap nor shall the sealing of the panels be dependent on caulking alone. All exterior panels shall be buck riveted and/or bonded to the body frame structure. Exterior metal panels shall be given a thorough anti-corrosion treatment.
- f. The exterior body panels shall have on each side one heavy-duty rubrail. Rubrails (1½" x 1/2" minimum) shall be extruded solid aluminum or extruded UV resistant plastic with a flexible, rubber-type resilient material insert or a solid rubber-type of flexible, resilient material. Rubrails shall be located no less than 25" nor more than 43" above the ground on each side. Rubber fender splash guards shall be installed on front and rear wheel openings. Where the rubrails and fender opening guards are not an integral part of the body, installation of rubrails and fender opening splash guards shall be made after the finish coat of paint is applied to the bus.
- g. Gun installed huckbolt fastenings, buck rivets, bonding adhesives, or approved equivalent shall be utilized on all exterior body panels, rubrails, and all other locations where stress is concentrated. All rivets, screws, bolts, nuts, washers, clamps, and other types of fasteners used in the construction process, including those that would be exposed to the elements, on the exterior and interior of the unit shall be properly plated to resist corrosion. No sheet metal screws shall be permitted, except for rubrails and rubber fender splash guards which can be secured with stainless steel or equivalent plated locking-type, self-tapping fasteners. Fastener materials shall be compatible with materials being fastened. Where self-tapping fasteners are used, body panels shall be reinforced with steel backing, aluminum backing, or stainless steel backing.

- h. Window openings cut into body panels shall have a maximum frame clearance of  $\frac{1}{8}$  " on each side to minimize the need for caulking (see Section II. V., Windows). All openings cut into metal body exterior panels must have the exposed cut edges primed or properly coated to inhibit water intrusion and corrosion before further assembly or painting occurs. Window frames installed in the body openings, shall be properly caulked/sealed to prevent intrusion of moisture and dust.

## **2. Fiberglass Reinforced Plastic (FRP) Composite Unitized-type Body**

- a. The bus body shall have a heavy-duty unitized structure and shall be of durable fiberglass reinforced plastic (FRP) composite construction. The body panels shall consist of an exterior high gloss gelcoat (.020" thickness, minimum) on a resin-hardened FRP (3/16" thickness, minimum) attached to a center layer of resin hardened Nida-Core<sup>®</sup> or equal honeycomb ( $\frac{3}{4}$ " thickness, minimum) with an inner FRP panel (3/16 " thickness, minimum); or may be  $\frac{3}{4}$ " polyurethane foam insulation gelcoated to  $\frac{1}{4}$ " FRP exterior with  $\frac{1}{4}$ " FRP interior, reinforced with steel perimeter and transverse supports, completely fiberglassed to adjoining body parts. It shall use proper adhesive materials to adequately bond and mechanically fasten all joints and points of stress with sufficient strength to comply with the FMVSS 220 rollover protection test. Each bidder shall provide certification with the bid that the bus as bid meets the FMVSS 220 rollover protection test (see Section VIII).
- b. The bus shall be designed to withstand road shocks, stop and start operations, seasonal weather and road extremes, and other conditions found in Michigan transit bus service. The body shall be securely fastened to the chassis frame structure using a method of uniform attachment consisting of strategically placed rubber isolators/cushions with connector bolts that permit body flexing independent of chassis flexing. Roof, side, front, and back panels shall be secured to the floor and lower body frame members; all of which shall result in a permanent, fully-integrated structural unit adequately reinforced at all points where stress concentration may occur. The body floor sub-frame assembly, including lower skirt reinforcements, shall be gauge number 14 (.075" thickness) minimum galvanized steel (mill applied), stainless steel, aluminum, or cold or hot rolled steel with corrosion resistant coating (including steel treated with a sprayed on coating), each of which shall have equal mechanical and corrosion resistance properties as gauge number 14 (.075" thickness) galvanized steel as a minimum. Wheelwells shall have minimum yield strength of gauge number 14 galvanized steel, gauge number 16 (.060" thickness) stainless steel, or gauge number 12 (.10" thickness) aluminum properly welded or secured with approved corrosion resistant fasteners to the floor structure. Passage holes provided for wiring and hoses shall be thoroughly sealed and protected to prevent dust and moisture intrusion and be sufficiently protected to ensure against wear from friction and the elements. The entire lower body frame shall be coated with corrosion resistant primer/paint (steel) or properly treated to resist corrosion (other materials). All treated components shall be properly cleaned to remove greases, oils, and residues before application of the corrosion resistant material
- c. All exterior side and roof panels when completed shall be at a minimum  $1\frac{1}{8}$  " thick. Bond lines at the side walls, rear endcap, roof, and front cap shall be interlocked by adhesives, resin saturated fiberglass matting, and mechanical

fasteners, forming a unibody design without exposed fasteners or protruding moldings. Imbedded reinforcements equal to the structural members of the body shall be installed at all door openings in order to support door mounting hardware and door operating mechanisms. All door openings shall have full structural framing to maintain integrity of the body structure. All exposed door frame structure shall be made of 304 stainless steel acid-etched, coated with zinc based primer and powder coated OEM white (including the fasteners).

- d. Interior panels may be an integral part of the FRP composite panel or may be made of scuff-resistant laminate/FRP finished material. Molded ABS may be used as trim but not for interior panels. Where threaded fasteners are in the trim/interior panel only, an imbedded reinforcing nut or a reinforcing panel shall be integrated into the FRP composite for added strength and fastener retention.
- e. Exterior panels may be an integral part of the FRP composite panel. Exterior panels shall be sufficiently stiff to prevent vibration, drumming, or flexing while the bus is in service. Lower skirt panels shall be sufficiently fastened and braced to prevent damage from ice and snow build-up. Lower skirt panels may be one piece in length at manufacture but shall be repairable in sections. Where panels are lapped, the upper and/or forward panels shall overlap the lower and/or rearward panels to prevent intrusion of water under the panels. Sealing and fastening of joints, including front and rear cap-to-body joints, shall prevent entrance of moisture and dirt. All exterior panels shall be bonded to the lower body frame. In no case shall the sealing of the panels be dependent on caulking alone.
- f. The exterior body panels shall have on each side one heavy-duty rubrail. Rubrails (1½" x ½" minimum) shall be extruded solid aluminum or extruded UV resistant plastic with a flexible, rubber-type resilient material insert or a solid rubber-type of flexible, resilient material. Rubrails shall be located no less than 25" nor more than 43" above the ground on each side. Rubber fender splash guards shall be installed on front and rear wheel openings. Where the rubrails and fender opening guards are not an integral part of the body, installation of rubrails and fender opening splash guards shall be made after the finish coat of paint is applied to the bus.
- g. No sheet metal screws shall be permitted, except for rubrails and rubber fender splash guards which can be secured with stainless steel or equivalent plated locking-type, self-tapping fasteners. Fastener materials shall be compatible with materials being fastened and meet the 1000 hour ASTM D117 Salt Spray test and the 1000 hour ASTM D2247 Humidity Resistance test. Where self-tapping fasteners are used in body panels, the body panels shall have an imbedded reinforcing nut or a reinforcing panel shall be integrated into the FRP composite for added strength and fastener retention.
- h. Window openings cut into body panels shall have a maximum frame clearance of 1/8" on each side, to minimize the need for caulking (see Section II. V., Windows). All openings cut into body exterior panels must have the exposed edges of the cutout properly coated to prevent moisture intrusion before further assembly or painting occurs. Window frames installed in the body openings shall be properly caulked/sealed to prevent intrusion of moisture and dust.

### **C. Passenger Door**

1. The manufacturer shall provide a heavy duty electrically operated passenger entrance door. The passenger entrance door shall be a split-type double leaf swing door. This door shall have a flexible soft rubber cushion on the meeting edge 1½ " in width, minimum. The door glass shall be see-through, AS-2 tint (70% luminous transmittance) safety glass. Under all operating conditions and bus speeds, an airtight, watertight, and dust-proof seal shall be formed between the door and the stepwell, between the door and body opening, and between the door leaf sections. The door leading edge opening speed shall not exceed 18 inches per second and the closing speed shall not exceed 12 inches per second to provide a total door closing or opening in 2 to 4 seconds. The front passenger entrance door shall not extend below the step frame. The door shall be located on the right side of the bus near the front wheel. Any door with an exposed (metal showing) outer frame shall be made of 304 stainless steel acid-etched, coated with zinc based primer and powder coated OEM white (including the fasteners). The entrance door shall provide a 30" clear width opening, minimum. Door opening height from the top of the first step to the door header shall be a minimum of 76". Where interior height is low at the entrance header, the header shall be padded to prevent injury to those exiting the bus.
2. The door frame strength and electric door operator strength shall be designed to match the entrance door size. The operator for the entrance door shall be located in an overhead compartment above the passenger entrance doorway; shall be concealed from passengers; and shall be easily accessible for servicing through a hinged access door. The access door shall be hinged to open up with a holding device and shall be as large as will fit in the overhead compartment space. Door motor operation shall be limited electrically to control door travel at full open and full closed positions and shall be adjustable to keep the door closed during bus operation. Physical door stops shall be used to prevent marring or damage to doors and/or surrounding parts. An entrance door manual release that allows disconnection and simple re-engagement of the door operator shall be provided so that the entrance doors can be manually opened in the event of loss of electrical power or other emergency. The door operator motor shall not run continuously when the manual release is operated. Electric door operator, door linkage, and baseplate components shall be of a single manufacturer. Suggested source: A&M Systems Inc, Excell, Vapor
3. The passenger door control switch shall be located in the driver's compartment within easy reach of the driver and be clearly marked for "open" and "close" (switch shall operate the same on all buses). The control switch shall be powered by a constant battery feed circuit with circuit breaker protection. The control switch shall be "hold on" for operation and of a different color than other standard switches.
4. A method shall be provided to lock all entrances to the bus when it is not in use.

#### **D. Passenger Stepwell**

All entrance steps and stepwells shall be gauge number 14 (.075" thickness) stainless steel, minimum. Steps and stepwells shall have adequate structural bracing. All metal trim hardware in the stepwell area shall be stainless steel. All fasteners in the stepwell area shall be stainless steel which will pass the 1000 hour ASTM D117 Salt Spray test and the 1000 hour ASTM D2247 Humidity Resistance test. Ground to first step shall not exceed 12" in height, each additional vertical step shall not exceed 9 ½ " and all tread depths shall be 9" minimum. All steps in the entrance stepwell shall be of the same width. A suspension kneeling feature may be used to achieve the required 12" step height. Stepwells shall be covered with flooring material as described in Flooring, Section II., F., Item 3). Any interior stainless steel except for exposed door frames shall be brushed, not painted.



## **E. Interior**

1. The interior of the bus shall provide a pleasant, aesthetically pleasing atmosphere. The door and driver instrument panel are to be painted or otherwise finished with a nonreflective, anti-glare finish which matches the overall interior tones of interior panels. All interior hinged access doors shall use SouthCo Model #M1-61-1 latch to hold the door positively closed. All interior markings shall be durable materials affixed to the interior panels' smooth surfaces or markings shall be durable materials affixed to metal plates fastened to the interior panels of the bus. The interior design and colors shall be approved by the State.
2. All interior panels may be made of scuff-resistant, textured paint on steel, or laminate/FRP finished material. A light grey color shall be installed in the interior area above the seat rail lines, in the ceiling area, and on the rear endwall. All materials and treatments shall be easily cleaned. Panel fastening devices shall match color of panels. All interior finished surfaces shall be impervious to diesel fuel, gasoline, and commercial cleaning agents. Finished surfaces shall not be damaged by controlled applications of graffiti-removing chemicals.
3. The interior height of the passenger compartment at center aisle shall be 74" minimum. At 6" from the sidewall there shall be 67" of interior height, minimum, with a gradual contour to the center aisle (no bulkheads). Interior headroom at the back of bus (rear air conditioning evaporator area) may be reduced to a minimum of 60", but it shall increase to the normal ceiling height at the front of the rear seat cushion. The interior width at seat line shall be 90", minimum.
4. All surfaces, items, or hardware in the passenger compartment having sharp edges, corners, or angles that could cause injury, shall be padded with a heavy-duty, vinyl-covered, energy absorbing material to match interior colors. Areas inside the passenger compartment of low headroom where a person is prone to strike his head shall be marked and padded. All handrails shall have rounded edges where exposed.
5. A storage area with a hinged, lockable, access door shall be provided in the interior area either above the windshield (without destination sign) or on the side above the driver as space permits. This area above the windshield shall also be constructed to adequately support 60 pounds of two way radio communication equipment. A restraint shall be installed to prevent any storage door from opening beyond 105° when the installation allows the door to swing down to open.

## **F. Flooring**

1. The floor deck may be integral with the basic structure or mounted on the structure securely to prevent chafing or horizontal movement. All floor fasteners shall be corrosion resistant steel and shall remain secured and corrosion resistant for the service life of the bus. The floor deck shall be 3/4 " A/B plywood of marine grade material, minimum, with sealed edges to prevent moisture intrusion. The floor deck upper surface shall have all cracks and voids filled and the whole surface rough sanded before installing the flooring material. A layer of sealer shall be installed between floor deck edges that butt against structural members and other deck sections to prevent dust and moisture intrusion. Passage holes provided for wiring and hoses in the floor deck shall be thoroughly sealed to prevent dust and moisture intrusion and be sufficiently protected to ensure against wear from friction and the elements. Passenger seating floor rail/track shall not be installed in

the wheelchair lift or wheelchair securement areas. The floor deck, including the sealer, attachments, and coverings, shall be waterproof, non-hygroscopic, resistant to wet and dry rot, resistant to mold growth, and impervious to insects. The floor deck shall not be sandwiched between the wall structural members and the floor structural members.

2. The stepwell, entrance area, and center aisle floor area shall be overlaid with ribbed, slip resistant, oil resistant commercial 3/16" step tread thickness. Suggested Sources: RCA Rubber Transit-Flor<sup>®</sup>, Rubber Solutions N.A., SMI SpecFlor
3. The aisle to door area flooring joint shall make a miter so that aisle and door area flooring grooves line up for easy cleaning.
4. The 1/8" thickness flooring under the seats and in the wheelchair area shall be smooth, slip resistant, oil resistant. The flooring shall extend up the sidewall and rear wall to the seat rail line and shall be coved at the floor/wall joint to form a smooth water-tight transition. Flooring adhesive shall be oil resistant. Suggested Sources: RCA Rubber Transit-Flor<sup>®</sup>, Rubber Solutions N.A., SMI SpecFlor.
5. Step treads shall be two-piece ribbed rubber flooring. Each tread shall have a band of bright yellow contrasting color molded in the full width of the step (must meet ADA contrast requirement). Step tread to stepwell joints shall be sealed to prevent intrusion of moisture and debris.
6. An aisle width standee line of bright yellow contrasting color shall be placed crosswise in the aisle just behind stepwell (must meet ADA contrast requirement).
7. Color of all flooring and step treads shall be equal to RCA Rubber Transit-Flor<sup>®</sup> grey (#766) or tan (#777) as requested by the agencies.
8. To provide easy access for service, the floor shall have a vapor and fumeproof bright aluminum diamond plate access panel to the 12-volt battery, located in between the chassis frame rails, and be labeled "BATTERY"
9. Wheelwells shall be thoroughly sealed to prevent intrusion of moisture and dirt. Metal wheelwells inside the passenger compartment shall be covered with flooring material or molded fiberglass (FRP or ABS).
10. Standee decals shall be furnished and mounted at the center of the bus above the windshield.

#### **G. Emergency Exits**

1. Each bus shall be equipped with a rear exit door with a minimum opening of 1296 square inches with a minimum size of 24" by 54" (a rear exit window in place of the door is optional). All exposed exit door frame/jamb structure shall be made of 304 stainless steel acid-etched, coated with zinc based primer and powder coated OEM white (including the fasteners. The rear door exit and side window exits shall meet federal requirements of FMVSS 217. The manufacturer shall provide a method to lock the rear exit door. The rear exit door shall have an audible alarm at the driver's area activated when the exit door latch handle starts to open and when the exit door is locked with the ignition on. A bus with a rear exit door shall have one small window on each side of the exit door in the rear endcap.

2. The rear exit door shall have two windows, an upper window and a lower window, as a part of the door. The door glass shall be see-through, AS-2 tint (70% luminous transmittance) safety glass. The upper door window height shall match top of rear bus windows, one on each side of rear door. Door windows shall match design of bus rear windows. Any door with an exposed (metal showing) outer frame/jamb shall be made of 304 stainless steel acid-etched, coated with zinc based primer and powder coated OEM white (including the fasteners). Heavy-duty door latch mechanism with handle guard shall provide a quick release for opening from inside and outside the bus but be designed to offer protection against accidental release. The door latch shall cause the door to compress the perimeter door seal to provide an airtight, dustproof and watertight seal around the door under all operating conditions and speeds. The door must also have a sliding door stop mounted on top of the door to automatically lock door in the open position for emergency use. This door stop must also have a manual release. Door panels shall match exterior and interior body panels (see section II. A., B., and C.) All doors shall be fitted with screwed or bolted-on heavy-duty stainless steel piano hinges or heavy duty hinges of a noncorrosive material. A restraint shall be installed to prevent the door from opening beyond 105° or striking the rear panel of the bus when the door is opened.
3. A passage way of 16" minimum width shall be provided to the rear exit door. No seats or other objects shall be placed in bus which restricts passageway to rear exit door.
4. One non-closing static exhaust vent, a combination roof vent-emergency exit (23" by 23" minimum), shall be installed at the mid point on the longitudinal center line of the roof of the passenger section of the bus. The roof vent-escape hatch shall provide fresh air flow inside the bus when opened and when the bus is in a forward motion. The escape hatch shall have an inside and an outside release handle. There is no warning buzzer requirement for the escape hatch. Suggested source: DMA 1122, Specialty Manufacturing Co., Transpec Inc.
5. Instructions for proper use of all emergency exits shall be marked in close proximity to the release mechanisms. All interior markings shall be durable materials affixed to the interior panels' smooth surfaces or markings shall be durable materials affixed to metal plates fastened to the interior panels of the bus. Instructions may be labels, of contrasting color, affixed to a location that shall be approved by the state. All emergency exits shall be marked on the exterior of the bus.
6. Lever-type latches used for emergency windows shall secure the windows tightly shut, shall be easily operated, and shall not unlatch due to vibration during bus operation. The latches shall be made of non-corrosive materials and be designed for minimal maintenance needs.

## **H. Gauges**

Chassis Original Equipment Manufacturer (OEM) gauges shall be used in the driver's instrument cluster, but if they are not available VDO brand gauges, Stewart Warner gauges, or equal shall be used. Each bus shall have an instrument cluster with the following non-glare needle-type gauges which are easily monitored by sight from the driver's position (lights in lieu of gauges are not acceptable).

1. Voltmeter and its wiring shall be compatible with generating capacities.
2. Engine oil pressure gauge.

3. Engine coolant temperature gauge.
4. Fuel gauge.

### **I. Farebox**

1. The farebox (a donation box is optional) shall be mounted with the trip handle toward the driver and within easy reach of the driver. The farebox shall be mounted on an adequately braced stanchion; shall be located over a flat floor surface near the driver; and shall be accessible to passengers entering bus (meet ADA requirements). An indirect farebox light shall be connected through an entrance door jamb switch to the running light circuit.
2. The farebox shall be lockable and supplied with two vaults that are interchangeable and lockable (2 keys for each lock). The vaults shall be keyed alike. The vault and farebox exteriors shall be marked with key reference. (Location shall be approved by the State at pilot model inspection.) Suggested source: Main Farebox Model M-4.

### **J. Bumpers**

The front bumper shall be an OEM bumper. The rear bumper shall be a high energy absorbing bumper. The rear bumper shall be installed per bumper manufacturer's specification. Bumper attachment shall use a minimum of SAE grade 8 fasteners with thread locking feature or other shake-proof (Nord-Lock or equal) mounting in all attachment brackets. Rear anti-ride bumper installation shall allow space between bumper and body for energy absorption movement without body damage. Lifting pads shall be provided as part of the bus so that the bus may be lifted (at curb weight) at the front and/or the rear without any deformation or damage to the bus or bumpers and mounting hardware. Rear Bumper Suggested source: Romeo R.I.M. Inc. H.E.L.P. bumper.

### **K. Mud Flaps**

The bus shall have commercial grade anti-sail mud flaps/splash aprons behind front and rear wheels and in front of the rear wheels which contain no visible imprinted logo or advertising. An inverted stainless steel "I" bracket shall be used to prevent the wind movement of the mud flap when the bus is in motion. The flaps/aprons shall be securely fastened with full width metal strips and appropriate fasteners. The flaps/aprons shall be compressed between a gauge number 11 (.125" thickness, minimum) support bracket and a gauge number 14 (.075" thickness, minimum) metal strip. The support bracket shall be fastened securely to the body substructure or chassis frame. The flaps shall extend to within 6" of the road surface at curb weight. The mud flaps/aprons shall be at least 1" wider than the tire widths (single front, dual rear) to control splash at the rear of wheel openings. Rubber fender splash guards, secured with stainless fasteners shall be installed on all wheelwell openings. Other mud flaps/splash aprons/shields shall be installed to protect bus equipment (AC components, batteries, front wheel inner shield, auxiliary heater box, and the like) from road splash.

### **L. Towing**

Tow hooks shall be provided with two in the rear of the bus, which shall be of sufficient strength to tow 1 1/2 times the GVWR of the bus. Tow hooks shall be easily accessed and free of interference with the bumper system when in use. Access to tow hooks may be made through holes in the bumper assembly. The intended use for tow hooks is only to safely move the bus to a point of tow truck hook-up. Tow hooks shall be installed to prevent them from dragging when

the bus is driven over an incline. The tow hooks equal to Original Equipment Manufacturer (OEM) units shall be mounted and adequately secured to the chassis frame as recommended by the tow hook manufacturer or may be supplied by the OEM as standard equipment on the chassis. The bus shall be designed to be towed from the rear. A fuel tank protection frame shall not interfere with a frame contact lift. The bidder shall provide the towing and lifting procedure to be followed.

#### **M. Undercoating/Rustproofing**

1. When the unit is completed, the sections of the underside of the bus exposed to the elements shall be treated with an undercoating material except those areas of the OEM chassis where undercoating is not recommended. Undercoating shall be warranted for the same period covered by the body/structure warranty. Suggested source: Tectyl 121-B.
2. Rustproofing - All box type steel tubing (except stainless steel) used in the floor shall have the interior of the tube coated with corrosion resistant material conforming to MIL-C-62218 as outlined in Federal Standard 297E. Sections that are treated shall be properly cleaned to remove greases, oils, and residues before application of the corrosion-proofing material. All mechanisms (moving or stationary parts) that are affected by or rendered useless by an application of sealant or insulation shall be cleaned free of sealant or insulation including vent canisters and drain pipes. Rustproofing shall be warranted for the same period covered by the body/structure warranty. Suggested source: Waxoyl, Ziebart Type-A.

#### **N. Interior Mirrors/Sunvisors**

##### **1. Interior Mirror**

Interior mirror (with adjustable mounting bracket) shall be a 4" by 10", minimum, flat mirror glass with rounded corners. The driver shall be able to adjust the mirror so that the complete passenger compartment can be viewed through interior mirror. Location shall be determined at pilot model inspection. Suggested source: B&R Manufacturing, Lucerix/Metagal, Mirror Lite Co, Inc, ROSCO, Mirror Lite Co, Inc., Manufacturer's standard.

##### **2. Sunvisor**

Windshield sun visor system shall be standard Original Equipment Manufacturer (OEM) chassis visor(s). If the OEM chassis is not equipped with a windshield sun visor, large transit-type, fully adjustable arm-type plexiglass sun visor(s) shall be provided for the driver at the windshield. Location shall be determined at pilot model inspection. Suggested source: manufacturer's standard.

#### **O. Exterior Mirrors**

1. Each bus shall be equipped with exterior left-hand and right-hand rear view mirrors of flat glass with convex mirrors (3" in diameter, minimum) attached or a combination flat/convex glass. The mirror shall contain at least 50 square inches of flat glass viewing area. Right hand mirror assembly shall be a fender ridge mount. Left hand mirror shall be a sail mount style. Suggested source: B&R Manufacturing, Lucerix/Metagal, Mirror Lite Co, Inc., ROSCO,

2. To prevent obstructed front and right-hand view a convex 15 degree radius (curvature) exterior crossview mirror (8" minimum diameter) shall be provided on the left-hand front corner of the bus. Suggested source: Manufacturer's standard.
3. All exterior mirrors shall be constructed with high impact plastic or stainless steel housings. Mirrors shall be remote adjusting and shall move independently of the mirror housing. The mirrors shall be modular in design so that the glass can be replaced using the "twist lock" mechanism for service without removing the entire mirror assembly from the bus.
4. Mirror mountings shall be reinforced when not in a structural frame member to prevent mirror vibration, with approval by the State at the time of pilot model inspection. The mirror placement shall not obstruct driver vision nor have window divider bars between the driver and mirror face. Final location of exterior mirrors shall be determined at pilot model inspection.

## **P. Seats**

### **1. Driver's Seat**

- a. The driver's seat shall comfortably hold and support the human body in the ergonomically correct position for driving and meet the flammability requirements of FVMSS 302. The driver's seat with arm rests (right side seat arm rest, left side door arm rest) shall have adjustments for fore and aft slide, 4" minimum travel, back recline, 20 degrees minimum, and weight range capacity up to 300 pounds. While seated, the driver shall be able to make all of these adjustments by hand without complexity, excessive effort, or being pinched. Manual operated adjustment mechanisms shall hold the adjustments and shall not be subject to inadvertent changes. The seat shall be high-backed and shall be properly aligned behind steering wheel to allow for maximum seat adjustments and operator comfort. The seat belt with shoulder harness, automatic retractor and supplemental restraint (SRS) system shall be chassis Original Equipment Manufacturer (OEM) equipment. All seats and seat mountings shall meet applicable federal standards. Suggested source: American Seating, Freedman.
- b. The driver's seat cushion shall be molded high resilient (HR) polyurethane foam padding with indentation load deflection (ILD) 35 pounds minimum, and the back cushion shall be molded or fabricated high resilient (HR) polyurethane foam padding (ILD) 25 pounds minimum. There shall be no welt or bead across the front of the seat cushion under the driver's legs. Compression to 10 percent maximum and tensile strength 15 lbs. per square inch minimum. Seat and back cushion foam shall meet the typical physical properties of ASTM D-3574 and the flammability requirements of FMVSS 302.
- c. The driver's seat covering shall be gray cloth-type Woven Fabric (with flame retardant qualities) meeting the requirements listed below in All Seats, Part 4.

### **2. Passenger Seats**

- a. All passenger seats shall be mid-back and are required to meet the following:
  - (1) Complete White Book tests
  - (2) All applicable FMVSS testing including FMVSS 210

- (3) Comply with cloth-type woven and vinyl fabric seat covering material test and performance criteria of the Federal Register dated October 20, 1993 (see Section IX., table 1).
- b. Two passenger, forward facing seats shall be 35" minimum width with a non foam yellow, energy-absorbent, vandal-proof grab handle mounted to the top of each seat back (two per double seat). Grab handles are not required on seats that have a back against a wall.
  - c. Single passenger seats shall be 17 ½ " minimum width with a yellow, energy-absorbent, vandal-proof grab handle mounted to the top of the seat back.
  - d. Forward facing seats shall have 27" minimum knee to hip room.
  - e. Aisle facing seats shall have arm rests on both ends if the seat is not against a modesty panel.
  - f. Aisles shall not be less than 16" wide except as noted in Part 3 of this section.
  - g. Suggested sources: American Seating Horizon™ 8535 Mid-Back Series; C.E. White LE Series; Freedman Feather Weight.

### **3. Wheelchair Lift-Equipped Buses**

Forward facing (double) fold-away or flip seats with seat belts shall be provided in the wheelchair securement area per seating arrangements (see Section III, Wheelchair Securement Area). All side facing seats provided shall be flip seats. Fold-away or flip seats shall include all dimensional, structural and testing requirements of the standard seat specification. Seat locking/latching devices shall be of high quality and be easy to latch and unlatch. Seats must positively latch in the seated and folded position to prevent inadvertent folding or unfolding of the seat. Any support legs resting on flooring shall be non-marring or rest on metal plates flush mounted with flooring. All fold-away seats shall be able to pass FMVSS 210 without having to fasten additional latches or cables. All fold-away seats shall fold against the wall when wheelchair space is required (no further than 12" from wall in the vertical folded position). Seat may not extend into bus more than 37 ½" (two passenger) and 18 ½" (1 passenger) when folded down for passenger seating. Aisle space may be reduced to 14@ inches where fold-up seating is placed on each side of the aisle or 15 ½" where placed opposite a stationary seat. The seat bottom cushion shall be a 5 degree tilt up from level, minimum, and back cushion shall be at 95 degrees, minimum. The seats shall be of the same design as the other passenger seats. All seat backs and all seat bottoms of fold-away/fold-up seats shall be covered with material matching seat cushion color and fabric. Suggested source: American Seating Horizon™ 8535 Mid-Back Series; C.E. White LE Series; Freedman Feather Weight; Braun #125.

### **4. All Seats**

Seats shall be individually contoured to each passenger for occupant comfort and retention. Seats shall be covered with cloth-type woven fabric or vinyl fabric at the transit agency's option. Cloth-type fabric or vinyl shall completely enclose the seat cushion and the seat back. Cloth-type fabric or vinyl shall comply with test and performance criteria of the Federal Register dated October 20, 1993 (see Section IX., table 1). Seat colors shall be a tan background or grey background approved by the State.

- a. **Cloth-type Woven Fabric Requirements (with flame resistant qualities)**{tc \l4 "a. **Cloth-type Woven Fabric Requirements (with flame resistant qualities)}**
- (1) Minimum weight 23 ounces per linear yard
  - (2) 50,000 minimum double rubs (ASTM - 3597-77 Wyzewbeek Method).
  - (3) Color fastness to light 300 hours minimum (AATCC-16-1977 Carbon Arc)
  - (4) Comply with cloth-type woven fabric seat material test and performance criteria of the Federal Register dated October 20, 1993 (see Section IX., table 1).
  - (5) Comply with California BLT-117.
  - (6) All cloth-type woven fabrics except Holdsworth Wool shall be treated with a flame proofing solution following the manufacturer's specifications, No-Flame by Amalgamated Chemical Inc., or equal.
  - (7) Suggested source: Flame Resistant Fabrics by CMI Nanocide Dimensions, Holdsworth Wool, or LaFrance Mills.
- b. Vinyl Fabric
- (1) Seat vinyl fabric shall be transportation grade expanded vinyl, 36 ounces per linear yard minimum.
  - (2) Seat vinyl fabric shall comply with test and performance criteria of the Federal Register dated October 20, 1993 (see Section IX., table 1).
  - (3) Suggested source: Flame Resistant vinyl by CMI D-90 or Omnova.
- c. Seats General
- (1) Seat cushion and back cushion shall be molded high resilient (HR) polyurethane foam padding. Seat cushion indentation load deflection (ILD) shall be 35 pounds minimum, with compression to 15 percent maximum, and tensile-strength of 15 minimum. Seat and back cushion shall meet the physical properties of ASTM D-3574 and the flammability requirements of FMVSS 302, minimum. The technical data sheet for the foam supplied shall be included in the bid proposal with the seat information. Suggested source: Manufacturer's standard.
  - (2) The seating arrangements and configuration shall be furnished by the State. The first double seat on the passenger side of the bus shall have an integrated child restraint seat capable of safely carrying children of 20 to 50 pounds.
  - (3) All seats shall be supported on the floor with high carbon steel support brackets. Seat frame shall be cold-roll steel tubing. Floor anchorage shall be neat and not interfere with entering and exiting the seat. All seat mounting bolts shall be a corrosion resistant coated/plated fasteners. Passenger seating floor rail/track shall not be installed in the wheelchair lift

or wheelchair securement areas. The bidders shall provide certification test data that the installation of the seats, seat mountings including floor anchorage and floor fasteners shall meet all applicable FMVSS including FMVSS 207, 208, 209, and 210 for the bus model being offered in this bid. (see Section VIII. N.).

- (4) Seat and back cushions shall be supported with a spring-type support system. Seat and back cushions shall be completely covered with seat cushion covering material. Seat back depth shall not exceed 3 ½" overall.
- (5) All metal components of the seat assembly shall be coated with a powder coat epoxy paint finish that shall meet the following tests:

Salt Spray	1000 hrs	ASTM D117
Humidity Resistance	1000 hrs	ASTM D2247
Impact Resistance	to 80 in-lbs	ASTM D2794

All testing is to be performed on standard metal seating materials that have coating thickness of 1.3 to 1.8 mils. Certified test documents are required with bid proposal.

## **5. Passenger Seat Belts**

The bidders shall provide certification test data that the seat belts, and the installation are in compliance with FMVSS-207, 208, 209, and 210 where applicable for the bus model being offered in this bid (see Section VIII. N.).

Two universal "Buckle Up" decals approximately 6" by 6" shall be furnished loose with each bus. Decals shall indicate that seat belt use is recommended.

All seats shall be equipped with seat belts for each designated seating position. Belts shall have:

- a. The latch end of the belt will have an emergency locking retractor. The retractor will be mounted underneath the seat to the seat frame. No lap retractors.
- b. A push button latch release mechanism.

## **Q. Handrails, Stanchions (Shall meet ADA regulations)**

- 1. The handrails and stanchions shall be a minimum of 1 ¼ " outside diameter. All handrails and stanchions shall be positioned so as not to interfere with wheelchair movement and shall meet ADA requirements for position and size. All handrails and stanchions in the passenger entrance area shall be highly visible yellow in color. All other handrails and stanchions shall be brushed stainless steel. Mounting brackets and fittings shall be composed of the same kind of material used for the stanchion or handrail.
- 2. All handrail and stanchion mountings shall have reinforcement plates welded to or imbedded in the structure behind surface panels of sufficient size and strength. Final locations shall be determined at pilot model inspection.
- 3. A floor-to-ceiling vertical stanchion shall be provided in close proximity to the rear of the driver's area. A guardrail shall be provided in back of the driver's area extending from the vertical stanchion to the left side of the bus 30" plus or minus 2" above the floor. A

padded modesty panel shall be provided from the guardrail to within 8" of the floor. Stanchion and guardrail shall not restrict any driver's seat adjustments.

4. A smoked plexiglass panel, 3/8" thick, shall be provided behind driver from top of the driver's seat to within 12" of bus ceiling. The panel shall not impair driver's seat adjustments. The panel shall be located to allow the driver's seat back to recline to 2" its maximum reclined adjustment with the driver's seat in the position furthest from the steering wheel. Panel may be incorporated into the stanchion and guardrail behind the driver and shall have cutouts to give hand access to the vertical stanchion.
5. Floor-to-ceiling stanchions (yellow) shall be provided near aisle on each side of front entrance.
6. Left and right side entrance handrails (yellow) shall be installed from low stepwell to floor-to-ceiling stanchions near aisle. Entrance handrails shall be positioned so passengers entering or exiting the bus will have handrail support throughout the entering/exiting process and so that articles of clothing may not become entangled in the handrail-stanchion-guardrail assemblies.
7. A guardrail (yellow) shall be provided in front of and at the rear of the front entrance steps, extending from the vertical stanchions to the right side of the bus 30" plus or minus 2" above the floor. A modesty panel (padded and vinyl clad both sides) shall be provided to the left (rear side) of the entrance from guardrail to floor (in case of lift bus, provide floor-to-ceiling stanchion to rear of platform lift with guardrail and modesty panel padded both sides, vinyl clad, with smoked plexiglass panel, 3/8" thick over the modesty panel which will prevent someone from touching the lift when it is in operation).

## **R. Interior Lighting**

1. Overhead entrance and stepwell lights shall be LED and provide no less than two foot-candles of illumination on the entrance step tread, or lift or ramp with the door open. Outside light(s) shall provide at least 1 foot-candle of illumination on the street surface within 3 feet of step tread outer edge. This system shall provide illumination automatically when the door is open and meet ADA requirements.
2. Overhead entrance and stepwell lights shall be wired to and be automatically activated by a door controlled switch. Lights shall operate any time the ignition key is on and the door is opened.
3. Stepwell light shall be on the side away from wheel splash.
4. Interior lighting shall be LED and provide a minimum of two foot-candles of illumination at a reading level. Interior lighting fixtures shall be reasonably flush with the interior walls and ceiling so no hazard exists for the passengers. All lights shall have lead wire long enough to remove light at least 6" from bus for service. All interior lights shall be grounded by an in-harness ground attached in the fuse panel to a common grounding point.
5. Light installation shall be designed to illuminate the lift platform when deployed at floor level at no less than two foot-candles of illumination. Outside light(s) shall provide at least 1 foot-candle of illumination on the street surface within 3 feet of step tread outer edge. This system shall provide illumination automatically when the lift door is open and meet ADA requirements. On-off light switch shall be lift door-actuated.



## **S. Exterior Lighting**

1. Exterior lighting shall be in accordance with Federal Motor Carrier Safety Regulations (393.11) and ADA regulations. All lights shall have the lead wires long enough to remove the light at least 6" from bus for service. All exterior lights shall be grounded by an in-harness ground attached in the fuse panel to a common grounding point. All exterior lights of the bus shall be light emitting diodes (LED) sealed lamps retained in a rubber grommet mounting except for front headlamp/turn signal assemblies. All lights shall have the mounting to body sealed to prevent moisture intrusion and grounded to the bus frame.
2. All lights in the rear panel of the bus shall be rubber grommet mounted round LED sealed lamps except the license plate light. License plate LED shall be Peterson Model M153C-MV with Peterson Model 150-40 bracket for those not mounted in the preformed recess in the rear panel. A sealed light with a weather proof connector shall be used when the preformed recess in the rear panel is used. Suggested Sources: Dialight, Grote, Peterson, Truck-Lite
3. Exterior marker lights shall be light emitting diodes (LED) (2" in diameter sealed lamp) retained in a rubber grommet mounting and conform to Federal Motor Carrier Safety Regulations Part 393. All marker lights shall have a weather proof two prong (one positive and one ground) plug-style connector with the ground wire connected to an in-harness ground attached to a common grounding point. Marker and tail lights shall be operated through a relay controlled by the headlight switch. Suggested Sources: Dialight, Grote, Optronics Peterson, Trucklite
4. Red voltage regulated LED high mount stop lamps shall be mounted centrally in the rear panel of the bus and work in conjunction with the brake lights. On buses with a rear emergency exit door, a 6½"x2¼" minimum, oval light shall be mounted between the upper and lower windows on the exit door and a 4" round light shall be mounted on the rear of the bus body just above the rear door. On buses with a rear emergency exit window, the two 4" round lights shall be mounted on the rear of the bus body with one just below and one just above the rear emergency exit window. Final location of high mount stop lamps shall be determined at pilot model production. Suggested Sources: Command Electronics model 003-82, Dialight, Grote, Optronics, Peterson, Truck-Lite
5. Brake lights shall be red 4" round sealed voltage regulated LED lamps and shall not override hazard flashers or turn signals. Rear turn signal lamps shall be amber 4" round sealed voltage regulated LED lamps.
6. Headlights shall be Halogen lamps and the standard front park/turn lights may be a part of the OEM headlight assembly
7. License plate mounting shall be with stainless steel screws and jack nut for securing license plate. Suggested Source: Wm. F. Hurst Co. model 6SJN

## **T. Safety Equipment**

All safety equipment provided by the manufacturer shall be secured to each bus and be easily accessible to the driver. Location of safety equipment shall be determined at pilot model production. The safety equipment shall be:

1. One UL listed 5 pound, 2A-10BC dry chemical fire extinguisher. Fire extinguisher shall have a metal head, a gauge to indicate state of charge, and a bracket with strap for securement. Source: Manufacturer's Standard.
2. One container of bi-directional emergency reflective triangles that meets FMVSS 125.
3. One web cutter shall be provided from the supplier of the wheelchair securement belts for use in an emergency.

#### **U. Heating/Ventilating/Air Conditioning (HVAC)**

1. During normal passenger service, front and rear heavy-duty heating system shall be capable of raising the interior temperature of a bus from 0°F to 60°F at knee level (22" above the floor) throughout the interior of bus within 30 minutes from engine startup. After initial warm-up, while the bus is in passenger service, the front and rear heavy-duty heating system shall be sufficient to maintain a minimum of 64°F at knee level throughout interior of bus and at the driver's foot space when the outside temperature is 0°F. Heating system operation will be verified by the required system testing as defined in Section VII Part D. Heating/Ventilating (HV) Certification. In addition to the front heater and windshield defrosters, for increased air circulation, one 6" two speed fan with non-glare blades and body shall be mounted away from passenger and driver traffic in the driver's area near the windshield. Grounding for all heater fan motors shall be supplied by an in harness ground wire attached in the fuse panel to a common grounding point. All HVAC fan motors shall be supplied with proper radio frequency (RF) suppression equipment to remove two-way radio interference.
2. Front heating unit shall be automotive in-dash type (chassis Original Equipment Manufacturer (OEM) or equal) and shall be capable of delivering heat, fresh air ventilation, and air conditioning (optional) to the driver's area. The front heater shall have a temperature control valve which can be regulated from the driver's area. The driver's area shall have air circulation in each mode of defrost, heat, fresh air ventilation, and air conditioning (optional) of 125 cfm at the foot area, with a total driver's area circulation of 400 cfm minimum.
3. Rear heating unit(s) shall distribute heat in at least a 180° direction and ensure air distribution to all passenger areas of the bus interior. Heating unit(s) shall have a minimum 5/8" I.D. heater inlet and outlet ports with a BTU/hr output rating to match the specified HVAC performance requirements. Coolant flow through the heating units shall not be restricted by excessive bends or kinks in hoses or excessive lengths of hoses. Heating units shall have rubber or nylon insulator(s) between their mounting base and floor of the bus. Suggested sources: AMFAB Inc., A. R. Lintern, Bergstrom, Pro-Air.
4. The premium heater hose (5/8" ID minimum) shall be high temperature resistant Ethylene Propylene Diene Monomer (EPDM) material. Hose shall be a reinforced type with Aramid knitted fiber reinforcement between the EPDM tube and EPDM cover. Heater hose material shall be compatible with all types of coolant including long life coolant. Rated temperature limits of the hose shall be -40°F to +300°F minimum, with a burst pressure of 130 PSI minimum.

5. Manual shut off valves for the rear heater shall be placed as close to the engine as is practical. The 5/8" ID heavy-duty brass 1/4 turn ball shut off valves shall be located in the heater outlet line (from engine to heater) and in the heater inlet line (to engine from heater). Shut off valves shall be accessible by personnel without going under the bus (may require an access panel door). Location to be determined at pilot model inspection.
6. Front heater shall have coolant temperature control valve or other controls which can regulate heater temperature from the driver's area.
7. All heat lines and hoses shall: have exterior routing along the bus frame rail where possible; be sufficiently protected to ensure against wear from friction and the elements; be insulated to reduce heat loss; use routing that eliminates excessive bends and hose lengths; and have heater hose passage holes through engine cowl and floor area thoroughly sealed to prevent air, dust, and moisture intrusion.
8. Air Conditioning (see Alternate Quotes, Section VI A).

#### **V. Windows**

1. Passenger compartment windows shall be T-type slider at top, full slider, or top tip-in type for window ventilation. Windows shall have tempered safety glass and heavy-duty locking features which shall meet FMVSS 217 for emergency exits, if applicable. Window glazing material shall be able to maintain its seal and glass retention for the life of the unit. Caulking around windows shall be used only as a seal, not to make up for body defects or out of tolerance window openings (maximum clearance of 1/4" around the frame, 1/8" on each side). All window glass shall be tinted - passenger windows AS-3 tint 31% luminous transmittance, right and left driver's side windows AS-2 tint 70% luminous transmittance, and windshield shaded-tinted AS-1 tint - and meet applicable federal standards. Driver's compartment right and left side windows shall be designed for maximum window area to provide unobstructed vision. Driver's compartment left side window shall be adjustable vent type (moveable front section of lower portion for ventilation) or chassis Original Equipment Manufacturer (OEM) door window. Driver's right side window shall be one piece. Suggested sources: Hehr, Kinro,

#### **W. Paint**

1. All exterior surfaces shall be smooth and free of visible fasteners (excluding round head structural rivets), dents, and wrinkles. As appropriate for the paint used and prior to application of paint, the exterior surfaces to be painted shall be properly cleaned and primed to assure a proper bond between the substrate and successive coats of original paint. Paint shall be applied smoothly and evenly, with the finished surface free of dirt, runs, orange peel, and other imperfections. All exterior finished surfaces shall be impervious to diesel fuel, gasoline, and commercial cleaning agents. Finished surfaces shall not be damaged by controlled applications of commonly used graffiti-removing chemicals.
2. All exterior paint shall be a two part acrylic-urethane-type or polyurethane-type with low volatile organic compound (VOC) emission. The finish coat of paint shall be applied before rubrail covers or inserts, fender flares, exterior lights, and other body mounted accessories are installed. Paint shall be applied in the following method:

- a. If on bare aluminum, use proper cleaner. Recommended sources: DuPont 2253, PPG, followed by aluminum conversion. Recommend sources: DuPont 2265, PPG
  - b. If on bare steel, use proper cleaner. Recommended sources: DuPont 5717S, PPG followed with steel conversion.
  - c. For all bare metal, use primer. Recommended sources: DuPont Prime 615/616 (two coats), PPG.
  - d. Appropriate primer as required shall be used on fiberglass surfaces.
  - e. Coat entire prepared surface to be painted with minimum of two coats of paint properly activated and reduced and have a minimum thickness of three millimeters. Recommended sources: DuPont, PPG Concept System, Sikkens Corporation U-Tech brand.
3. Standard paint color for all buses shall be the manufacturer's pre-finished white exterior panels (OEM white). Color scheme on all buses shall be provided at the time of ordering. Additional paint schemes will be quoted in VI. ALTERNATE QUOTES (OPTIONS) Item L. Special design paint application pricing will be negotiated at the time of ordering by the transit agency.

#### **X. Insulation**

1. Inside walls, ceiling, passenger floor area, driver floor area, and fire wall area shall be adequately insulated for sub-zero winters with spray-type foam insulation or glued in place insulation with a minimum R factor of 5. The insulation shall be non-formaldehyde, fire-resistant (FMVSS 302 minimum), non-hygroscopic, and resistant to fungus. Insulation shall prevent condensation and thoroughly seal bus so that drafts cannot be felt by the driver or passengers during operations with the passenger door closed. Insulation shall not cover up electrical wiring harnesses, electrical switches, or other devices and shall not be sprayed in wheelwells. All mechanisms (moving or stationary parts) that are affected, create a fire hazard, or are rendered useless by an application of sealant or insulation shall be cleaned free of sealant or insulation, including vent canisters and drain pipes.
2. Engine hood cover and driver's area shall have adequate insulation to keep driver's foot area cool during summer months, warm during winter months, and reduce engine noise to an acceptable level. The OEM insulation provided on the engine hood is acceptable.

#### **Y. Type I Lift, Passive (Platform Type) (Shall Meet ADA Requirements)**

1. All buses equipped with lifts must meet FMVSS 403 and 404 requirements. All costs required to meet these requirements shall be included in the bid price.
2. The Type I platform lift (passive lift) shall be installed in a separate door opening for use by persons with disabilities. The lift assembly shall be mounted within the bus body on the right (curb) side. The bus manufacturer must provide documentation (reviewed by the State at pilot model production) that the lift installation complies with the lift manufacturer's lift installation requirements. The overhead clearance between the top of the door opening and the raised lift platform, or highest point of a ramp shall be a minimum of 68" for a bus over 22 feet in length to meet ADA requirements.

3. The lift door(s) shall be manually operated with an outside key locking handle. Spring loaded struts, gas struts or manual latches shall be provided on the lift door(s) to positively hold the door(s) in the open position. All door openings shall have full structural framing around the opening equal to the structural members of the body. The lift door(s) shall have an upper window similar to the side windows of the bus. Any exposed lift door frame structure shall be constructed of 304 stainless steel acid-etched, coated with zinc based primer and powder coated OEM white (including the fasteners).
4. The lift shall be an electro-hydraulic type. If the lift has a crossbar, it shall be above the door opening and well padded. The platform lift equipment shall be a double "C" channel parallel arm construction, hydraulically operated by two single-acting cylinders with gravity unfold, gravity down, power up, and power fold (stow) operation. No part of the lift platform shall exceed 6 inches/second during the lowering and lifting of an occupant, and shall not exceed 12 inches/second during deploying or stowing. The lift shall have a mechanical outboard safety wheel stop to prevent wheelchair from rolling off the platform during the lifting cycle. Successful bidder shall deliver the lift equipped bus with the type of lift equipment requested by the State. Suggested sources: Braun, Maxon, Ricon.
5. A manual safety override shall be provided that will remain operable. Lift shall have manual override instructions visible from inside and outside the bus with door open.
6. The entire lift assembly shall be installed inside the bus body and shall have adequate protection installed on all sharp corners or items that protrude into the passenger area to prevent accidental injury to passengers. Wall and floor mounting points shall be reinforced and shall be attached with fasteners having a thread locking feature. Lift installation shall insure that no lift rattling exists when the bus is operated while the lift is stowed.
7. A lift control interlock system shall be installed that shall ensure that the bus cannot be moved when the lift is not stowed and that the lift cannot be deployed unless the interlock is engaged [to meet ADA regulation in 49 CFR Part 38, Subpart B--Buses, Vans and Systems, §38.23, (b)(2)(1)]. The interlock system shall engage when the lift operation sequence is followed. Interlock operating instructions shall be included with the bus at delivery. An indicator light (red, labeled) shall be provided at the driver's station that is activated when the lift door is open and when the lift is in operation. An interlock override system shall be installed that allows service personnel to move the bus to a safe area for repairs. Suggested Source: Intelligent Lift Interlock System (ILIS) by Intermotive Products.
8. All lift equipped buses shall display the international symbol of accessibility, one each on left and right side of the bus. Location shall be determined at pilot model inspection.
9. The passive lift shall meet ADA requirements as well as these minimum requirements.
  - a. Capacity 800 pounds minimum.
  - b. Usable platform width 33" minimum.
  - c. Usable platform length 50" minimum.
  - d. Platform shall include automatic locking inboard safety wheel stop (minimum 6" height) and outboard safety wheel stops to prevent wheelchair from rolling off.

- e. Platform shall automatically stop at floor level.
- f. Platform shall automatically stop when lowered to ground level.
- g. Hand held controls shall be conveniently located on a flexible, cut resistant cable and shall be mounted with access from inside or outside the bus. The cable shall be routed to eliminate being pinched in any moving parts and be wrapped with a flexible exterior protective conduit.
- h. Platform, bridge plate, and area between bridge plate and aisle shall be skid resistant.
- i. Bridge plate and platform shall be coated to resist rust.
- j. Platform shall have horizontal handrails (one each side) on platform to assist passenger during lift operations. Handrails (yellow) shall fold automatically to prevent any obstructions into the bus passenger area.
- k. Lift door operated interrupt switch shall prevent use of lift with lift door(s) closed. Heavy duty long life switches shall be used in this application.
- l. The color of the lift shall coordinate with bus interior colors and be approved by the State. The outside edges of the platform shall either be painted yellow or use 3M™ vinyl safety stripe tape to enhance visibility when extended on the ground.
- m. Sharp corners of lift platform shall be padded (remove for lift use) when in the stored position.
- n. The wheelchair lift shall comply with all federal, Americans with Disabilities Act (ADA), and Veterans' Administration regulations.
- o. Lift platform shall be fitted with device to prevent the platform from touching or leaning against door after being returned to stored position when the lift assembly is not in use.

### **III. WHEELCHAIR SECUREMENT AREA**

- A.** The wheelchair securement system shall be installed according to ADA requirements. Securement location shall be installed as shown by the seating plan option and approved at pilot model production. Fold-away seating shall be provided for use when wheelchairs are not being carried as shown in floor plans. The integrated securement system shall restrain the occupant and the wheelchair separately and securely.
- B.** Wheelchair securement shall meet these minimum requirements:
  - 1.** Forward facing wheelchair tie down and occupant restraint shall consist of four floor attachment points for the chair and a combination, lap belt/shoulder restraint with manual height adjuster for the occupant per location.
  - 2.** Securement floor anchorage points shall be anodized aluminum, stainless steel or other noncorrosive metal construction and consist of aircraft type insert pockets that can be flush mounted with the rubber flooring (Flanged "L" style track with end caps Q-Straint

Q5-6100-FPD). Floor anchorage points for the first securement space shall be spaced at a minimum of 54" from front to rear. Floor anchorage points shall be located no closer than 8" from a stationary wall or obstruction (forward or rearward) that would hinder an operator from attaching the securement system. Anchorage points can be used for the front tie downs, the rear tie downs, and can be shared by the center run of anchorage track. Width of anchorage track shall be no less than 30" wide allowing for the widest of mobility devices.

3. Securement wall anchorage point for shoulder restraint shall be stainless steel or other aircraft quality noncorrosive metal. Wall anchorage device shall provide vertical adjustment (approximately 12") for differences in height of the secured mobility aid. Wall anchor shall be permanently fastened to the body structure in the wall according to the belt assembly manufacturer's installation instructions.
  4. The belt components shall be permanently marked to identify their location as follows: "floor", "lap", or "shoulder". The four belts that attach to the wheelchair from the floor anchorage points shall use a simple speed hook end ("J" or "S" style) for chair attachment and have automatic heavy duty retractors with a hard metal cover and manual knob control. All floor attachment belts shall be the same and work in any of the four floor attachment points and be equipped with connector brackets for the lap belt assembly. Automatic self tensioning and self locking retractors with metal covers shall be part of the four floor belt assemblies for automatic belt tensioning. Belt ends with floor anchor attachments shall be easily identified for placement in the floor track.
  5. All belt components shall meet ADA requirements and random static testing forces equal to:
 

rear belt assy.	6,000 lbs. each, minimum
front belt assy.	2,000 lbs. each, minimum
lap belt assy.	2,500 lbs. each, minimum
shoulder belt assy.	2,500 lbs. each, minimum
floor insert assy.	6,000 lbs. each, minimum
  6. All components shall meet SAE J2249 requirements and be 30 MPH/20G impact tested.
  7. All components shall be installed to the securement manufacturer's recommended specifications.
  8. Suggested sources: Sure-Lok's Retractor™ Systems for L track; Q'Straint Model Q-8100-A1L...
- C. Storage pouches shall be provided for wheelchair restraints so that the restraints can be stored off the floor in the bus when not in use. Location of storage pouches will be determined by the state at pilot model inspection.

#### IV. CHASSIS SPECIFICATIONS {tc \11 "IV. CHASSIS SPECIFICATIONS}

The chassis shall have a pre-delivery inspection performed by a representative of the chassis manufacturer before the bus manufacturing process begins. A copy of the completed pre-delivery inspection form shall accompany the bare chassis during manufacture as part of the build order. All standard or optional chassis equipment to be included shall be as advertised by the manufacturer and factory installed and shall not consist of substitute or after market equipment. Optional chassis

equipment not available from the factory may be dealer installed. The chassis shall meet the following minimum requirements:

**A. Chassis**

Commercial or Recreational Vehicle (RV) rated chassis shall be the highest Gross Vehicle Weight Rating (GVWR) available for the wheelbase and shall have one front axle with single wheels and one rear axle with dual wheels.

**B. Tilt Wheel/Power Steering**

Chassis shall be equipped with power steering and a tilt wheel steering column. The steering column shall be adjustable for various up and down positions of the steering wheel. The steering gear shall be a full hydraulic power assist type. A secondary, electronically driven hydraulic power steering and power braking assist system shall be provided to ensure complete functionality of the power steering and power brake systems during periods of engine off mode.

**C. Wheelbase**

Wheelbase shall be 158", minimum.

**D. Engine**

The engine shall be a gasoline V8, fuel injected, 5.4L minimum.

**E. Hybrid System**

1. **Drive Motor** – 100kW A/C induction drive motor with regenerative braking capabilities
2. **Drive Motor Controller** – 120kW Inverter
3. **Starter** – Integrated high voltage starter/generator, 8kW
4. **Low Voltage** - 12V supply provided through DC/DC converter from high voltage battery

Recommended Source: Azure Dynamics Balanced Hybrid Drive

**F. Transmission**

Heavy-duty, five-speed automatic cooled by an external "H.D. transmission oil cooler" in series with radiator cooler or equal (cooler capacity to match GVWR of bus).

**G. Alignment**

The bus shall have a four wheel alignment at final point of inspection, just prior to delivery to the transit agency and a copy of the work order indicating the camber, caster, and toe-in settings at time of final inspection shall be provided with the bus at delivery.

**H. Gross Vehicle Weight Rating (GVWR)**

**Front Axle Rating - 4,600-lb. minimum.** Bus shall not exceed chassis manufacturer's rated front axle weight capacity.

**Rear Axle Rating, - 9,450-lb. minimum.** Bus shall not exceed chassis manufacturer's rated rear axle weight capacity.

**Chassis GVWR - 14,050-lb. minimum.** (see Purpose of Specifications, Section I)

### **I. Differential**

Heavy-duty rear axle with full floating axles. Gear ratio shall allow buses to travel approximately 65 miles m.p.h. loaded, and not exceed manufacturer's recommended engine operating R.P.M. Axles shall be marked if synthetic oil is used.

### **J. Batteries**

1. **12- Volt Batteries** - The battery equipment shall be furnished by the chassis manufacturer where available. The dual batteries shall be maintenance free, 12-volt minimum. The batteries installed in the bus must be a pair of matching units. The batteries must be fresh, fully charged units when the finished bus leaves the manufacturing plant. Batteries that have been in the bus during the manufacturing process which were allowed to become fully discharged for a period of time shall be replaced with fresh new batteries. One battery shall be located in the engine compartment in the stock OEM mounting location, and the second battery shall be located between the chassis frame rails, in an enclosure of sufficient structure to prevent physical damage from road debris and to protect against environmental hazards. Suggested Source: OEM.
2. **High Voltage Battery** - The high voltage battery pack shall be a maintenance free, nickel-metal hydride or lithium ion and provide a minimum of 288 volts, 60 kilowatts, and 8.4 ampere-hour. The high voltage battery pack shall be protected to prevent physical damage from road debris and to protect against environmental hazards. Suggested Source: Cobasys, Johnson Controls.

### **K. Battery Cables and Grounds**

Battery positive and ground cables shall be AWG size 2/0 minimum, fine stranded, flexible copper wire with permanently affixed cable connector ends with heat shrink tubing applied. All cable ends shall be fastened in a manner equal to the method used by the chassis Original Equipment Manufacturer (OEM). Positive cable ends at the battery shall use a protective cover or cap as an added insulator. Cable assemblies installed in place of chassis manufacturer's battery cables shall be sized to match the electrical system's maximum current draw to provide proper engine starting and operation of all systems.

An additional ground of the battery cable size shall be installed between the engine and chassis frame and between the transmission case and the chassis frame. One additional ground wire of the battery cable size shall be installed between the frame rails just ahead of the rear axle. The bus body shall be properly grounded with cables to the chassis frame in at least two places. Engine, body, and equipment grounds (properly sized) shall be installed to handle subsystem electrical capacity. Lift pump motor shall be grounded directly to chassis frame using a cable of the same size as the pump motor feed wire. All exterior lights and accessories added by the body manufacturer shall be grounded by an in-harness ground attached at a common grounding point. There may be a common grounding point in the rear of the bus along with a required grounding point at the fuse panel. For all ground wire connections; 1) paint shall be removed at the grounding point to provide a cleaned surface; 2) grounding wires and cables fastened to the frame or body structure shall use a bolt with nut installed in a proper sized hole; and 3) a coating of

dielectric material shall be applied to the cleaned surfaces, cable ends, bolts, and nuts where each positive or grounding cable or wire is attached.

All buses shall be supplied with proper radio frequency (RF) suppression equipment to reduce radio interference and improve radio transmission and reception performance. High corrosion resistance and high conductivity braided ground straps shall be added: between the engine and the chassis frame of 1" width, minimum; between the engine and the firewall of ½ " width, minimum; two between the frame and the body sections of ½ " width, minimum; and between the separate body sections of ½ " width, minimum. For all braided ground wire connections, paint shall be removed and a coating of dielectric material applied to the cleaned surfaces where each braided cable attaches as is required in other ground wire applications. All removable covers in the engine area including fiberglass hoods need to be shielded and RF grounded. All braided high corrosion resistance and high conductivity ground straps shall be as short as possible and shall use the negative battery cable attachment point (except those between separate body sections) as the termination point of the RF grounding.

#### **L. Alternator**

The alternator equipment shall be furnished by the chassis manufacturer where hot output will match system needs. This system shall be a 12-volt dual-belt drive or serpentine belt drive with internal or external voltage regulator. It shall be capable of maintaining the battery at a state of full charge under all operating conditions and equipment loads, 155 amp minimum. The alternator shall be supplied with proper radio frequency (RF) suppression equipment and have a ½" wide braided ground strap connected between the alternator frame and the engine block to reduce two-way radio interference. Any bracket modifications shall not reduce the strength of the mounting bracket.

#### **M. Brakes**

Foundation brakes shall be a power-actuated four wheel disc type or a disc front/drum-type rear, anti-lock braking system. The system shall be the heaviest-duty available for stop and go operation. Brake system shall include a low brake warning system provided by chassis manufacturer.

1. Front Foundation Brakes: disc, 12 5" rotor with 45 square inches of pad lining minimum.
2. Rear Foundation Brakes: drum, 12.125" x 3 5" minimum or disc with rotor and pad of equivalent size to match axle weight rating.
3. Parking Brake: Rebuildable, heaviest-duty available from chassis manufacturer.
4. Regenerative Braking: Hybrid drive system shall have integrated regenerative braking capabilities to provide additional braking effect during deceleration.

#### **N. Fuel Tank**

Fuel tank shall be 55-gallon minimum. On **gasoline models** where the fuel tank is mounted outboard of the chassis frame rail, the fuel tank shall have a protective cage for impact protection provided by the chassis manufacturer in compliance to regulations for school bus fuel tank impact protection. Fuel fill shall be protected from weather.

#### **O. Hazard Flasher**

Hazard flashers shall be the equipped with a dash mounted control (pull on/push off, lighted knob) switch with indicator (audible and light) and utilize an electronic or a heavy duty transistorized flasher. A combination of an OEM flasher switch and an additional dash mounted control is an acceptable solution in lieu of removing the OEM flasher switch. Final location, on the dashboard, shall be determined at pilot model production by the state. Suggested sources: OEM, Hela, Signal Stat..

**P. Shock Absorbers**

Chassis shall have gas filled shock absorbers front and rear, most heavy-duty available from chassis manufacturer.

**Q. Suspension**

1. The chassis shall be equipped with a heavy-duty spring front suspension to match the specified gross axle weight rating.
2. The chassis shall be equipped with a heavy-duty rear suspension fitted with a rubber shear spring suspension that works in conjunction with the OEM chassis leaf spring suspension to match the specified gross axle weight rating. The added suspension, consisting of a spring carrier assembly, a frame hanger assembly, a cross-member tube assembly, and a carrier spring assembly, shall be installed in place of the original spring hanger and shackle assembly. The frame hanger must bolt into the existing Original Equipment Manufacturer (OEM) spring hanger holes in the frame. The added suspension system must not alter the OEM gross axle weight rating. Suggested sources: MOR/ryde® "RL" Suspension System.

**R. Stabilizer**

Chassis shall have suspension stabilizers as provided by chassis manufacturer.

**S. Wheels**

Bus wheels (6) shall be 16.0" x 6.0" minimum. Wheels shall have stainless steel or brass valve stems a minimum of 1 ½" long

**T. Tires**

All tires (6) shall be from the same manufacturer and be all season, tubeless, steel radial blackwall (LT225/75Rx16E), single front, dual rear. The tires shall be the largest size available from chassis manufacturer to meet the GVW rating.

**U. Drive Shaft**

The drive shaft shall be integrated as part of the hybrid drive system and have guards of sufficient strength to prevent the drive shaft from striking the floor of the bus or the ground in the event of a tube or universal joint failure. Drive shaft guards (OEM chassis equipment preferred, or installed by the chassis manufacturer) shall be secured properly and be equal in materials and design to drive shaft guarding installed on a school bus chassis.

**V. Wipers/Horn**

Electric wipers shall be two speed, delay style, dual jet washers (electric), with OEM standard arms and blades. The bus shall have two electric horns (high and low pitch).

## **W. Radiator and Cooling System**

The cooling system shall have an extra cooling capacity radiator, water pump, pulley, secondary electronically driven circulation pump for engine off periods, and clutch-type fan with coolant recovery system (heavy duty installed by chassis manufacturer). Cooling system shall be winterized (minimum -35°F freezing point). Radiator removal instructions and estimated removal time shall be furnished with first bus to each agency. Coolant integrity shall be maintained throughout the manufacturing process to insure that the coolant, including additives, in the delivered bus is equal to the coolant installed at the chassis OEM factory.

## **X. Fluids**

Fluids shall be checked and filled from inside front hood where application allows. Engine oil fill/check, transmission oil fill/check, and coolant fill/check shall be located for easy access.

## **Y. Engine Cover**

The engine cover shall be insulated from engine heat, engine noise, and road noise. Driver's area noise level (at driver ear level) shall not exceed 82 DBA for any engine at a constant speed of 55 mph on a level roadway and shall be verified at pilot model inspection. Additional equipment added to the engine cover area shall not interfere with removal/installation of the engine cover.

## **Z. Exhaust System**

The exhaust shall exit the rear of the bus on the street (left) side just forward of the left end of the rear bumper flush with the body. The exhaust system shall meet FMVSS §393.83 and current Environmental Protection Agency (EPA) requirements. The exhaust system must be installed to provide maximum ground clearance and departure angle at the rear of the bus.

## **V. OTHER ITEMS**

### **A. Safety**

The following safety items shall be provided on each bus:

1. A 12-volt 97-db sealed solid state electronic warning alarm that is readily audible from outside the bus when transmission is in reverse. The alarm shall: be steam cleanable; have passed a 1 million cycle test; and meet SAE J994, OSHA, Bureau of Mines and all State Regulations. The alarm shall be mounted with bolts and properly grounded in a protected location in the rear axle area (location shall be approved by the State). Suggested source: OEM standard.
2. The rear door shall have an audible alarm at driver area that is energized when the rear door latch handle starts to open and when the rear door is locked with the ignition in the on or accessory position.
3. A lift master switch with light (green and labeled) at driver's station, illuminated when switch is on.
4. An indicator light (red and labeled) at driver's station that is activated when lift door is open and when the lift is in operation.

5. An interlock system shall be provided to ensure that the bus cannot be moved when the lift is not stowed and that the lift cannot be deployed unless the interlock is engaged (to meet ADA regulation). The interlock system shall engage when the lift operation sequence is followed. Interlock operating instructions shall be included with each bus at delivery.
6. An automatic daytime headlight control system shall be provided. The system shall illuminate the headlights when the ignition switch is on and the headlight switch is off. The system shall activate automatically after engine start up with the headlamp switch off and shall deactivate automatically when the headlamp switch is on or the ignition switch is turned off. Suggested sources: Chassis OEM.
7. A low profile electronic strobe light (white) with a clear lens and branch guard shall be provided. The light shall meet SAE J1318 requirements and be mounted centrally on the roof of the bus approximately 6' forward of the rear of the bus. The 12 volt light shall have a control switch in the driver's area. The light shall be approximately 4" in height, produce 80 ( $\pm 10$ ) double flashes per minute, and have a light intensity of 1 million candlepower with a current draw of approximately 1 ampere. Suggested Sources: Meteorlite, Peterson, Target Tech Pulsator<sup>®</sup> 451, Truck-Lite

## **B. Electrical**

1. Lift equipped buses shall have a circuit breaker with a manual reset in the lift feed circuit. The circuit breaker shall be mounted under the hood, with easy access, in the positive power cable leading to the lift power pack.
2. Install a 12 volt power point for hand held equipment in the driver's area.
3. All cable and wires added by the body manufacturer shall be continuous color coded and numbered or function coded. The manufacturer shall furnish complete as built wiring diagrams with integrated body and chassis wiring marked to show the codes used. Mating harnesses and harness connectors shall use matching wiring and coding unless chassis OEM wiring and coding is different from body manufacturer. The wiring shall be designed to be a "plug and play" system where the harnesses and components are fastened through common standard terminal ends and connectors.
4. Electrical panels installed by the body builders shall be located for easy access. Circuit breaker circuit protection shall be standard but blade type fuses may be used when expressly required by the component manufacturer. The master electrical panel shall use a separate "plug and play" connector and terminal system. Highest quality components available shall be used. Two spare electrical fuses that match fuses used on the bus body and chassis shall be supplied with the bus and stored in a box or spare circuit area at fuse box. All components shall be placed on the front of the electrical panel for ease of service. Suggested sources: R.C. Tronics Incorporated
5. All wiring added to chassis fuse block shall be securely fastened to prevent wires from being knocked loose or loosening from vibration. The manufacturer shall use wire raceways where needed. Wiring, harnesses, and raceways shall be supported at regular intervals by "P" clamps, or by other supporting hangers where necessary, and routed in separate hangers from heater hoses or air conditioning hoses. Body fuse/electrical panel shall be sufficiently sealed to prevent intrusion of dirt and moisture.
6. All wiring shall be heavy-duty; be properly grounded to body frame structure and the chassis; use a common grounding point; and be adequate for electrical system capacity.

All wiring passage holes through engine cowl, floor area, and other partitions shall be thoroughly sealed to prevent dust and moisture intrusion and be sufficiently protected to ensure against wear from friction and the elements.

7. All accessories and accessory electrical equipment shall be wired through a constant solenoid energized when the bus's ignition switch is in "ignition on" or "run" mode. A master switch with light in the driver's control panel shall control this constant solenoid and act as a quiet switch overriding individual switches for accessories. This master switch is wired in series with the ignition switch to control the constant solenoid. The constant solenoid shall not control headlights, taillights, emergency lights, charging system voltage regulator energizer lead, a fused power lead for the passenger door, and a fused constant power lead for all electronic control units' long term memory.
8. All control switches, relays, and circuit breakers used for the various electrical circuits shall have a current carrying capacity adequate for the circuit that they control and shall be properly marked for their function. The illuminated switch markings shall be permanent and not wear off with switch use. Control switches shall be positioned for easy access.
9. All added wiring shall be installed in a properly sized and supported split open-type loom or a properly supported raceway for protection. All wiring harnesses shall have adequate length to allow for harness flexing from supporting brackets and where harnesses connect to electrical equipment. Any wiring added by splicing into an existing chassis Original Equipment Manufacturer (OEM) harness or wire shall match modification standards set forth by the chassis manufacturer, such as Ford's QVM. Any added accessories or electrical circuits shall not interfere with nor back-feed into other electrical circuits.
10. Wiring added from OEM chassis wiring to rear lights, fuel tank, and/or other accessories shall be supported and protected from the ice and snow build-up. Wiring shall be inside bus where possible. Wiring to taillights and other exterior lights shall be long enough to remove assembly by 6" for service. Exterior connections shall be weatherproof positive lock connectors coated with dielectric grease. Suggested sources: Metri-pak, Weather-Pak.
11. Scotch lock wire connectors are not acceptable and shall not be used for wiring installation. Terminals shall be as follows:
  - a. Machine crimped on wire ends shall be used on all harnesses and cable assemblies used in the production of buses. Harness assemblies shall have connectors matching a mating connector where harnesses attach to other harnesses, switches, or other electrical units. Connections made in any harness assembly shall use Sta-Kon<sup>®</sup>, disconnects and splice connectors where machine applied connectors cannot be used. Connectors shall be properly crimped with Sta-Kon<sup>®</sup>, tools and covered with heat shrink tubing. In-line fuse assemblies shall use spade type fuses in a Weather-Pak holder and shall be located for ease of service.
  - b. All exterior wiring connectors (plug-ins) including harnesses shall be weatherproof positive lock with the connector pins applied with the proper crimping tool (Weather-Pak, Metri-Pak). All exterior ground connections, except factory supplied braided ground straps, shall have properly applied terminal ends with heat shrink insulation applied.

## VI. ALTERNATE QUOTES (OPTIONS)

## A. Air Conditioning System

1. a. The air conditioning system (AC) shall have front and rear evaporator units. The system shall be integrated with a compatible in-dash driver's area evaporator unit and compressor (chassis OEM) capable of delivering tempered air for windshield defrosting. The systems shall use refrigerant type R-134A and be warranted from in service date for one full year, minimum. The system shall be of sufficient capacity to maintain interior temperature requirements stated in the test procedure for air conditioning systems during summer operation (see required certification in Vendor/Manufacturer Requirements, Section VII. C).
- b. The front system shall be integrated with a compatible in-dash driver's area evaporator unit (complete front system may be Chassis OEM). The front system shall provide temperature control with sufficient cooling ventilators for driver comfort with no reliance on the rear system for front temperature control. Front and rear air flow and temperature shall be controlled by separate switches on the driver's control panel or dash panel. Front and rear systems shall have separate fan controls.
2. Compressor: There shall be one engine driven air conditioning compressor of nominal 10 cu. in. displacement (may be chassis OEM). Hose end metal fittings connecting hoses to the compressor shall be electro-coated steel that pass the ASTM D117 1000 hour Salt Spray test. The compressor clutch circuit shall be interrupted when abnormal pressures are detected by the pressure monitoring switches. Low pressure switch shall be located between expansion valve and compressor in the low pressure side of the system. The high pressure switch shall be located between compressor and condenser in the high pressure side of the system. Suggested sources: A.C. Industries, American Cooling Technology, Thermo King, Trans/Air,.
3. Condenser: The system's condenser shall be **roof** mounted. The condenser fans and motors shall be enclosed within the condenser housing. The housing shall be galvanized with heat-fused powdered epoxy coating. The condenser coil shall be copper tube expanded into aluminum fins and vinyl-coated. Hose end metal fittings connecting hoses to the condenser shall be electro-coated steel that pass the ASTM D117 1000 hour Salt Spray test. High pressure cut out switches shall be wired into the clutch circuit. The condensers shall be equipped with 10" axial fans dynamically balanced with permanent magnet totally enclosed motors. The condenser shall blow air on an angle down from the bus chassis to help prevent re-circulation of hot air back through the condenser core. A refrigerant dryer shall be included and a sight glass where necessary. The condenser shall include winter guard kits approved by the State. Suggested sources for the condenser: A.C. Industries, American Cooling Technology, Inc., Thermo King, Trans/Air.
4. Evaporator(s)
  - a. The front (may be chassis OEM equipment) and rear evaporator shall have three-speed or variable speed continuous duty permanently lubricated blower motors (rear blower assembly rated at 1985 CFM, minimum). The evaporator cores shall be a copper coil with aluminum fins (four rows deep, minimum), galvanized heavy-duty frame and coil end sheets with a galvanized drain pan. The evaporator expansion valve shall have "O" ring refrigerant connections. Suggested

sources: A.C. Industries, American Cooling Technology, Inc., Thermo King, Trans/Air.

- b. The driver's evaporator shall be controlled separately from the passenger area evaporator and shall have a three-speed or variable speed continuous duty permanently lubricated blower motor (may be chassis OEM equipment). The controls shall include an on/off switch and a three-speed blower switch. The in-dash unit shall not interfere with removal or replacement of the engine cover or be blocked by the entrance door control mechanism.
  - c. The passenger area evaporator system shall be separately controlled from a control station at the driver's position. The controls shall include an on/off switch and a three-speed or variable speed blower switch.
5. The components of the air conditioning system shall be readily accessible for maintenance. Service/charging ports shall be accessible without removing any other component or item. The refrigerant hose construction shall comply/exceed SAE specification J2064 Type D or E. The construction of the hose shall include a nylon-based thermoplastic inner liner reinforced with two separate layers of textile yarn and a cover consisting of a synthetic elastomer in order to reduce incidences of chaffing, cuts, and ruptures with adequate extra length for flexing where connected to compressors and other components. Refrigerant fitting construction shall comply/exceed SAE specification J2064 Type D or E. All refrigerant hose end fittings shall be electro-coated steel that will pass the ASTM D117 1000 hour Salt Spray test. The hose coupling end of all fittings shall include two hose barbs and two areas of elastomeric or HNBR seals. Refrigerant hose clamp construction shall; comply/exceed SAE specification J2064 Type D or E, be made of stainless steel to ensure coupling integrity, properly align hose end fitting, and clamp the hose directly over the elastomeric or HNBR seals. Refrigerant hose fittings shall be Aeroquip E-Z Clip system, Carrier/Transicold Quick-Klik system.
6. The wiring shall meet all applicable specifications (see Section V. B.). The evaporator and condenser wiring (power and ground circuits) shall be properly sized to provide full battery voltage to each electrical unit.
7. Air conditioning electrical circuits shall be protected with automatic circuit breakers or thermal relays

## **B. Manual Entrance Door**

1. The manufacturer shall provide a heavy duty manually-operated passenger entrance door with control handle located in the driver's compartment within easy reach of the driver. The passenger entrance door shall not extend below the step frame. All exposed door frame structure shall be made of 304 stainless steel acid-etched, coated with zinc based primer and powder coated OEM white (including the fasteners). The door shall be located on the right side of the bus behind the right front wheel. The entrance door shall provide a 30" clear width opening, minimum, with all handrails installed. Door opening height from the top of the first step to the door header shall be a minimum of 76".
2. Passenger entrance door shall be a double-folding, split-type double leaf swing door. This door shall have a flexible soft rubber cushion on the meeting edge 12" in width, minimum. The door glass shall be see-through, tinted (AS-2) safety glass. Under all operating conditions and bus speeds, an airtight and dust-proof seal shall be formed between the door and the stepwell, between the door and body opening, and between the door leaf sections.
3. A method shall be provided to lock the bus when the bus is parked.

## **C. Driver-Side Running Board**

A driver side running board shall be constructed of either stainless steel or aluminum. The running board shall be securely attached to the chassis and have the capacity support 300 pounds.

## **D. Auxiliary Air Heater System**

The auxiliary air heater systems provided shall be able to preheat, provide supplemental heat, and maintain heat for the interior of the bus for all engines. The auxiliary heater systems shall be supplied as a heated air model with an on/off, variable temperature, and with a seven-day electronic timer control. The seven-day timer control shall be capable of a two hour preheat, minimum and be capable of continuous run control when the key is on with the engine running. The system control units shall be located in the driver's area of the bus. The heater system shall be complete with all fuel and electrical controls, exhaust system, and standard warranty. All heaters shall be 12 volt units with a fused power supply and with protection for high and low voltage conditions. The auxiliary heater system shall meet FMVSS 301 fuel system integrity requirements. The heating units shall be fueled by the bus's primary fuel supply. The electrical connection shall be a one piece harness from the control switch to the heating unit with weather-pak or equal exterior connections.

The heated air model (with mounting brackets) shall be a self-contained unit placed in the passenger area either between the bus seat and bus floor or in a clear free space in the interior of the bus (placement shall be decided at the time of installation). The heated air system shall be a variable output, multi-stage heater for all engines. The heating unit shall have, 1) 16,000 BTU heat output, minimum (high heat setting), 2) 100 CFM of air delivery, minimum, and 3) automatic cycling between heat output stages. The heating unit shall be operated from the bus driver's area control unit. The unit shall have automatic overheat protection. All heater systems' fuel and exhaust connections shall be made outside the passenger compartment of the bus. The auxiliary heater exhaust shall be connected to a section of rigid exhaust pipe with a down sweep that exits just beyond the body side. The heating unit shall be fueled from the bus's primary fuel supply. Suggested source: Espar Inc. D5LC/B5LC (gas, heated air) Webasto

**E. Power Seat Base for Driver's Seat**

Provide a six-way power seat base for standard driver's seat that allows for fore and aft, up and down, front tilt and rear tilt for the driver. Suggested source: Chassis Original Equipment Manufacturer (OEM) Deluxe Power Seat Base.

**F. Destination Sign**

A 12-volt or 24-volt, solid state, LED destination sign shall be provided which meets ADA requirement (one front and on side sign). Sign shall be programmable using latest version of Microsoft Windows® based software. Suggested sources: Luminator VISTA, TwinVision®

**G. Ceiling Handrails**

1. Two full length transit-type ceiling handrails shall be provided and securely attached to roof structure. The handrails shall be a minimum of 1 1/4" outside diameter, brushed finish, stainless steel including mounting brackets and fittings. All handrails shall meet ADA requirements for position and size.
2. All handrail mountings shall have reinforcement plates welded to or imbedded in structure behind surface panels of sufficient strength to withstand passenger force. Final locations shall be determined at pilot model production.

**H. Exterior Heated Remote Mirrors**

The exterior heated mirrors shall meet all exterior mirror specifications listed in part IV, section O. Suggested sources: B&R Manufacturing, Luceix/Metagal, Mirror Lite Co, Inc., ROSCO,

**I. Donation Box**

A donation box (to replace the farebox) shall be mounted on an adequately braced stanchion; shall be located over a flat floor surface near the driver; and shall be accessible to passengers entering the bus (meet ADA requirements). The lockable donation box shall be supplied with two keys. (Location shall be approved by the State at pilot model inspection.) Suggested source: Main Farebox Model C91M.

**J. Farebox Electrical Prep**

Electrical connections and wiring only (no farebox) along with support stanchion shall be supplied to the area where the standard farebox would be mounted (location shall be approved by the State at pilot model inspection).

**K. Rear Emergency Exit Window**

1. Each bus shall be equipped with a rear exit window with a minimum of 1,200 square inches of glass area. The rear window shall have a latching device for opening from inside the bus which may be quickly released but designed to offer protection against accidental release. Lever-type latches shall be used for rear emergency exit windows and shall secure the windows tightly shut, shall be easily operated, and shall not unlatch due to vibration during bus operation. The latches shall be made of non-corrosive materials and be designed for minimal maintenance needs. The rear window exit shall meet federal requirements (FMVSS 217). The rear window exit shall have an audible alarm at the

driver's area energized when the window starts to open with the ignition on. A clear full width path of 16" minimum height shall be provided to the rear exit window. No objects shall be placed in the bus which restricts passageway to the rear exit window. All emergency exits shall be marked with instructions for proper use.

2. The bus rear exit window shall have a glue-on wide angle view Fresnel lens to improve vision directly in back of bus. Minimum size shall be 80 square inches. Suggested source: Vanguard made by 3M.

#### **L. Paint - Optional Designs**

1. The bus shall have an 11" belt painted stripe (no decals). An example would be: an OEM white bus with a 11" belt stripe.
2. The bus shall have the roof painted a different color. An example would be: an OEM white bus with the roof painted red.
3. The bus shall be painted a full body color, including the roof, other than OEM white. An example would be: a bus painted all red.

#### **M. Folding Platform Passive Lift (Platform) (Meet ADA Requirements)**

The folding platform lift shall meet all of the lift requirements stated in Part II, Section Y except that the lift shall have a platform that folds in the center during stowage and the lift platform is 32" usable width. The folding platform lift provides an unobstructed view from inside the bus through the lift opening. Braun Vista, Ricon KlearVue model K-5005 ADA.

#### **N. Rear Five Place Passenger Seat**

On buses with a rear exit window, forward facing seating for five passengers shall replace two double place forward facing seats at the rear wall of the passenger compartment increasing the passenger capacity by one. The five passenger seating shall be available for buses with the lift forward of the rear axle (no wheelchair lift and/or securement location at the rear of the bus). The five passenger seat shall be 88" minimum width and shall comply with all requirements specified in Section II, Part P., Item 4. and Item 5. of these specifications but without grab handles. The seats shall be of the same design and color as the other passenger seats. The seats shall be equipped with passenger seat belts.

#### **O. Two-Way Radio Antenna/Power**

All material and labor required for a pre-installation package for two-way radio equipment shall be furnished by the manufacturer. All equipment and accessories installed as part of the buses shall have no measurable radio frequency (RF) interference. All equipment installed on the bus must operate in its normal mode while radio transmissions are being made from an on board transmitter producing 100 watts or more of transmit power while operating in the range of 43 Megahertz (Mhz) to 900 Mhz. Proper RF suppression to eliminate interference shall be provided by the manufacturer in any equipment and accessories that can produce interference. The bus frame and body shall be designed to provide no measurable radio interference (shielding) for improved radio emissions and reception performance. Certification of radio reception and transmission performance by the bus manufacturer as well as locations of components for installation of the radio packages for 43 Mhz to 900 Mhz shall be completed at pilot model production.

1. Two (2) antenna mounting plates (.060" steel minimum) shall be mounted in the roof of the bus for the purpose of providing a connection to the ground plane and providing a secure mount for the antenna. On buses with a metal exterior skin, one plate shall be mounted forward of the roof escape hatch on the roof center line and the second plate shall be mounted to the left (driver's side) of the first plate just above the bus side window. For buses with FRP composite bodies, the mounting plates may be installed in the front cap of the bus--one centered in the roof section of the cap and one centered in the left (driver's) side section of the cap. Each mounting plate must be properly positioned in relation to its ground plane to ensure proper operation of an antenna installed at that mounting point. The total thickness of the exterior shell of the bus in the mounting plate area including the mounting plate shall be no more than 1/2".
2. Two (2) antenna ground planes, which are required for proper antenna operation, shall be mounted in each bus. All ground planes shall be radio frequency (RF) grounded to the nearest metal portion of the body structure using high corrosion resistance and high conductivity braided ground straps of the proper size (3/8" minimum width). Ground planes shall provide a comparable area of radio transmission coverage whether buses have a metal exterior body covering or have a FRP composite exterior. At each antenna access opening and mounting plate area, the ground planes shall be of proper size and shape for proper communication operations. The ground planes shall be a solid piece and operate over the range of frequencies from 43 Mhz to 900 Mhz. The ground plane material used by the manufacturer must be a durable material that can be connected to the antenna mounting plate and grounded to the chassis frame. The ground plane shall be of the proper size to protect passengers in the bus from unnecessary radiation from the transmitting antenna at the bus's antenna access openings.
3. A 6" high branch deflector shall be installed on the roof of the bus 6" forward of the antenna mounting area.
4. Two threaded type access holes with covers approximately 6" in diameter shall be installed at the following antenna mounting plate locations:
  - a. The interior ceiling forward of the roof escape hatch.
  - b. For buses with metal exterior skin directly to the left (driver's) side above the side window line of the bus.
  - c. For buses with FRP composite bodies the screw-type access holes may be installed in the front cap of the bus, one centered in the roof section of the cap and one centered in the left side section of the cap. Adequate space shall be provided between the installed access cover and the inner body to allow for routing of the antenna lead and its connections without interference.
5. A concealed thin wall plastic conduit, 5/8" I.D. minimum, (with antenna cable pull wire) shall extend from the antenna mounting plate locations (roof and above side window or in front cap) to the mounting location for the radio. When installed, the conduit shall have no sharp or right angle bends or be distorted to prevent insertion of the antenna lead. For both antenna mounting plate locations, sufficient space shall be left at each end of the conduit to allow easy removal and replacement of the devices attached to the cable. The antenna pull wire shall terminate behind the driver's seat with 2 feet of extra length extending into the bus interior.

6. 12-volt power for the two-way radio - The positive lead (red 8 ga wire fused at 40 amperes) for the radio connection shall be provided directly from the battery positive post. The ground lead (black, 8 ga) shall be connected directly to the chassis frame with a bolt and nut for fastening. Proper suppression equipment shall be incorporated in the bus's electrical system to eliminate interference with radio and television transmission and reception shall not cause interference with any electronic system on the bus. The radio power and ground leads shall terminate directly behind the driver's seat with 12 feet of extra length extending into the bus interior.
7. A split loom or other flexible wire race-way (1" minimum) shall be installed from the radio location to the dash mounted microphone control location.
8. The modesty panel behind the driver shall be used for radio mounting and shall be constructed to support 60 pounds of weight. To provide for radio mounting, a 5" minimum distance shall be provided between the driver's seat and the modesty panel when the driver's seat is in its most rearward travel position.

**P. Stereo/Radio and Public Address System – Optional Systems**

1. AM/FM/compact disc (CD) stereo radio system and shall be equipped with two (2) speakers. Suggested source: OEM.
2. Combined AM/FM/compact disc (CD) stereo radio and a public address system and shall be equipped with two (2) speakers.
3. Public address system only and shall be equipped with two (2) speakers.
4. Extra speakers to a total of four (4).

**Q. Raised Floor (No Wheel Wells)**

The bus shall be equipped with a raised floor where no wheel wells are showing in the rear of the bus. The raised floor shall not cause changes to any other requirements as stated this specification. In addition, the step well shall meet the same requirements as specified in part II, section D.

**R. Smooth Anti-slip Flooring**

1. The entire passenger area including the wheelchair securement area, entrance steps and stepwell area shall be overlaid with smooth, slip resistant flooring material. The resilient sheet flooring system (2.2 mm thickness minimum) shall be a high quality vinyl constructed with aluminum oxide, silicon carbide grains and PVC chips blended in a high quality wear layer with a non woven polyester/cellulose backing with glass fiber reinforced center scrim. The flooring shall extend up the sidewall and rear wall to the seat rail line and shall be coved at the floor/wall joint to form a smooth water tight transition. Installation of flooring must be done strictly according to the flooring manufacturer's directions using the proper accessories, tools, and adhesives. Suggested sources: Altro Transflor™ Meta, Altro Transflor™ Chroma.
2. Step treads shall be one-piece resilient sheet flooring system matching the passenger compartment flooring. All step edges (nosings of step tread material) shall have a band of bright yellow contrasting color running full width of the step. Step tread to stepwell joints shall be sealed to prevent intrusion of moisture and debris. An aisle width standee line of

bright yellow contrasting color shall be in the aisle just behind stepwell (must meet ADA contrast requirement). Suggested sources: Altro Safety Step System

## **S. Entrance Stepwell Heater**

The entrance stepwell shall include a 12-volt electric heating element/unit for the lower step to prevent icing of entrance steps. The low voltage step heater shall consist of one or more wire elements laminated and vulcanized between two plies of .026" silicone rubber impregnated fiberglass cloth to maintain an approximate temperature of 160° F with a low temperature (30°F) sensing switch (Warm Welcome® by Lighthouse International, Ltd.). The entire lower step heating unit with power wires shall be enclosed between the stepwell and the step tread (beneath the step tread) of the lower step. Lead wires shall be loomed, supported by brackets, and protected by grommets where they pass through structure. The sensing switch (thermostat) shall be integral with the power feed wire and located outside the stepwell in a protected area under the bus or be integral with a separate short harness that plugs into the feed wire under the bus.

## **VII. VENDOR/MANUFACTURER REQUIREMENTS**

### **A. Bus Information Furnished**

Bus information in this section shall be reviewed at the pre-pilot model review meeting and at final pilot model production. Bus information identified by “\*” shall also be supplied with each bus at delivery where indicated. All manuals shall be provided in a hardcopy and an electronic copy (CD or DVD). The vendor/manufacture shall maintain record or proof that all bus information was supplied to the transit agency.

1. Copy of manufacturer's statement of origin for a bus.
- 2.\* Warranty papers for chassis, body, and additional equipment with each bus.
- 3.\* As built drawings showing wiring schematics of all electrical circuits, body, and chassis with each bus.
- 4.\* Operator's manual for bus and all add-on equipment with each bus.
- 5.\* A complete set of repair manuals for the chassis and a manufacturer's parts manual for the body, and auxiliary equipment for the first bus of each model year delivered to each transit agency.
- 6.\* Drivability and emissions manual for the first bus of each model year delivered to each transit agency.
- 7.\* Bus operating instructions showing controls and operation on a DVD for the first bus delivered to each transit agency.
- 8.\* Standard manufacturer's production option sheet(s)/decal(s) for chassis and body shall be installed in manufacturer's standard location, with no holes or rivets obscuring writing and numbers. Sheet shall include rear axle ratio. A paper copy of the service broadcast sheet for chassis shall also be provided with each bus.
- 9.\* Maintenance and inspection schedule incorporating the required maintenance and inspection of the basic bus and its subsystems (i.e., wheelchair lift) with each bus.
10. Detailed description and specifications of the frame structure, roof structure, side sheathing, inside panels, with particular reference to material used.

11. Detailed drawing on how body structure is mounted on chassis frame.
12. Certification that the seating floor anchorage and floor fasteners shall meet all applicable FMVSS including FMVSS 207, 208, 209, and 210.
- 13.\* Proof of bus suspension alignment (work order or bill) at final bus inspection and with each bus. Four wheel alignment shall include adjustments to front and rear suspension and steering parts so that axle alignment, camber, caster, and toe settings are within manufacturer's desired limits.
- 14.\* Proof of undercoating (warranty) at final bus inspection and with each bus.
- 15.\* Front end and rear towing instructions with each bus.
- 16\* Wheelchair securement product instructions and training program.

## **B. Manufacturer Quality Control**

Bus contractor/manufacturer shall provide a plan for quality control during bus construction and include the plan as part of the bid documents (ISO 9001:2000 Certification). Bus contractor/manufacturer shall also provide the name of the chief of quality control for bus construction.

The contractor shall establish and maintain an effective in-plant quality assurance organization. It shall be a specifically defined organization and should be directly responsible to the contractor's management and completely independent from production. The quality assurance organization shall exercise quality control over all phases of production from initiation of design through manufacture and preparation for delivery. The organization shall also control the quality of supply articles. The quality assurance organization shall verify inspection operation instructions to ascertain that the manufactured product meets all prescribed requirements. The quality assurance organization shall detect and promptly assure correction of any conditions that may result in the production of defective transit buses. These conditions may occur in design, purchases, manufacture, tests or operations that culminate in defective supplies, services, facilities, technical data, or standards. The contractor shall maintain drawings and other documentation that completely describe a qualified bus that meets all of the options and special requirements of this procurement. The quality assurance organization shall verify that each transit bus is manufactured in accordance with these controlled drawings and documentation.

The contractor shall ensure that all basic production operations, as well as other processing and fabricating, are performed under controlled conditions. Establishment of these controlled conditions shall be based on the documented work instructions, adequate production equipment, and special work environments if necessary. A system for final inspection and test of completed transit buses shall be provided by the quality assurance organization. It shall measure the overall quality of each completed bus. A system shall be maintained by the quality assurance organization for identifying the inspection status of components and completed transit buses. Identification may include cards, tags, or other quality control devices. Inspection stations shall be at the best locations to provide for the work content and characteristics to be inspected. Stations shall provide the facilities and equipment to inspect structural, electrical, hydraulic, and other components and assemblies for compliance with the design requirements. Stations shall also be at the best locations to inspect or test characteristics before they are concealed by subsequent fabrication or assembly operations. These locations shall minimally include, as practical, under-body structure completion, body framing completion, body prior to paint

preparation, water test before interior trim and insulation installation, engine installation completion, under-body dress-up and completion, bus prior to final paint touch-up, bus prior to road test, bus final road completion and presentation to resident inspectors. Tests shall be performed by the bus manufacturer to ensure that the unit is dustproof, water-tight, fumeproof, and that all bus fluids are per specifications. The quality assurance organization shall be responsible for presenting the completed bus to the resident inspectors. Sufficiently trained inspectors shall be used to ensure that all materials, components, and assemblies are inspected for conformance with the qualified bus design.

The State may be represented at the contractor's plant by resident inspectors. They shall monitor, in the contractor's plant, the manufacture of transit buses built under this procurement. The contractor shall provide office space for the resident inspectors in close proximity to the final assembly area. This office space shall be equipped with desks, chairs, outside and interplant telephones, and other items sufficient to accommodate the resident inspector staff. Inspectors shall have lifting equipment available for raising buses for under bus inspections.

### **C. Air Conditioning Certification**

Bus manufacturer shall provide air conditioning system performance certification (conducted by an independent laboratory or testing agency and supported by documentation of the actual test on the pilot model bus) that the air conditioning system installed in the bus meets or exceeds performance levels required by these specifications.

1. The air conditioning system performance testing shall be conducted using a heating chamber of sufficient size to contain the basic bus, to heat soak the bus at 100°F for 4 hours minimum, to simulate sun load entering windshield, and to maintain 100°F exterior temperature continuously after heat soak during testing. An interior temperature of 72°F ( $\pm 3^\circ\text{F}$ ) must be reached within 30 minutes from the beginning of the test. Engine speed shall be maintained at 1300 RPM ( $\pm 200$  RPM) during the test.
2. Instrumentation for temperature monitoring of the bus interior shall be a minimum of 3 points in the passenger area 30" above the floor - one in driver's area at knee level, and one at the evaporators' air inlets and air outlets. Instrumentation and recording equipment shall be able to monitor all points, record data at one minute intervals, and print a data report.

### **D. Heating/Ventilating Certification**

The bus manufacturer shall provide test results that certify the performance of the heating/ventilating system as installed in the bus meets or exceeds performance levels required by these specifications. The test should be conducted by an independent laboratory or testing agency and supported by documentation of the actual tests on the pilot model bus. Testing may be performed in natural cold climate conditions. Testing of the diesel engine equipped bus shall be deemed sufficient.

1. The heating system performance testing shall be conducted using a cold chamber of sufficient size to contain the basic bus; to cold soak the bus at 0°F for 12 hours; to maintain 0°F continuously after cold soak during testing; and be equipped with a chassis dynamometer to simulate road operation under conditions encountered in normal transit operations with a 20% load of passengers, 1 wheelchair and a bus driver. *An average interior temperature of 60°F must be reached* within 30 minutes from the beginning of the test. After initial warm-up while the bus is in passenger service, the front and rear heavy-duty heating system shall be sufficient to maintain a minimum of 64°F at knee level

throughout interior of bus and at the driver's foot space when the outside temperature is 0°F. The test procedures shall be completed: 1) to show actual temperature rise from static parked condition; 2) to simulate an average bus route; and 3) to measure coolant flow rates in the heater circuits at idle and at operating speeds.

2. The test is to be: 1) warm-up of 15 minutes with 8 minutes @ idle and 7 minutes @ 35 mph road load; 2) idle bus, 3 minutes [passenger boarding - door open for 1 minute]; 3) run @ 25 mph for 5 minutes, run @ idle 3 minutes [passenger boarding - door open for 1 minute]; 4) run @ 25 mph for 5 minutes, run @ idle for 8 minutes [wheelchair boarding - doors open for 4 minutes]; 5) 2 cycles of run @ 25 mph for 5 minutes, idle 3 minutes [passenger boarding - door open for 1 minute]; 6) run @ 25 mph for 5 minutes, run @ idle for 8 minutes [wheelchair boarding - doors open for 4 minutes]; 7) 2 cycles of run @ 25 mph for 5 minutes, idle 3 minutes [passenger boarding - door open for 1 minute]; 8) run bus at 35 mph for 6 minutes; and 9) idle bus, 5 minutes. Total test operation cycle of 95 minutes.
3. Instrumented monitoring for the bus interior temperature shall be a minimum of 3 points located front, center, and rear in the passenger area 30" above the floor -- one in driver's area at knee level 22" above the floor, at front heater's air inlets and air outlets, and at rear heater's air inlets and air outlets. Other temperature monitoring points shall be: engine operating (coolant); engine oil; engine outlet to heater; heater return at engine or radiator; and exterior ambient. Coolant flow shall be monitored from the engine outlet to the heaters and for coolant flow through each circuit to the heater unit. Normal engine operating temperature shall be reached 30 minutes into the test and shall be maintained throughout the performance test. Supplemental heat shall be supplied to raise engine to normal operating temperature if testing conditions fail to raise the engine to normal operating temperatures at 30 minutes into the test. The standard used for this test for normal engine operating temperature is determined by the engine manufacturer's specifications. Instrumentation and recording equipment shall be able to monitor all points, record data at one minute intervals, and print a data report.

#### **E. Purchaser Inspection**

The purchaser reserves the right and shall be at liberty to inspect all material and workmanship at all times during the progress of the work, and shall have the right to reject all material and workmanship which do not conform with the specifications or accepted practice. Where a resident inspector is used, upon the request to the quality assurance supervisor, the resident inspectors shall have access to the Contractor's quality assurance files related to this procurement. These files shall include drawings, material standards, parts lists, inspection processing and records, and record of defects.

#### **F. Warranty**

Warranty shall become effective on the date the bus is placed into service based upon agency notice to contractor. Warranty service performed at the manufacturer's facilities at the manufacturer's request shall have all costs covered by the manufacturer. Warranty for the bus shall be the following as a minimum:

1. Three (3) years/36,000 miles on chassis.
2. Three (3) years/36,000 miles on transmission.
3. Three (3) years on body structure, exterior and paint.

4. Eighteen (18) months on lift.
5. All wiring shall be warranted for one (1) year from date of delivery.
6. Manufacturer's standard warranty of one (1) year 12,000 miles, minimum, on other add-on components and items.
7. The chassis, body, and all add-on components shall be warranted by the successful contractor.
8. Hybrid System shall be warranted by the hybrid manufacturer for 5 years or 60,000 miles.

**G. Miscellaneous**

1. The vendor shall furnish the State with the delivery schedule of chassis to vendor and a delivery date of completed buses within 30 calendar days from date of order.
2. Any in-line equipment changes shall have prior written approval of the State.
3. The vendor shall supply the bus turning radius: wheel-to-wheel and wall-to-wall.
4. The vendor shall furnish warranty procedure instructions and necessary forms used by customers to obtain necessary warranty repairs.
5. The manufacturer(s) shall produce as pilot models the first two buses ordered by the State for its transit agencies. The buses shall be: 1) one gas powered bus, 2) one diesel powered bus, 3) each lift equipped, 4) each air conditioned, and 5) each the largest sizes on request by the transit agencies. All necessary testing and equipment placement shall be performed on the pilot models before final inspection/acceptance by the State. The pilot models shall serve as a standard for the following units but shall not relieve the contractor from an obligation to manufacture all units in compliance with all specifications.

**VIII. BID DOCUMENTS**

**The bidder shall supply a copy of the following documents with the bid quotation:**

- A. The Michigan Bus Specification forms completed in detail.
- B. A floor plan of the bus shall be provided indicating dimensions and showing the interior layout of the bus. The plan shall include wheelchair placement, stanchion locations, engineering calculated loaded bus axle weights, and be drawn to scale for all configurations.
- C. Detailed engineering drawing for the design of the entrance door and door opening device (with drawings).
- D. Detailed engineering drawing for the design of the entrance step configuration (with drawings).
- E. Roof, sidewall, and flooring drawings showing structure and structural specifications indicating metal size and type used. Include side sheathing and inside panels.
- F. A description of the manufacturer's chassis (specifications).

- G.** Detailed engineering drawing on how body structure is mounted on chassis frame.
- H.** All bidders must supply manufacturer's technical specifications for wheelchair lifts and wheelchair restraints. Manufacturer's sales literature is acceptable if it contains the technical specifications.
- I.** The warranties for body, chassis, and drive train.
- J.** A copy of the Bus Rollover Protection Test (FMVSS 220) results of the bus offered as specified in the bid.
- K.** The required Federal Transit Administration (FTA) clauses shall be attached to bid quotation.
- L.** The technical data sheet including flammability and smoke emissions for the seat covering material supplied.
- M.** Seat frame Salt Spray, humidity and impact resistance tests' results
- N.** Certification test data showing that the seats, the seat belts, and the installation are in compliance with FMVSS-207, 208, 209, and 210 where applicable for the bus model being offered in this bid.
- O.** Certification that the wiring and the switches for air conditioning and all add-on components are adequate to withstand transient loads expected.
- P.** A copy of the dealer agreement between the Bus Manufacturer and the designated dealer.
- Q.** Certification that the bus model offered is a 5 year or 150,000 mile bus and will meet the requirements of Federal Register Rules and Regulations 49 CFR Part 665, Bus Testing Program. Stating from ' 665.13 Test Report and Manufacturer Certification, Section (b)(1), "A manufacturer of a new bus model or a bus produced with a major change in component or configuration shall provide a copy of the test report to a recipient during the point in the procurement process specified by the recipient".

**IX. TABLE 1**

1. Materials tested for surface flammability should not exhibit any flaming running, or flaming dripping.

2. The surface flammability and smoke emission characteristics of seat cushion materials should be demonstrated to be permanent after testing according to ASTM D-3574 Dynamic Fatigue Tests  $I_3$  (Procedure B).

3. The surface flammability and smoke emission characteristics of a material should be demonstrated to be permanent by washing, if appropriate, according to FED-STD-191A Textile Test Method 5830.

4. The surface flammability and smoke emission characteristics of a material should be demonstrated to be permanent by dry cleaning, if appropriate, according to ASTM D-2724. Materials that cannot be washed or dry-cleaned should be so labeled and should meet the applicable performance criteria after being cleaned as recommended by the manufacturer.

5. ASTM E-662 maximum test limits for smoke emission (specific optical density) should be measured in either the flaming or non-flaming mode, depending on which mode generates more smoke.

6. Flooring and Fire Wall assemblies should meet the performance criteria during a nominal test period determined by the transit property. The nominal test period should be twice the maximum expected period of time, under normal circumstances, for a vehicle to come to a complete, safe stop from maximum speed, plus the time necessary to evacuate all passengers from a vehicle to a safe area. The nominal test period should not be less than 15 minutes. Only one specimen need be tested. A proportional reduction may be made in dimensions of the specimen provided that it represents a true test of its ability to perform as a barrier against vehicle fires. Penetrations (ducts, piping, etc.) should be designed against acting as conduits for fire and smoke.

7. Carpeting should be tested in according with ASTM E-848 with its padding, if the padding is used in actual installation.

8. Arm rests, if foamed plastic, are tested as cushions.

9. Testing is performed without upholstery.

#### Definition of Terms

1. Flame spread index ( $I_s$ ) as defined in ASTM E-162 is a factor derived from the rate of progress of the flame front ( $F$ ) and the rate of heat liberation by the material under test ( $Q$ ), such that  $I_s = F \times Q$ .

2. Specific optical density ( $D_s$ ) is the optical density measured over unit path length within a chamber of unit volume produced from a specimen of unit surface area, that is irradiated by a heat flux of 2.5 watts/cm<sup>2</sup> for a specified period of time.

3. Surface flammability denotes the rate at which flames will travel along surfaces.

4. Flaming running denotes continuous flaming material leaving the site of the burning material at its installed location.

5. Flaming dripping denotes periodic dripping of flaming material from the site of burning material at its installed location.

#### Referenced Fire Standards

The source of test procedures listed in Table 1 is as follows:

(1) Leaching Resistance of Cloth, FED-STD-191A-Textile Test Method 5830.

Availability from: General Services Administration Specifications Division,

Building 197, Washington, Navy Yard, Washington, DC 20407.

(2) Federal Aviation Administration Vertical Burn Test, FAR-25-853.

Available from: Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

(3) American Society for Testing Materials (ASTM)

(a) Surface Flammability of Materials Using a Radiant Heat Energy Source, ASTM E-162;

(b) Surface Flammability for Flexible Cellular Materials Using a Radiant Heat Energy Source, ASTM D-3675;

(c) Fire Tests of Building Construction and Materials, ASTM E-119;

(d) Specific Optical Density of Smoke Generated by Solid Materials, ASTM E-662;

(e) Bonded and Laminated Apparel Fabrics, ASTM D-2724;

(f) Flexible Cellular Materials—Slab, Bonded, and Molded Urethane Foams, ASTM D-3574.

Available from: American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

In all instances, the most recent issue of the document or the revision in effect at the time of request should be employed in the evaluation of the material specified herein.

Issued: October 14, 1993.

Grace Crumican,  
Deputy Administrator.

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BILLING CODE 4910-57-P

**IX. TABLE 1**

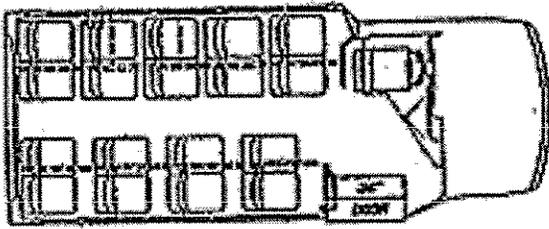
**TABLE 1: RECOMMENDATIONS FOR TESTING THE FLAMMABILITY AND SMOKE EMISSION CHARACTERISTICS OF TRANSIT BUS AND VAN MATERIALS**

Category	Function of Material	Test Procedure	Performance Criteria
Seating	Cushion <sup>1;2;3;5;9*</sup>	ASTM D-3675	$I_p \leq 25$
		ASTM E-662	$D_s(1.5) \leq 100; D_s(4.0) \leq 200$
	Frame <sup>1;5;8</sup>	ASTM E-162	$I_p \leq 35$
		ASTM E-662	$D_s(1.5) \leq 100; D_s(4.0) \leq 200$
	Shroud <sup>1;5</sup>	ASTM E-162	$I_p \leq 35$
		ASTM E-662	$D_s(1.5) \leq 100; D_s(4.0) \leq 200$
Upholstery <sup>1;3;4;5</sup>	FAR 25 853 (Vertical)	Flame time $\leq 10$ seconds; burn length $\leq 6$ inches	
	ASTM E-662	$D_s(4.0) \leq 250$ coated; $D_s(4.0) \leq 100$ uncoated	
Panels	Wall <sup>1;5</sup>	ASTM E-162	$I_p \leq 35$
		ASTM E-662	$D_s(1.5) \leq 100; D_s(4.0) \leq 200$
	Ceiling <sup>1;5</sup>	ASTM E-162	$I_p \leq 35$
		ASTM E-662	$D_s(1.5) \leq 100; D_s(4.0) \leq 200$
	Partition <sup>1;5</sup>	ASTM E-162	$I_p \leq 35$
		ASTM E-662	$D_s(1.5) \leq 100; D_s(4.0) \leq 200$
	Windscreen <sup>1;5</sup>	ASTM E-162	$I_p \leq 35$
		ASTM E-662	$D_s(1.5) \leq 100; D_s(4.0) \leq 200$
	HVAC Ducting <sup>1;5</sup>	ASTM E-162	$I_p \leq 35$
		ASTM E-662	$D_s(4.0) \leq 100$
Light Diffuser <sup>5</sup>	ASTM E-162	$I_p \leq 100$	
	ASTM E-662	$D_s(1.5) \leq 100; D_s(4.0) \leq 200$	
Flooring	Wheel Well and Structural <sup>6</sup>	ASTM E-119	Pass
	Carpeting <sup>7</sup>	ASTM E-648	C.R.F. $\geq 0.5$ w/cm <sup>2</sup>
Insulation	Thermal <sup>1;3;5</sup>	ASTM E-162	$I_p \leq 25$
		ASTM E-662	$D_s(4.0) \leq 100$
	Acoustic <sup>1;3;5</sup>	ASTM E-162	$I_p \leq 25$
		ASTM E-662	$D_s(4.0) \leq 100$
Miscellaneous	Firewall <sup>6</sup>	ASTM E-119	Pass
	Exterior Shell <sup>1;5</sup>	ASTM E-162	$I_p \leq 35$
		ASTM E-662	$D_s(1.5) \leq 100; D_s(4.0) \leq 200$

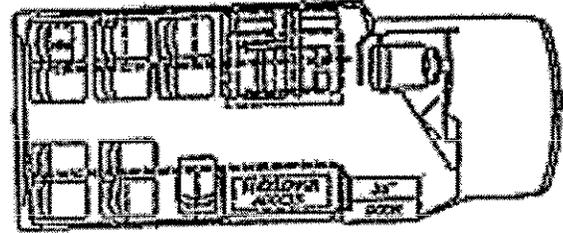
\* Refers to Notes on Table 1

## X. BUS SEATING ARRANGEMENTS

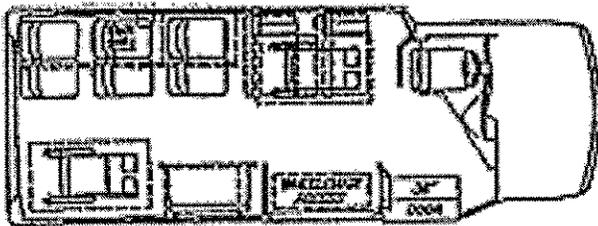
1. 158" Wheel Base - The hybrid, 18-passenger, non-lift/lift buses shall be supplied as requested in the following seating arrangements:



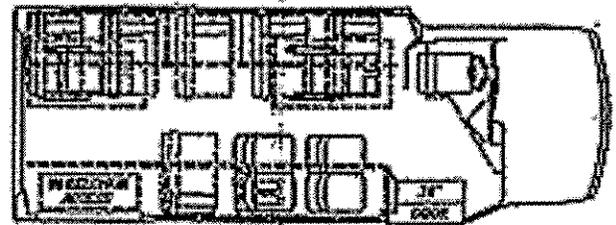
A. 18 Passenger Bus Without Lift



B. 11+1 Passenger Bus With Lift Forward of Rear Axle

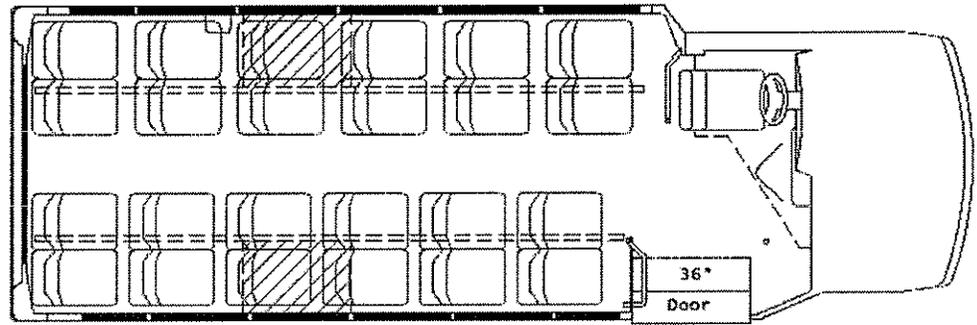


C. 8+2 Passenger Bus With Lift Forward of Rear Axle

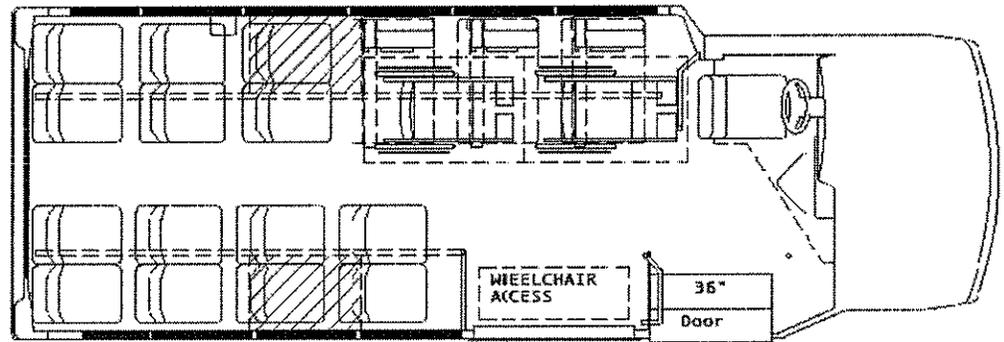


D. 4+2 Passenger Bus With Lift Behind Rear Axle

2. 176" Wheel Base - The hybrid, 24-passenger, non-lift/lift buses shall be supplied as requested in the following seating arrangements:



**E. 24 Passenger Bus Without Lift**



**F. 14+2 Passenger Bus With Front Lift**

**This specification was developed as a cooperative effort between the Michigan Department of Transportation and a committee of representatives from various Michigan Public Transit Agencies.**

**Upon request, this specification can be obtained in alternative format such as braille, large print,**

**or audio tape. Contact Michael Frezell, Michigan Department of Transpor**

# APPENDIX B

## Body Specifications

The attached body specifications are representative of standard construction of the bus proposed by Midwest Transit Equipment. MDOT's specifications will supersede some of the standard items shown. Every attempt will be made to point out all the variances between the standard body features and what the actual MDOT bus build will have. Here is a list of some of those items.

1. Floor decking will be ¾" Marine grade plywood material.
2. Passenger entrance door step well and frame is 304 stainless steel with stainless attachment hardware.
3. Wheelchair door frames are 304 stainless steel with stainless attachment hardware. Door has locking handle.
4. Rear bumper will be rubberized Romeo Rim help energy absorbing bumper.
5. Exterior mirrors are remote and heated.
6. Mud flaps have support and brackets as requested by MDOT in the RFP as issued.
7. Headliner includes additional imbedded steel plates for the securing of handrails and stanchions.
8. Flooring is either grey or tan in color with yellow step nosing and standee line. Flooring is coved up the side walls to the seat rail line.
9. Exterior of the bus includes a heavy duty rub rail at the floor line.
10. Design and quantity of stanchions and modesty panels are as requested in the bid specifications. Included are entrance hand rails both sides of stepwell, vertical stanchion behind entrance and driver as well as horizontal rail from this stanchion to wall, drivers plexi glass shield and padded modesty panels. Stanchions and handrails in entrance area are bright yellow in color. There is also a stanchion/rail with modesty panel and plexi shield mounted to rear of the lift.
11. Interior mirror is a minimum of 4" x 14".
12. Insulation and support of wiring to meet requirements of the specs issued by MDOT.
13. All exterior connectors are weather pak type.
14. All exterior lights are LED where specified by MDOT and meet the number, style and location as requested.
15. All interior lights are LED as requested by MDOT meeting the lighting intensity and location as specified.
16. For information on warranty, see section 8 of this binder.

For additional information that may not be contained above, please refer to "Appendix "A" Evaluation Form" found in section #2

Should there be any questions or need for clarification needed, please contact Tom Boldwin at 800-933-2412.

# ***STARTRANS SENATOR STANDARD BUILD SPECS***

## ***JULY 2008***

### **STEEL FLOOR**

The steel sub frame parts are welded together in a welding fixture. It is constructed from the following material.

12-gauge cross members are welded to four 10-gauge long sills which are 4 ¼" wide x 1 ¼" high. These cross members are a modified "C" 1 ½" wide x 3" high.

14-gauge steel floor support tubes ¾" x 1 ½" are welded between the cross members to form a grid that ties the steel sub frame together.

12-gauge floor side rails attach the sidewalls to the steel floor structure.

12-gauge seat track 1 5/8" wide x 7/8" high are welded every 6" to a 14-gauge steel strip that is 3 ½" wide and welded to the cross members.

A 10-gauge wheel chair lift support (paratransit model) is welded to the cross members under the wheel chair lift area. The support is designed as a secure point for the lift so it becomes an integral part of the steel sub frame.

Rear wheel wells are constructed of 12-gauge steel and designed with flanges that are welded under the lip of the cross members to create a watertight seal and fastened at the wall side.

The steel sub frame is painted after assembly to assure protection from rust and corrosion.

### **UNISTRUT CHANNEL SEAT TRACK**

All seating is secured in a 1 5/8" wide Unistrut channel seat track. A 3 ½" wide 14-gauge steel plate is welded to the steel sub frame. The Unistrut channel is then welded to this plate.

### **OPTIONAL FLAT FLOOR**

The floor structure is identical except for the following changes.

The cross members are raised 5 ½" and are supported by ¼" "V" style brackets that are welded to the bottom of the cross member and the top of the long sill.

The 12-gauge side rail depth is increased to 9 1/8" to allow the sidewalls to sit in their standard location. It has a 4" 12-gauge gusset welded to the backside and the bottom of the cross member to support the increased depth.

ILO the steel wheel wells a flat 14-gauge galvaneal steel plate is welded to the sub frame to complete the wheel well area.

### **FLOOR DECK**

The finished sub floor is ¾" thick Fiberglass reinforced plywood. This material is described as follows: The inner core of the FRP panel is made of Northern Fir Lauch B/C plywood that has been plugged and filled. The maximum number of filler plugs per 4' x 8' sheet to be no more than twenty (20). This material is sandwiched between 18 Oz woven rope fiberglass matt that is impregnated with fiberglass resin, the face side of the material to have 20 mil. Gel coat with the back side covered with co-extruded melinex film.

The FRP panels are then installed on the top of the steel sub frame with grade five (5) floor bolts. Construction adhesive is utilized as well along the top of all floor members that intersect the floor decking material as an additional securement method. A minimum of six (6) bolts per crossmember is standard.

# ***STARTRANS SENATOR STANDARD BUILD SPECS***

## ***JULY 2008***

### **OPTIONAL W/C FLANGED L TRACK**

L track is mounted in 9 ¾" pieces and bolted through the floor with 5/16" grade 8 torx bolts. End caps are installed at each end for a finished look.

### **SIDEWALLS**

The sidewall structure consists of a steel cage and fiberglass laminated together to form a one piece seamless wall. It is constructed in the following manner.

¾" x ¾" 16-gauge and ¾" x 1 ½" 14-gauge steel tubing is designed to create a steel grid work that is a part of the total steel structure that surrounds the passenger compartment. Paratransit models have one additional ¾" x 1 ½" horizontal support located 1" above the window line for the wheel chair shoulder harness support and two additional ¾" x 1 ½" vertical steel wall bows located at the wheel chair door location.

The exterior is a gelcoated surface at a 15 to 22 mil thickness.

A layer of resin and fiberglass will be skin coated at a thickness of 110 to 120 mil. The fiberglass content of this layer will be 31 %.

A layer of spray core is then applied at a thickness of 75 to 80 mil.

A second layer of resin and fiberglass is applied.

At the top and bottom of the window line and at track seating location a glass mat is laid in the wet resin. This gives additional strength at key stress points.

The steel cage is then laid in the wet resin and a ¾" (2 lb density) polyurethane foam is added between the steel cage supports and rolled down flush.

A final layer of resin and fiberglass is then sprayed on top.

While the final coat is still wet the interior surface is applied as a sub assembly consisting of an interior gelcoat with a layer of resin and woven fiberglass mat (10 oz.).

The entire assembly is placed in a vacuum press until it is cured.

### **ROOF**

The roof structure consists of a steel cage and fiberglass laminated together to form a one piece seamless roof. It is constructed in the following manner.

¾" x ¾" 16-gauge and ¾" x 1 ½" 14-gauge steel tubing creates a steel grid work which along with the sidewall cage completes the steel that surrounds the passenger compartment.

The exterior is a gelcoated surface at 15 to 22 mil thickness.

A layer of resin and fiberglass will be skin coated at a thickness of 110 to 120 mil. The fiberglass content of this layer will be 31 %.

A second layer is then applied.

The steel cage is then laid in the wet resin and a ¾" wood core is added between the steel cage supports and rolled down flush.

A final layer of resin and fiberglass is then sprayed on top.

The entire assembly is placed in a vacuum press until it is cured.

# ***STARTRANS SENATOR STANDARD BUILD SPECS***

## ***JULY 2008***

### **FRONT & REAR CAPS**

The front & rear fiberglass caps are of one piece design and constructed in the following manner. The exterior is a gelcoated surface at 15 to 22 mil thickness. A layer of resin and fiberglass will be skin coated at a thickness of 110 to 120 mils. The fiberglass content of this layer will be 31 %. Reinforcements are then installed and glassed in.

### **WINDOWS**

#### **Driver's Window (meets FMVSS 205 & 217)**

At the driver's position, one window is provided by the OEM. This window rolls down manually.

#### **Curbside Transition Window (meets FMVSS 205 & 217)**

The curbside transition window is located in front of the entry door. The window's size is 40" high x 13 ½" at widest point (12" at the bottom). The top 1/3 is angled to fit the contour of the cab. The total square inches of viewing area is 425. It has a tempered safety glass rating of AS-2 with a 31% tint.

#### **Passenger Side Windows – Non-Egress (meets FMVSS 205 & 217)**

The number of windows depends on the model of the bus. The window's size is 34" high x 24" wide. It is a double "T-slider" ventilation type which is designed for the top 7" to open by sliding either the front or rear 6" sections toward the center. The window is maintained in the closed position by mechanical latches. The total square inches of viewing area is 816. It has a tempered safety glass rating of AS-3 with a 31% tint.

#### **Passenger Side Windows – Egress (meets FMVSS 205 & 217)**

The number of windows will depend on the model of the bus. They are identical to the non-egress in construction, but are designed to be opened in an emergency situation by releasing two clearly marked red release latches located on each side of the window. There will be operating instructions located at and on each egress window.

#### **Rear Egress Window (meets FMVSS 205 & 217)**

There is one rear egress window. The window is designed to be opened in an emergency situation by releasing two clearly marked red release latches located on each side of the window. There will be operating instructions located at and on each egress window. The window's size is 22" high x 58" wide. The total square inches of viewing area is 1,276. It has a tempered safety glass rating of AS-3 and 31% tint.

#### **Window Seals**

The windows are sealed between the body and window frame with ½" ribbed rectangle closed cell rubber seal.

### **ASSEMBLY**

The bus body is assembled in the following manner.

# ***STARTRANS SENATOR STANDARD BUILD SPECS***

## ***JULY 2008***

The entry door steel portal frame is welded and bolted to the chassis so this assembly becomes an integral part of the OEM chassis.

The steel floor sub frame assembly is then mounted on the OEM chassis utilizing by bolting to the OEM frame with 12mm x 1.75 class 9.8 bolts and nuts supplied by the chassis manufacturer utilizing the OEM rubber mount suspension system. This allows the body to be mounted the same as the OEM cab which reduces any stress where the two are connected and helps isolate road vibrations from the body.

The floor deck is next. A closed-cell rubber seal is applied to the edge of the plywood floors, so when the sidewall is set this seal will close any gap between the floor and sidewall, creating a weather proof passenger compartment.

The front fiberglass cap is secured to the OEM chassis utilizing mechanical fasteners and a butyl rubber seal between the chassis and the flange on the front cap to create a weather proof seal.

The side walls are then installed, securing them to the steel sub frame and portal frame with mechanical fasteners.

The interior rear wall follows and is attached to the rear cross member and the sidewalls, utilizing mechanical fasteners.

The roof is then installed and attached to the front cap, sidewalls and rear interior wall, utilizing mechanical fasteners in conjunction with steel reinforcing attachment strips.

The entry door frame and steps are installed and attached to the portal frame utilizing mechanical fasteners and butyl rubber seal. The double-out doors are then installed to complete the main body structure.

After the body is assembled a liquid sealer is applied to the seams at the floor line and interior rear wall. This sealing is in addition to sealing the interior after the final trim pieces are applied.

This completes the steel/fiberglass composite combination body structure, having a minimum of body seams, no exposed fasteners, resistant to impact, "body shock" (OEM rubber mounting system), oxidation finish, and non-corrosive. This body structure fully meets FMVSS 220 & 221 requirements.

The remaining components are not an integral part of the body structure, but are designed for weather protection and/or cosmetic components. The rear cap is then set over the rear interior wall and along with the fiberglass side skirts, fender flares, transition pieces and the bumper anti ride, installed with mechanical fasteners and sealed with a butyl rubber seal (interior) or an automotive caulk (exterior). In addition, the skirts and fender flares are fastened to the horizontal steel tubes in the sidewalls and the anti ride into the steel sub frame.

After all the above components are installed, an aluminum trim, secured by mechanical fasteners, is placed over the body seams. This trim is covered with a vinyl insert and sealed with an automotive caulk to assure the body is completely weather proof.

### **DOORS**

#### **DRIVER'S DOOR**

The driver's door is OEM and has a keyed lock and manual window.

#### **PASSENGER ENTRY DOOR**

##### **Entry Door Portal Frame**

# ***STARTRANS SENATOR STANDARD BUILD SPECS***

## ***JULY 2008***

The entry door portal frame is a 1 ½" x 1 ½" 14-gauge tubular frame that is welded at the bus sub frame and the chassis cab floor. It is fastened with mechanical fasteners at the curbside "A" pillar. The purpose of this frame is to support the entry doorframe.

### **Entry Door Step Well Frame**

The step well frame consists of 14-gauge galvaneal steel formed to create a perimeter frame, step well, and the finished opening for the double-out entry doors. The step well is a 3-step entry on a standard floor, 4-step on a flat floor model. This frame is powder coated black.

### **Double-Out Entry Doors**

The standard entry door is a manually opened double door design with a clear opening of 32" wide x 83" high. The opener is a "pistol grip door closer" with an over-center positive lock A&M Systems, Inc. Aluma-Clear™ Door Specifications:

Full clear span, full view glass

Glass panel is 1/8", AS-2 green tint;

Fully anodized 6063-T6 aluminum extruded door frame

Extrusion has a minimum wall thickness of .090"

All frame assembly joints use Key-Lok™ design for added joint rigidity

All attaching hardware is zinc plated or stainless steel for corrosion control

Lower pivot point is glass-filled injection molded design

Upper Torque Arm drive is zinc plated and easily replaced if required

Both door panels are identical and can be used in either forward or aft position

Door panels are light weight, typically less than 35 lbs each

### **WHEEL CHAIR DOORS (paratransit model)**

The double-out wheel chair door is constructed in the following manner.

The door leaf consists of an interior frame assembled from 1 3/8" x 3/4" substrate with a 1.85 lb density foam sandwiched between an inner and outer skin of .040 smooth aluminum. These items are laminated together to form a one-piece solid door.

The front leaf utilizes a 3-point dead bolt latch system, while the rear leaf is a 2-point.

Each leaf has an upper 36" high x 14 ½" wide window. It has a total square inch viewing area of 522 and a tempered safety glass rating of AS-3 with a 31% tint.

There are 3 rubber seals, a ¼" "D" style, a ½" "D" style, and a ½" ribbed seal, which complete the assembly for a weather tight fit

The outer perimeter frame is constructed from extruded aluminum and incorporates the hinges that have .120 steel hinge pins. The hinges are then mechanically fastened to the door leaves.

A header plate, installed at the top of the assembly, allows for two, top mounted, steel check-style, zinc plated hold open devices with 30 lb springs.

The entire assembly is then inserted into the wheel chair door frame. This frame consists of 14-gauge galvaneal steel, powder coated white, and formed to create a perimeter frame and lift platform support.

# ***STARTRANS SENATOR STANDARD BUILD SPECS JULY 2008***

## **EXTERIOR FEATURES**

### **FRONT BUMPER**

The chassis manufacturer provides the standard front bumper.

### **REAR BUMPER**

The rear bumper is a wrap-around style constructed of 10-gauge steel. It is powder coated black. The bumper is supported by two formed 3/16" x 6 1/4" x 14" bumper brackets that are welded to steel "C" channel and bolted to the chassis frame.

### **EXTERIOR MIRRORS**

There are two Rosco brand exterior mirrors. The mounting brackets include a driver's side wing mount and a passenger side fender mount quad design. The mirrors and mounting brackets will have a black finish with a 2-in-1 mirror head. The upper flat glass measures 6 3/4" wide x 9 3/4" high with the lower convex measuring 6" wide x 3 1/2" high.

### **MUD FLAPS**

There are four mud flaps, two front and two rear. The rear mud flaps are constructed of 1/4" black thermoset plastic and are fastened to a steel support that is a part of the steel sub frame. The front mud flaps are constructed from 1/8" smooth rubber.

### **FUEL FILL**

A fiberglass fuel fill is recessed into the body on the driver's side so the OEM fuel fill pipe and fuel cap does not protrude beyond the body sides.

### **DRIVE SHAFT GUARDS**

A drive shaft guard is installed on each section of the drive shaft. These guards are 1/4" steel and 2" wide. They are welded to the chassis steel sub frame.

### **HEAT SHIELD**

A heat shield is installed over the exhaust pipe and muffler. This shield is constructed from .040 aluminum and fastened to the bottom of the sub frame cross members with mechanical fasteners.

### **UNDERCOATING**

The entire underside of the bus is undercoated with Z-Tech (ZPG20060B) except the areas directly above the chassis exhaust pipe, muffler and tailpipe. (12" from exhaust pipe and 2" from fuel tank) The undercoating meets all MIL specs C-62218A.

### **FIBERGLASS SKIRTS, FENDER FLARES, TRANSITION PIECES & ANTI RIDE**

The fiberglass parts are constructed in the following manner.

# ***STARTRANS SENATOR STANDARD BUILD SPECS***

## ***JULY 2008***

The exterior is a gelcoated surface at 15 to 22 mil thickness.

A layer of resin and fiberglass will be skin coated at a thickness of 110 to 120 mils. The fiberglass content of this layer will be 31 %.

### **INTERIOR FEATURES**

#### **REAR WALL FINISH**

The interior rear wall is constructed in the following manner, starting with the interior surface and working to the outside.

The interior surface is gelcoated at a thickness of 15 to 22 mil.

A layer of resin and 10 oz. woven fiberglass mat is then applied to the gelcoat surface.

A ¾" x 2" substrate frame is stapled and glued to form a grid work to support and outline the perimeter of the rear wall. Between the horizontal and vertical pieces of the substrate grid work, pieces of ¾" 2 lb. density polyurethane foam are installed to create a solid core wall.

An 1/8" sheet of substrate provides the rear layer.

The three layers of the rear wall are then assembled using a hot-melt glue/press-roller process.

Two 10-gauge steel plates (12" x 31") are secured to the rear wall (paratransit model) as tapping plates for the shoulder harness for the rear wheelchair positions.

#### **CAB LINER**

The cab liner is a one-piece fiberglass design.

The exterior is a gelcoated surface at 15 to 22 mil thickness.

A layer of resin and fiberglass will be skin coated at a thickness of 110 to 120 mils. The fiberglass content of this layer will be 31 %.

Prior to installing, a 1 ½" thick fiberglass insulation is inserted between the exterior front cap and the cab liner.

The cab liner is then fastened to ¾" thick x 4" wide substrate strips that have been secured to the underside of the exterior front cap.

#### **HEADLINER**

The standard headliner is a one-piece fiberglass design.

The exterior is a gelcoated surface at 15 to 22 mil thickness.

A layer of resin and fiberglass will be skin coated at a thickness of 110 to 120 mils. The fiberglass content of this layer will be 31 %.

The headliner is then fastened to ¾" thick x 4" wide substrate that has been secured to the underside of the roof.

#### **HOSE COVERS**

The rear hose covers are a one-piece fiberglass design.

The exterior is a gelcoated surface at 15 to 22 mil thickness.

# ***STARTRANS SENATOR STANDARD BUILD SPECS***

## ***JULY 2008***

A layer of resin and fiberglass will be skin coated at a thickness of 110 to 120 mils. The fiberglass content of this layer will be 31 %.

### **BODY SEAM TRIM**

After all the above fiberglass components are installed, an aluminum trim, secured by mechanical fasteners, is placed over the body seams. This trim is covered with a vinyl insert.

### **FINISHED FLOOR**

The standard floor covering is black, 1/8" thick, transit type smooth rubber with 3/16" ribbed rubber in the entry way and the aisle. The entry steps have a white step nosing covering the leading edge of the step riser.

### **ROTOCAST TRIM PANELS**

A rotocast trim panel is installed at the floor to sidewall seam. Over the wheel wells, there is a molded piece of the same material, which follows the wheel well contour.

The "B" pillar, driver's door header, windshield header, and curbside transition window also utilize a rotocast panel to cover the unfinished areas of the OEM chassis.

### **ENTRY DOOR TRIM**

The areas surrounding the entry door frame are trimmed with padded vinyl which matches the interior color scheme.

### **STANCHIONS, MODESTY PANELS, & ASSIST HANDRAILS**

There are two 1 1/4" OD stainless steel stanchion poles constructed in the following manner. Behind the driver's seat, a vertical stanchion will run from floor to ceiling connecting with a horizontal stanchion secured to the wall. All fittings and fasteners are stainless steel. The fasteners are a clad type with no exposed threads.

Behind the entry door, a vertical stanchion will run from floor to ceiling connecting with a horizontal stanchion secured to the wall. In addition, a modesty panel is attached to this assembly. All fittings and fasteners will be stainless steel. The fasteners are clad type with no exposed threads. The modesty panel is constructed from a 3/4" substrate and covered with a white laminate finish. It is rectangular in shape and covered with a color-coordinated plastic edge around the entire perimeter.

An entry assist hand rail, constructed from the same materials, is attached to the entry door vertical stanchion for safety and to assist entering and exiting the bus.

### **INTERIOR MIRROR**

A 2 1/2" x 9" fully adjustable mirror located in the top center portion of the windshield shall be supplied by the chassis manufacturer. In addition, a 6" x 9" convex mirror with a full range adjustment is located above the driver's area, on the interior front cab liner for viewing the passenger area.

# ***STARTRANS SENATOR STANDARD BUILD SPECS***

## ***JULY 2008***

### **WALL TRACK**

The Unistrut channel is monobolted every 8" to a 1 ½" x ¾" 14-gauge steel tube that is part of the interior side wall structure.

The seat frames are bolted to the seat channel with two 7/16" grade 8 bolts, threaded into two 1 ¼" x 7/16" hardened channel nuts.

This installation meets FMVSS 207 & 210 requirements.

### **DRIVER'S SEAT**

The driver seat pedestal is mounted in the holes provided by the OEM. The seat is a high back recliner with a right hand arm rest. This seat meets FMVSS 207 & 210 requirements.

### **ELECTRICAL**

#### **WIRING**

All wiring added by the final stage manufacturer meets one of the following standards.

SAE Specification J1128-SXL high temperature wire (8 to 14-gauge)

SAE Specification J1128-GXL high temperature wire (8 to 14-gauge)

SAE Specification J1128-SGX high temperature wire (Battery cable)

In addition to the above specifications, all wiring is color-coded, number and function designated every 12" to enable identification and circuit trace ability.

### **INSTALLATION & SECUREMENT**

All wiring under the body or hood is protected with high temperature (minimum 125 degree) nylon convoluted tubing and is secured by one of the following methods.

High temperature heavy gauge wire ties

Insulated rubber coated P clamps.

In addition to the above requirements, all wiring is routed no closer than ¾" from any sharp edge or a minimum of 4" away from any heat source.

No wiring will be routed through the wheel well unless protected by a metal shield and convoluted tubing.

A minimum of 1 ½" clearance is maintained between any wiring and the engine to compensate for engine roll.

No wiring will be secured to brake or fuel lines.

### **CONNECTORS**

All wiring is connected in the under-body or under-hood areas by one of the following connectors or methods.

Sealable insulated eyelet

Sealable insulated butt connector.

Sealable insulated quick disconnect.

Sealable insulated ring connector.

# ***STARTRANS SENATOR STANDARD BUILD SPECS***

## ***JULY 2008***

Where it is not possible to install a sealable insulated electrical connector in these locations, the insulated connector is protected by heat shrink tubing with a sealable glue inside.

The remaining wiring located inside the bus is connected by one of the following connectors.

Standard insulated eyelet.

Standard insulated butt connector.

Standard insulated quick disconnect.

Standard insulated ring connector.

### **GAUGE OF WIRE**

All wiring is sized to carry the electrical load required for length of bus.

### **LIGHTING**

#### **EXTERIOR LIGHTING**

The following lights are installed and meet FMVSS 108 requirements. (Lamps, reflective devices and/or associated equipment)

##### **Identification lamps**

Three amber rectangular lights centered and recessed in the front cap

Three red rectangular lights centered and recessed in the rear cap

##### **Clearance lamps**

Two amber rectangular lights located and recessed at each outer edge of the front cap

Two red rectangular lights located and recessed at each outer edge of the rear cap

##### **Side Marker Lights**

Two red rectangular lights located one on each side of the side wall just in front of the rear cap in line with the rear clearance lights

##### **Stop/Tail lamps, Turn signal lamps, and Backup lamps**

Three 4" round light assemblies located and recessed in each side of the rear cap

##### **License Plate Light**

One chrome plated license plate light recessed in the rear cap on the driver's side

(In addition to the light, there will be space provided for the license plate in the recess.)

The chassis manufacturer supplies the headlights, chassis front turn lights, and the hazard flashers. The chassis system is then tied into the bus system by the final stage manufacturer

### **INTERIOR LIGHTING**

#### **Driver's Courtesy Lights**

A driver's courtesy light is installed just above the driver's left shoulder. Opening the driver's door or turning the headlight switch counter-clockwise activates the light.

#### **Step Well Entry Lights**

Two 2" flush mount step well lights are provided, one on each side of the entry step well. These lights activate when the double-out entry doors are opened.

# ***STARTRANS SENATOR STANDARD BUILD SPECS JULY 2008***

## **Overhead Courtesy Lights**

Six overhead courtesy lights (four standard on the 20' model) are installed in the ceiling of the bus to provide lighting for safe passenger movement. Turning on the switch in the driver's console or opening the double-out entry door activates the lighting.

## **Dash Instrumentation Lighting**

Dash instrumentation lighting is provided by the chassis manufacturer and activated by the headlight switch.

## **DRIVER'S CONTROL PANEL**

### **MASTER DISTRIBUTION PANEL**

A master distribution panel is installed in an aluminum cabinet located by the front entry door. The function of this panel is to supply all power to the bus except those functions related to the OEM chassis. A #2 cable that is connected to a solenoid that powers this panel. These circuits will be protected by ATC type fuses. The solenoid is activated when the ignition is turned on.

In addition to the power supplied by the ignition hot solenoid circuit, there are four circuits in the panel that are battery hot. These circuits are for the radio and electric door operator options.

### **ELECTRONIC SWITCH PANEL CONTROL**

A switch panel is located within easy access of the driver to control all the functions necessary to operate the bus except the OEM chassis functions. Any electrical devices requiring a switch will be provided as needed.

### **EXTERIOR FINISH**

The standard exterior finish is a bright white gelcoat to match the OEM chassis white. Optional paint packages are painted with a Dupont paint.

### **WARRANTY**

The finished product has a general warranty of 12 months/12,000 miles and a structural body warranty of 5 year/75,000 miles.