1. GENERAL

1.1. SCOPE

1.1.1. These Technical Specifications cover requirements for Medium-Duty Paratransit Vehicles that may be used for rural, suburban, and urban general paratransit service, or for small urban fixed-route operations. These vehicles shall be used on urban streets and rural roadways in the general environmental and climatic conditions prevailing throughout the State of Illinois. It is intended for the widest possible spectrum of passengers, including the elderly, and persons with disabilities.

1.1.2. It is the intent of this specification to describe the design requirements for a medium-duty paratransit vehicle rugged enough to withstand intensive daily service and provide maximum reliability and availability, with a minimum of maintenance and repair time. The vehicle shall allow for comfort and safety, combined with excellence in reliability, operating characteristics, efficiency, and economy of operation. Design is subject to review and final approval by the Procuring Agency.

1.1.3. The vehicle shall be fully compliant with the applicable requirements of the Americans with Disabilities Act (ADA) and any revisions published by the Architectural and Transportation Barriers Compliance Board or the Federal Transit Administration for non-fixed route operations. Through the selection of listed options, the vehicle can be modified, at the option of the Procuring Agency, to be compliant with the requirements of ADA for fixed route operations as well. Where these specifications exceed the requirements of ADA, the specification requirement shall apply.

1.1.4. The vehicle provided shall be fully tested to assure compliance with the performance and safety requirements of the specifications. At the option of the Procuring Agency, the Vendor may be required to provide test results and/or certifications ensuring compliance with the requirements of the specifications. Test results, certifications or written documentation outlining test procedures and results shall be prepared by a Professional Engineer and/or test laboratory certifying compliance with the requirements of this section. All documentation shall be provided by the Vendor for approval by the Procuring Agency.

1.1.5. The standard vehicle shall have a gasoline engine (with diesel options, see Section 2.2.1.1.) and be equipped with a wheelchair/mobility aid lift and shall be able to accommodate a minimum of 14 passengers plus the driver.

1.1.6. Required options and other options that may be selected by the Procuring Agency include:

A - Four wheelchair/mobility aid positions, Section 1.5.1.1.1
B - Intentionally left blank.
C - Intentionally left blank
D - Diesel fueled engine, Section 2.2.1.1
E - Rubber shear spring rear suspension, Section 2.4.3.2
F - Intentionally left blank
G - Non-locking fuel access door, Section 2.10.2
H - Intentionally left blank
I - Marine plywood floor, Section 3.3.3.2

J - PVC anti-skid smooth floor and step covering, Section 3.3.3.3
K - Alternative color floor covering, Section 3.3.3.3
L - Storage device for walkers, crutches, oxygen tanks, canes or braces, Section 3.3.5.6
M - Intentionally left blank
N - Emergency rear window (replaces rear door), Section 3.3.6.3.8
O - Intentionally left blank
P - Aftermarket driver's seat, Section 3.3.10.3.4.
Q – Intentionally blank
R - Additional automatic tightening wheelchair/mobility aid securement system, Section 3.3.10.6.1.
S - Retractable under seat storage of wheelchair/mobility securements, Section 3.3.10.6.1.
T - Engine hour meter, Section 3.3.13.6.
U - Intentionally left blank
V - Intentionally left blank
W - Inside passenger signal system for a) vehicle and b) each wheelchair securement area, Section 3.3.21
X - Public address system, Section 3.3.22
Y - Intentionally left blank
Z - Backup camera system, Section 3.4.1.10
AA - Intentionally left blank
BB - Destination and route signs, Section 3.4.4.
CC - Bicycle Rack, Section 3.4.5
DD - Intentionally left blank

All options shall be priced separately in the bid.

1.1.7. The basic vehicle shall be designed as a Purpose Built or Cutaway Body-on-Chassis Bus, incorporating a body structure designed and constructed as a complete integral unit.

1.1.8. Submittals and approvals required by the Procuring Agency are summarized below. Specific requirements are included in each applicable section.

1.1.8.1. Submittals that shall be prepared and available to the Procuring Agency:

Section 1.1.4. – Documentation that assures compliance with the performance and safety requirements of this specification.

Section 5.1.3.1. – Information pertaining to the Vendor's configuration control program.

Section 5.1.6.4. – Information pertaining to the Vendor's quality assurance program.

1.1.8.2. Submittals required by the Procuring Agency with the bid:

Sections 1.5.4.2. and 3.3.10.1.5. - Scaled diagrams or layout drawings of the proposed interior seating arrangement(s).

Section 2.1.4.2. – Altoona data showing acceleration, gradeability, and top speed capabilities of the bus

Section 2.2.1.1.- Details of shutdown system and/or power de-rate system. Details of DEF system for Option D.

Section 2.2.1.5. - Certification that engine meets all applicable EPA regulations.

Section 2.8.2.1. – Written notification that tires supplied with the vehicle are standard or optional equipment, or as Dealer Special Order (DSO); Written notification that specified tires are not available if applicable.

Section 2.10.2.1. – Written notification that fuel tank deviates from OEM installed location if applicable.

Sections 2.11.1.1. and 2.11.2.1. – Proof that the alternator charging system will meet operational electrical load demands. Alternator nameplate rating in Amps. Notification that a second or alternative alternator is required to meet operational loads.

Section 2.11.4.1. – Location, accessibility and details of primary and secondary batteries including tray and compartment.

Section 2.11.5.1. – Written request to remove or modify any OEM installed electrical component/connector.

Section 2.11.5.10. - A listing of the specific protection device (manual circuit breaker, cartridge fuse, etc.) used on each of the circuits added to the OEM chassis and a justification that each protection device is adequate for the circuit being protected.

Section 3.2.1.1. – Certification that vehicle meets all Federal and State Regulations applicable regarding collision strength, impact resistance and passenger safety, including the requirements of FMVSS 220.

Section 3.2.4.3. - Methods used to meet specific undercoating requirements.

Section 3.2.5.1. - Method to attach the body to the chassis.

Section 3.2.5.3. - Details of mechanical fastening of the rollover cage.

Section 3.2.5.4. - Method of attachment for all exterior body panels.

Section 3.2.5.6. - Written documentation of water test procedures.

Section 3.2.7.1 – Design and layout of roof gutters or alternative design.

Section 3.2.11.2 - Front mud flaps can be omitted if the Vendor can prove with bid submittal that other provisions provide the same or better road splash protection.

Section 3.3.3.2. - Written justification that alternative sub-floor material meets or exceeds 5/8-inch minimum, 5-ply, APA standard grade A-C plywood if applicable.

Section 3.3.4.1. – Design and layout of passenger stepwell.

Section 3.3.5.6. – Design and suggested locations of storage device and indication if seating layout will change as a result of this option.

Section 3.3.5.7. - Design and location of modesty panels, stanchions, handrails and grabrails

Section 3.3.6.1.1. thru 3.3.6.3.7. - Written documentation showing all doors including structure, installation, size, materials, location, glazing, hold-open mechanism, entry door protection material, and emergency signage and handle.

Sections 3.3.6.3.8. and 3.3.6.3.8.1. - Written documentation showing emergency rear window including size, placement, glazing and signage.

Section 3.3.6.4.4. - Written documentation showing details of wheelchair/mobility aid lift door including hold-open device.

Section 3.3.7.7. – Written documentation showing details of windshield, windows and glazing.

Section 3.3.9.6. - Details of the interior storage compartment, its location, interior finish, access door, and the hold-open device.

Section 3.3.10.3.3. – Details of driver's seat.

Section 3.3.10.3.4. – Details of optional driver's seat.

Section 3.3.10.4.2. - Sample seat materials and colors.

Section 3.3.10.5.2. - Written documentation showing test procedures and results of passenger restraint assembly and anchorage.

Section 3.3.10.6.1. – Details of the automatic tightening securement systems.

Section 3.3.10.6.4. – Written documentation and diagram(s) showing design and location of all wheelchair/mobility aid "L" track system.

Section 3.3.10.6.8. - Documentation showing compliance with WC18, SAE J2249, FMVSS, ADA, and any other existing regulations for Wheelchair Tiedowns and Occupant Restraints for Use in Motor Vehicles.

Section 3.3.10.6.10. – Certification that the wheelchair/mobility aid/passenger securement/restraint system meets all applicable standards.

Section 3.3.13.2. - Written request to use non-OEM digital type instrumentation or light-bar instrumentation if applicable.

Section 3.3.13.7. - Notification if cruise control is offered not as standard equipment bus as an option and the cost of the option. Also, provided notification if the cruise control feature is part of an OEM option package that includes other features that can not be excluded from the package if applicable.

Section 3.3.14.3.5. - Documentation and drawing(s) showing general design layout of the interior climate control system, specifications and performance data. Certification that the climate control system is adequately sized for the vehicle and can meet performance requirements.

Section 3.4.1.9 – Details of back up warning system.

Section 3.4.1.10 – Details of back up camera.

Section 3.4.2.1. - Notification that non-OEM exterior mirrors and installations will be used, and documentation showing details of non-OEM exterior mirrors if applicable.

Section 3.5.2.1. - Certification that the wheelchair/mobility aid lift system is adequate to withstand the loads and stresses imposed by regular lift operation on a sustained basis.

Section 3.5.2.2. – Details of 1,000 lb. wheelchair/mobility aid lift system.

Section 3.5.2.9. - Documentation showing installation drawings and details of the wheelchair/mobility aid lift system installation including general layout, dimensions, safety features, and controls.

Section 5.2.2. - Documentation showing written plan pertaining to acceptance testing.

Section 5.3.6. - Complete warranty plan.

1.1.8.3. Approvals required by the Procuring Agency after completion of the Pilot Vehicle and prior to production:

Section 1.5.5.5. – Approval if any component with identical functions are not interchangeable among all vehicles.

Section 1.5.6.2. – Approval if any component parts installed in the vehicle are not exact duplicates if applicable.

Section 1.5.6.3. – Approval if vehicle is not completed on PVM/Vendor’s dedicated assembly line.

Section 2.1.4.2. – Performance data to justify powertrain selected.

Sections 2.2.1.1. and 3.3.14.4.1. - Approval of auxiliary heater location and information decal.

Section 2.10.2.1. – Approval of fuel tank.

Section 2.11.1.1. – Approval of analysis of the estimated electrical load expressed in Amps for each system described.

Section 2.11.1.3. – Approval of bell tones when key left in ignition and headlights left on with ignition switched off.

Section 2.11.2.1. – Demonstration that the alternator charging system will meet operational electrical load demands.

Section 2.11.4.1. – Approval of location, accessibility and details of primary and secondary batteries including battery tray and compartment.

Section 2.11.4.3. – Approval of electrical disconnect switch.

Section 2.11.5.10. – Approval of add-on circuit breaker panel location if applicable.

Section 2.11.8.2. – Approval of speaker locations.

Section 3.2.5.4. – Approval of method of exterior panel attachment.

Section 3.2.5.5. – A listing of designated welders, their certification and/or training, and quality assurance procedures for welding.

Section 3.2.6.2. – Approval of exterior paint and color.

Section 3.2.7.1. – Design and layout of roof gutters or alternative design.

Section 3.2.10.1. – Approval of design and installation of running board.

Section 3.3.4.1. – Approval of passenger stepwell.

Section 3.3.4.4. – Approval of stepwell heater.

Section 3.3.5.7. – Approval of design and location of modesty panels, stanchions, handrails and grabrails.

Sections 3.3.6.1.1., 3.3.6.2.1., 3.3.6.3.2., 3.3.6.3.6. – Approval of all doors including structure, installation, size, materials, location, glazing, hold-open mechanism, entry door protection material, and emergency signage and handle.

Section 3.3.6.2.7. – Location of exterior key lock.

Sections 3.3.6.3.7. and 3.3.6.3.8.1. – Approval of emergency rear window including size, placement, glazing and signage.

Section 3.3.6.4.4. – Approval of wheelchair/mobility aid lift door including hold-open device.

Section 3.3.7.3. – Approval of emergency side window signage.

Section 3.3.7.7. – Approval of windshield, windows and glazing.

Section 3.3.9.4. – Approval of interior color scheme coordination, treatments, color shades and density, trim and finish.

Section 3.3.9.6. – Approval of the interior storage compartment, its location, interior finish, access door, and the hold-open device.

Section 3.3.10.1.5. – Approval of seating arrangement.

Section 3.3.10.4.2. – Approval of seat materials and colors.

Section 3.3.10.6.8. – Approval of wheelchair/mobility aid/passenger securement/restraint system, configuration and installation.

Section 3.3.10.6.9. – Approval of wheelchair/mobility aid securement storage unit location(s).

Section 3.3.12.2. – Approval of quality and location of all switches and controls.

Section 3.3.14.1.2.-Approval of location of high-capacity rear hot water heater(s).

Section 3.3.14.4.1. – Approval of shut-off valve and signage.

Section 3.3.14.4.2. – Approval of controls for air conditioning system.

Section 3.3.14.4.8 – Approval of climate control system.

Section 3.3.15.1. – Approval of all interior rear view mirrors.

Section 3.3.19.2. – Approval of location and mounting of safety and emergency equipment.

Section 3.3.22. – Location and operation of optional PA system including amplifier, microphone and speakers if selected.

Section 3.3.22.5. – Location of PA power switch

Section 3.4.1.3. – Approval of side signal lamp location.

Section 3.4.1.4. – Approval of additional warning lights

Section 3.4.1.7. – Approval of all exterior lighting.

Section 3.4.1.10 – Approval of optional back-up warning camera (if applicable).

Section 3.4.2.1. – Approval of all exterior mirrors and control switches.

Section 3.4.3.1. – Approval of layout and location of exterior decals.

Section 3.5.2.6. – Demonstration and approval of wheelchair/mobility aid lift and controls.

Section 4.1.2. – Approval of location of P-clamps used for heating hoses.

1.1.8.4. Submittals required by the Procuring Agency at vehicle delivery:

Section 1.4.3. - Results of Illinois Vehicle Safety Lane Inspection Test

Section 1.5.5.2. – Preventive maintenance tasks and related scheduled service intervals.

Section 2.7.1.2. – Brake test results.

Section 2.11.7.1. – Instructions to prevent damage from voltage spikes.

Sections 2.11.9.1. and 4.1.17. – "As built" electrical schematics and other technical documentation.

Section 3.3.10.5.3. – Part numbers for replacement seat belts.

Section 3.5.2.6. – Demonstration and approval of wheelchair/mobility aid lift and controls.

1.2. DEFINITIONS

1.2.1. The following are definitions of special terms used in this Technical Specification.

1.2.1.1. dBA. Decibels with reference to 0.0002 microbar as measured on the "A" scale.

1.2.1.2. CW. (Curb Weight). Weight of vehicle, including maximum fuel, oil, and coolant; and all equipment required for operation and required by this Specification, but without passengers or driver.

1.2.1.3. SL. (Seated Load). 150 lbs. for every passenger seating position and for the driver and 300 lbs. for each wheelchair or mobility aid securement location provided.

1.2.1.4. Gross Load. 150 lbs. for every passenger seating position and for the driver and 300 lbs. for each wheelchair or mobility aid securement location provided.

1.2.1.5. SLW. (Seated Load Weight). Curb Weight plus Seated Load.

1.2.1.6. GAWR. (Gross Axle Weight Rating). Maximum axle capacity.

1.2.1.7. GVW. (Gross Vehicle Weight). Curb Weight plus Seated Load plus driver.

1.2.1.8. GVWR. (Gross Vehicle Weight Rating). Curb Weight plus maximum gross load vehicle is rated for.

1.2.1.9. Wet Weight. Curb Weight plus driver.

1.2.1.10. Fireproof. Materials that will not burn or melt at temperatures less than 2,000° F.

1.2.1.11. Fire-Resistant. Materials that have a flame spread index less than 150 as measured in a radiant panel flame test per ASTM-E 162-75.

1.2.1.12. Standard Configuration Vehicle. The vehicle described by these Technical Specifications if no options are selected.

1.2.1.13. Option. An alternative specification condition to the standard configuration vehicle. The Procuring Agency may select from the options presented in the Technical Specifications.

1.2.1.14. OEM. Original Equipment Manufacturer means the original manufacturer of the chassis supplied to the Vendor.

1.2.1.15. RMC. Regional Maintenance Center. Service locations designated by the Procuring Agency that can provide major maintenance and repair services on paratransit vehicles.

1.2.1.16. Procuring Agency. Illinois Department of Transportation or any other agency identified in the "term contract" that may purchase off the term contract.

1.2.1.17. Term Contract. Purchase agreement between the Illinois Department of Central Management Services and the Vendor.

1.2.1.18. Vendor. The organization that contracts to provide vehicles to the Procuring Agency. If the Vendor is different than the paratransit vehicle manufacturer (PVM), the vehicle dealer, or another third party, it is the Vendor's responsibility to ensure that all requirements of this specification are met.

1.2.1.19. PVM. Paratransit Vehicle Manufacturer refers to the organization that builds the vehicle from the OEM chassis

1.2.1.20. Delivery Location. Location(s) identified by the Procuring Agency for the Procuring Agency to perform final inspection and delivery of vehicles.

1.2.1.21. Elastomeric. A rubber, plastic, polyvinyl, etc. material.

1.3. ABBREVIATIONS

1.3.1. The following is a list of abbreviations used in these Technical Specifications.

1.3.1.1. ADA: Americans with Disabilities Act

1.3.1.2. APA: American Plywood Association

1.3.1.3. ASA: American Standards Association

1.3.1.4. AWS: American Welding Society

1.3.1.5. ASTM: American Society for Testing and Materials

1.3.1.6. EPA: Environmental Protection Agency

1.3.1.7. FMVSS: Federal Motor Vehicle Safety Standards

1.3.1.8. 49 CFR: Title 49 Code of Federal Regulations, (Part 571)

1.3.1.9. HVAC: Heating, ventilation and air conditioning

1.3.1.10. ICC: Interstate Commerce Commission

1.3.1.11. IDOT: Illinois Department of Transportation

1.3.1.12. JIC: Joint Industrial Council

1.3.1.13. OEM: Original Equipment Manufacturer

1.3.1.14. PVM: Paratransit Vehicle Manufacturer

1.3.1.15. RMC: Regional Maintenance Center

1.3.1.16. SAE: Society of Automotive Engineers

1.3.1.17. UL: Underwriters Laboratories. Inc.

1.3.1.18. UMTRI: Univ. of Michigan Transportation Research Inst.

1.4. LEGAL REQUIREMENTS

1.4.1. The vehicle shall meet all applicable FMVSS and ADA regulations in effect at the date of manufacture. The Vendor shall comply with all applicable Federal and State of Illinois regulations. In the event of any conflict between the requirements of this Specification and any legal requirement, then the legal requirement shall prevail.

1.4.2. The OEM or Vendor shall comply with all applicable notifications regarding safety recalls and technical bulletins if notified or discovered, and shall notify the Procuring Agency in addition to each applicable vehicle owner and all RMCs as soon as safety recalls and technical bulletins are known.

1.4.3 An Illinois Vehicle Safety Lane Inspection Test shall be performed and the results submitted prior to each vehicle delivery. Locations can be found at http://www.dot.il.gov/trafficsafety/LanesForInternet.pdf.

1.5. OVERALL REQUIREMENTS

1.5.1. Physical Size and General Dimensions

1.5.1.1. With the exceptions of exterior mirrors, marker and signal lights, flexible portions of the bumpers, fender flares and skirts, and rubrails, the vehicle shall have the following overall dimensions and capacities.

1.5.1.1.1. Seated Capacity Baseline Vehicle.

(a) 14 forward facing seated passengers plus the driver, convertible to,

(b) two wheelchair/mobility aid securement locations and ten forward facing seated passengers plus driver, convertible to,

(c) five wheelchair/mobility aid securement locations and zero (0) seated passengers plus the driver in less than five minutes without the use of tools.

OPTION A: Seating capacity shall be:
(a) 14 forward facing seated passengers plus the driver, convertible to,

(b) two wheelchair/mobility aid securement locations and ten seated passengers plus driver, convertible to,

(c) four wheelchair/mobility aid securement locations and four (4) seated passengers plus the driver in less than five minutes without the use of tools.

Note: Any last seat in the rear can be a fixed mid high back style seat as needed.

Note: Seating layout will change as a result of Option N, Section 3.3.6.3.7., which replaces the rear emergency door with an emergency window. Seating layouts based on Option N shall also be included in Section 1.5.1.1.1. All options shall be priced separately in the bid and reflect the differential cost for each alternative seating layout using the seating layout in Section 1.5.1.1.1 (a-c) as the baseline.

1.5.1.1.2. Length, Overall: 290 inches, maximum.

1.5.1.1.3. Wheelbase: 158 inches, minimum.

1.5.1.1.4. Width, 96 inches maximum (excluding wheels and wheel flares).

1.5.1.1.5. Height, Overall @ GVWR: 117 inches, maximum excluding roof hatch.

1.5.1.1.6. Interior Width @ seated shoulder height: 90 inches minimum.

1.5.1.1.7. Aisle Width: 16 inches, minimum.

1.5.1.1.8. Seat Width, per person (all): 17.5 inches.

1.5.1.1.9. Interior Headroom: 72 inches, minimum.

1.5.2. Underbody Clearance

1.5.2.1. The vehicle shall have the following minimum clearance dimensions at GVWR, as defined in SAE Standard J689.

1.5.2.1.1. Ramp Clearances. Approach angle shall be no less than 12 degrees. Breakover angle shall be no less than 10 degrees. Departure angle shall be no less than 10 degrees.

1.5.2.1.2. Ground Clearance. Overall vehicle ground clearance and axle/wheel zone ground clearance shall be maximized and adequate to enable the vehicle to operate in normal paratransit service in the environmental climatic, and street and roadway conditions prevailing throughout the State of Illinois.

1.5.3. Weight

1.5.3.1. The curb weight of the standard baseline vehicle, with options, shall be such that the GVW, with full seated load including driver and a minimum of two wheelchair or mobility aids in the securement locations, shall not exceed the OEM's GVWR and GAWR. The minimum GVWR shall be 14,200 lbs.

1.5.3.2. The maximum curb weight of the vehicle shall not cause the chassis GVWR, as certified by the OEM to be exceeded by any selected combination of options and/or seating capacity required in these specifications.

1.5.3.3. The chassis shall not be altered by the Vendor to increase the OEM’s stated GVWR.

1.5.4. Seating Capacity

1.5.4.1. Seating capacity shall conform to Section 1.5.1.1.1

1.5.4.2. **Scaled diagrams or layout drawings of the proposed interior arrangements conforming to the requirements of Section 1.5.1.1.1 shall be provided with bid submittal.** A sample seating layout is included as Attachment A to this specification. The sample reflects the current seating layout, but is NOT intended to be final layout.

The Vendor is encouraged to develop a seating layout or a series of seating layouts that meet specification requirements in an innovative and efficient manner. The Vendor is also encouraged to develop a seating layout for OPTION A. The Procuring agency will select one(s) that best meets its needs. Options A seating shall be priced separately in the bid and reflect the differential cost for each alternative seating layout using the seating layout in Section 1.5.1.1.1 (a-c) as the baseline.

1.5.5. Service Life and Maintenance

1.5.5.1. Service Life. The design life of the paratransit vehicle shall be at least 180,000 miles. It shall be capable of operating at least 40,000 miles per year.

1.5.5.2. Maintenance and Inspection. Scheduled maintenance or inspection tasks as specified by the OEM, and by the Vendor, shall require a skill level of 3M Service Mechanic or Class B Serviceman, or less. Scheduled preventive maintenance tasks shall be related and shall be grouped in maximum mileage intervals. Routine scheduled maintenance actions, such as filter replacement and adjustments, shall not be required at intervals of less than 5,000 miles, except for routine daily service performed during the fueling operations. Higher levels of scheduled maintenance tasks shall occur at even multiples of mileages for lower level tasks. Preventive maintenance tasks and related scheduled service intervals shall be included with each vehicle at delivery.

1.5.6. New Manufacture Equipment

1.5.6.1. All vehicles and related components whether specified or not in this Technical Specification, shall be the manufacturer's current model year production and shall conform to quality, design, material, and workmanship practices consistent with standards established by the commercial automotive industry.

1.5.6.2. All components and parts shall be of new manufacture, and in no case shall used, reconditioned, or obsolete parts be acceptable. All component parts installed in the vehicle shall be an exact duplicate in design, manufacture and construction in each and all of the vehicles per order, unless otherwise approved by the Procuring Agency prior to production.

1.5.6.3. All vehicles, subassemblies, component parts and equipment shall be final assembled on station, on the PVM’s and Vendor’s dedicated assembly line, and shall be complete, unless approved by the Procuring Agency prior to production.

1.5.7. Operating Environment

1.5.7.1. The vehicle shall achieve normal operation in temperature ranges of minus 30° F to +110° F, at relative humidities between 15 percent and 100 percent, and at altitudes up to 3,000 feet above sea level, and in harsh winter conditions involving ice, snow, slush, and road salt. Degradation of performance due to atmospheric conditions shall be minimized at temperatures below –minus 10° F and above 100° F. Special equipment or procedures (excluding use of ether for glow-Plug equipped diesels) may be employed to start the vehicle engine after a 12-hour or more exposure to temperatures below 0° F for gasoline engines and below 20° F for diesel engines, without the engine in operation. Speed, gradability, and acceleration performance requirements shall be met at, or corrected to, 85° F, 29.00 inches Hg, dry air. The interior climate control system shall perform in accordance with the requirements of Section 3.3.14.

1.5.8. Pilot Vehicle

1.5.8.1. At least 30 days prior to the regular production of each order, the Vendor shall produce a Pilot Vehicle manufactured to the technical specifications contained in this document. A pilot vehicle shall also be required when a major design change is introduced.

1.5.8.2. The Resident Inspector and Procuring Agency shall inspect the Pilot Vehicle for compliance with this specification and either ask for changes, modifications, or repairs, to bring the Pilot Vehicle within compliance; or accept the Pilot Vehicle if it meets all requirements of this specification.

1.5.8.3. Upon approval of the Pilot Vehicle by the Procuring Agency, the regular production of vehicles can begin.

1.5.8.4. If the Vendor determines that minimal model or design changes preclude the need for a Pilot Vehicle, the Vendor can request a waiver of the Pilot Vehicle for that order only. The waiver must provide justification for why a Pilot Vehicle would not be required.

2. PROPULSION SYSTEM

2.1. VEHICLE PERFORMANCE

2.1.1. Power Requirements

2.1.1.1. Propulsion system and drivetrain shall provide sufficient power to enable the vehicle to meet the defined acceleration, top speed, and gradability requirements. Sufficient excess power shall be available to operate all accessories at peak output.

2.1.1.2. The specifications for powertrain components in the following subsections are intended to ensure an adequate longevity (150,000 mile design goal minimum) coupled with reasonable, acceptable vehicle road performance. Vehicle top continuous cruising speeds must be achieved at an engine speed (RPM) well within the manufacturer's recommended maximum.

2.1.2. Top Speed

2.1.2.1. Vehicles shall be capable of a top continuous cruising speed of 65 mph on a straight, level road at GVWR with all accessories operating.

2.1.3. Gradability

2.1.3.1. Gradability requirements shall be met on grades with a surface friction coefficient of 0.3 and above at GVWR with all accessories operating. Vehicles shall maintain a minimum sustained speed of 55 mph on a 2-1/2 percent grade, and a minimum speed of 25 mph on a 10 percent grade in an appropriate transmission gear range, with all accessories operating at maximum.

2.1.4. Acceleration

2.1.4.1. An average acceleration rate of at least 0.12g shall be achieved at GVWR between 0 and 25 mph.

2.1.4.2. The Vendor shall supply the Procuring Agency with bid performance data from most recent Altoona bus testing report for the bus model being built including gradeability results showing acceleration, gradeability, and top speed capabilities of the bus.

2.1.5. Powerplant and Accessory Mounting

2.1.5.1. All powerplant and accessory mounting, whether mounted to the engine or remotely mounted, shall be mechanically isolated to minimize transfer of vibration to the vehicle chassis and body structure.

2.1.6. Service

2.1.6.1. Easy access shall be provided for inspection and checking of engine coolant, engine oil, transmission fluid, and power steering fluid. Fluid level check points or dipsticks and filler tubes shall be accessible from outside the vehicle through the vehicle engine compartment without removing the engine cover or any accessories or components. All fluid fillings shall be accomplished with standard funnels, pour spouts, and automatic dispensing equipment. Access to the engine compartment for inspection and service shall be provided by an inside locking release or engine compartment access door which shall be OEM standard with no modifications or obstructions.

2.1.6.2. The engine shall be equipped with sufficient heavy-duty fuel and oil filters for efficient operation and to protect the engine between scheduled filter changes. Filters shall be OEM and/or spin-on, disposable type and shall be easily accessible. Fuel and oil lines, and hydraulic lines if used, within the engine compartment and elsewhere, shall be rigidly supported and shall be composed of steel tubing where practicable. They shall be routed or shielded so that failure of a line shall not allow fuel or oil to spray or drain onto any component operable above the auto-ignition temperature of the fluid. All flexible fuel, oil, and hydraulic lines added to the OEM chassis shall be Teflon hoses with braided stainless steel jackets, or approved equivalent, with standard SAE or JIC brass or steel, reusable, swivel, end fittings. Hoses shall be individually supported with clamps coated with elastomeric material, and shall not touch one another or any part of the vehicle.

2.1.7. Accessories

2.1.7.1. All engine-driven accessories shall be heavy-duty type and mounted as a unit for quick removal and repair. Accessory drive systems shall operate without failure or unscheduled adjustment for a minimum of 25,000 miles. These accessories shall be driven at speeds sufficient to assure adequate system performance during extended periods of idle operation and low route speed operation at high accessory output demand. Drive belts shall be heavy-duty type and shall have sufficient wrap around pulleys to avoid slip and provide long life.

2.2. POWERPLANT

2.2.1. Engine

2.2.1.1. The standard engine shall be gasoline powered with a minimum displacement of 6.0L. The engine shall have a heavy-duty rating with a displacement and horsepower rating sufficient to meet the requirements of Section 2.1. An automatic engine shut-down and/or power de-rate system shall also be provided if available from the OEM. Details of shutdown system and/or power de-rate system including overrides for safety reasons shall be provided with bid submittal if features are available. The Procuring Agency has an interest in advanced propulsion systems (other than hybrid, CNG, hydrogen, etc.) that reduce fuel consumption and emissions, and reduce the nation's dependency on foreign oil. The Vendor shall inform the Procuring Agency of the availability of any such propulsion systems if they become available during the contract period, but no changes shall be instituted unless first approved by the Procuring Agency.

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OPTION C – Intentionally left blank.

OPTION D – The engine shall be an electronically controlled diesel fueled engine compatible to operate on a maximum of 20 percent biodiesel (B20). The engine shall have a heavy-duty rating with a displacement and horsepower rating sufficient to meet the requirements of Section 2.1. The diesel engine shall be equipped with an OEM automated engine shutdown system described in Section 2.2.1.1. A non-OEM engine shutdown system shall be provided if OEM system is not available. The diesel engine option shall include an in-line heater booster pump, automatically activated by the heater switch to improve heating. The diesel engine option shall also include a fuel-fired auxiliary coolant heater as specified in Section 3.3.14.1.2. If not provided by the chassis OEM, a heavy-duty water/fuel separator/filter shall be installed before the injector pump. The filter shall be mounted in a convenient location inside the frame rails in the under chassis area. Details of the diesel engine option including but not limited to engine and emission reduction features, performance statistics, engine shutdown, block heater, fast idle, details of DEF (diesel exhaust fluid) system shall be provided with bid submittal. All options shall be priced separately in the bid.

OPTION EE - An OEM installed preparation kit for either compressed natural gas (CNG) or liquefied petroleum gas systems (LPG) shall be provided to facilitate the installation of CNG/LPG propulsion in the future. At a minimum, the engine shall be fitted with hardened exhaust valves and valve seats for improved wear resistance and durability for gaseous fuel systems. Additionally, the OEM CNG/LNG preparation kit will provide all fittings necessary to connect the alternative fuel tanks to the engines. The OEM kit shall also include calibration guidance and recommendations to allow a properly converted vehicle to maintain its original engine warranty.

2.2.1.2. The most heavy-duty air-to-oil or water-to-engine oil cooling system available from the chassis OEM shall be provided. The cooler must be able to maintain engine oil at the appropriate temperature during all conditions, especially in severe urban service.

2.2.1.3. The engine shall be equipped with a 110 VAC, minimum 750 watt engine block heater in accordance with SAE Recommended Practice J1310 to ensure that the engine can be started without starting aid after a 12 hour exposure to –minus 20° F. The receptacle shall be stowed in the engine compartment and easily accessed through the grille.

2.2.1.4. The vehicle shall be equipped with an automatically controlled engine fast idle system approved by the OEM.

2.2.1.5. The Vendor shall provide certification with bid submittal that the installed engine meets all applicable EPA noise, gas and smoke emissions, and toxic fume regulations.

2.2.2. Cooling System

2.2.2.1. Temperature of operating oils and fluids on the vehicle shall be controlled by a cooling system. The cooling system shall be sized to maintain fluids at safe, continuous operating temperatures during the most severe operations with the vehicle loaded to GVWR and with ambient temperatures up to 110° F. The engine shall be cooled by a water-based, pressure type, cooling system that does not permit boiling or coolant loss during the operations described above. Engine thermostat(s) shall be easily accessible for replacement.

2.2.2.2. The radiator shall be of durable, heavy-duty, corrosion resistant construction and shall be the largest capacity OEM installation available for the vehicle, or as may be part of the chassis OEM's Heavy-Duty Service or Towing Package.

2.2.2.3. An OEM coolant recovery system for the radiator, such that coolant expelled is retained and restored to the cooling system, shall be provided. If an OEM system is not available, an aftermarket system of minimum 4 quart capacity with suitable OEM cap shall be provided. The coolant shall be protected from freezing with ethylene glycol antifreeze/water mixture to –minus 30° F. A tag listing level and date shall be attached to the radiator.

2.2.3. Engine Air Filtration

2.2.3.1. Engine aspiration air shall be filtered through a chassis OEM heavy-duty, dry type, replaceable element unit.

2.2.4. Transmission

2.2.4.1. The transmission shall be a heavy-duty truck type, fully automatic shift with hydraulic torque converter and number of forward gears capable of meeting the performance requirements in Section 2.1.

2.2.4.2. The most heavy-duty chassis OEM air-to-oil or water-to-oil transmission oil cooler shall be provided to maintain transmission fluid at the appropriate operating temperature during all conditions, especially in severe urban service. The cooler shall be the largest capacity chassis OEM installation available for the vehicle, or it may be part of the OEM chassis Heavy-Duty Service or Towing Package, or supplied by a non-OEM heavy-duty components and equipment supplier.

2.2.5. Exhaust System

2.2.5.1. Exhaust gases and waste heat shall not be discharged on the curb side, and shall be directed away from the vehicle and routed to exit towards the street side to the rear of the body. Should this exhaust location not be standard for the OEM chassis, the exhaust system shall be modified and shall be to OEM standards. Exhaust system muffler, and piping shall be

corrosion resistant, if OEM available. Piping joints shall be slip-joint type secured with heavy-duty clamps, and supported by heavy-duty compliant type hanger brackets. Butt-welded joints shall not be used. Section of exhaust that extends over rear axle shall not consist of more than three pipe sections.

2.2.5.2. The vehicle exhaust system, including modifications, shall meet all applicable federal and state noise and emissions requirements. Exhaust piping modifications shall not restrict the underbody clearances defined in SAE J689.

2.2.6. Exterior Noise

2.2.6.1. Exterior noise generation by the engine, exhaust system and operating accessories of the completed modified vehicle shall be the minimum practicable and shall not exceed OEM standards, under all operating conditions. Care shall be taken by the Vendor to ensure that the completed vehicle does not generate an audible discrete frequency.

2.3. FINAL DRIVE

2.3.1. Rear Axle

The vehicle shall be driven by a heavy-duty full floating, single reduction gearing, limited slip or locking differential type axle at the rear. The rear axle shall be a one piece forged or cast steel housing and separable carrier construction. The axle assembly shall have a load rating sufficient for the vehicle loaded to GVWR. Axle ratio shall be one of the OEM's standard ratios, and shall be capable of meeting the vehicle performance requirements in Section 2.1 of these specifications. The driven axle shall be capable of operation for 100,000 miles without repairs.

2.3.2. Propeller Shaft(s)

The vehicle drive shaft(s) shall be a heavy-duty, high-capacity design capable of transmitting the maximum torque of the engine/transmission powertrain in all drive gear ranges and under all power applications. The propeller shaft(s) bearings and universal joints shall be the OEM's standard for the engine selected and GVWR specified with no changes or modifications made unless first approved by the Procuring Agency. The propeller shaft(s) shall be correctly balanced and aligned and the universal joint yokes shall be oriented in the proper phase to each other to minimize vibrations and provide maximum bearing life. The propeller shaft(s) shall be restrained by heavy-duty guards to prevent any section of the shaft(s) from entering the vehicle or striking the ground in case of shaft(s) or U-joint failure. The guard shall be a minimum of 3/16-inch thickness steel, and shall be securely bolted to the vehicle frame.

2.4. SUSPENSION

2.4.1. General

2.4.1.1. Front and rear suspension systems shall be OEM and of a type most widely utilized in commercial fleets of this vehicle type, used in service operations characterized by

continuous duty under moderate to severe road conditions and climatic environment. Suspension system components shall be computer selected, matched and tuned to provide maximum load capacity, ride quality, stability, and desirable steering and handling characteristics. Damping shall be sufficient to control vehicle motion to one cycle or less after hitting road perturbations.

2.4.2. Front Suspension

2.4.2.1. The front axle shall be non-driving, independent kingpin type, with a load rating sufficient for the vehicle loaded to GVWR. Front suspension shall incorporate a coil or leaf type spring system to provide acceptable quality ride under varying load conditions. A stabilizer bar shall be incorporated to provide additional suspension control and vehicle stability only if available through the OEM. Vertical damping of the suspension shall be accomplished by gas filled shock absorbers that shall maintain their effectiveness for at least 25,000 miles in normal service. Front suspension system components; springs, shock absorbers, stabilizer bar, and including bearings, hubs and spindles shall be the heaviest duty OEM equipment available.

2.4.3. Rear Suspension

2.4.3.1. Rear suspension shall incorporate "progressive" leaf type springs to provide acceptable ride quality under varying load conditions. A rear stabilizer bar shall also be provided to provide additional suspension control and vehicle stability. Vertical damping of the suspension shall be accomplished by gas filled shock absorbers that shall maintain their effectiveness for at least 25,000 miles without repairs in normal service. Rear suspension components' springs, and shock absorbers shall be the heaviest duty OEM equipment available. A stabilizer bar shall be incorporated to provide additional suspension control and vehicle stability only if available from the OEM.

2.4.3.2. A helper leaf shall be added to the rear curb side spring.

OPTION E: Rear suspension shall incorporate a rubber shear spring system that functions in conjunction with the existing leaf springs to increase axle travel, isolate and absorb road shock, and improve ride quality. All options shall be priced separately in the bid.

2.5. STEERING

2.5.1. General

2.5.1.1. The vehicle shall be equipped with OEM installed hydraulic-assisted power steering system with a tilting/adjustable steering column. Power steering failure shall not result in loss of steering control.

2.5.1.2. The steering wheel shall be largest diameter OEM unit available.

2.6. LUBRICATION

2.6.1. All elements of steering and suspension systems requiring scheduled lubrication shall be provided with grease fittings as supplied by the OEM. These fittings shall be located for ease of

inspection, and shall be accessible with a standard grease gun. Each element requiring lubrication shall have its own grease fitting with a relief path. Lubricant specified shall be standard for all elements on the vehicle serviced by standard fittings.

2.7. BRAKES

2.7.1. Service Brakes

2.7.1.1. Service brakes shall be controlled and actuated by a hydraulic power assist system. The braking elements shall be self-adjusting disc type on the front and rear axles. The brakes shall be equipped with an anti-locking system, if available from the chassis OEM.

2.7.1.2. Brake system shall be heaviest duty and largest size and rating offered and must comply with all applicable FMVSS requirements. Brake test results shall be furnished with each vehicle at the time of delivery. Results of brake tests performed as part of Illinois Vehicle Safety Lane Inspection Tests may be accepted as satisfying this requirement, subject to the approval of the Procuring Agency.

2.7.1.3. The entire service brake system, excluding friction material, shall have an overhaul or replacement life of at least 30,000 miles in normal service operations, and shall be self-adjusting throughout this period.

2.7.2. Parking Brake

2.7.2.1. Parking brake shall be mechanical type, manually operated independently of the transmission control, working on the vehicle rear wheels or driveline. The parking brake shall be capable of holding a fully loaded vehicle at GVWR on a 15 percent incline. The system shall include a dash panel mounted red warning light to indicate to the driver when the brake is applied.

2.8. WHEELS AND TIRES

2.8.1. Wheels

2.8.1.1. Vehicle shall be equipped with the heaviest duty, ventilated, one-piece integral pressed steel drop center construction wheels recommended by the OEM for the GVWR and tires specified. Single wheels shall be used on front axle and dual mounted wheels on rear axle, and shall be completely interchangeable. All mounted wheels shall be tightened in a star pattern to OEM torque specifications and documented in Section 5.2.2, Pre-Delivery Tests.

2.8.2. Tires

2.8.2.1. Vehicle shall be equipped with tires suitable for the conditions of paratransit service and sustained operation at the maximum speed capability of the vehicle. Load on any tire at GVWR shall not exceed tire supplier's load rating. Tires shall be heaviest duty OEM available, premium quality, tubeless, black sidewall, all-weather, radial type, or the highest capacity tires supplied for this vehicle chassis. The tires must have at least E range rating. Tire construction shall be light truck type with steel belted casing and tread plies, and all-season highway tread incorporating variations to minimize road noise. Tires shall be

supplied with the vehicle from the OEM assembly plant as standard or optional equipment, or as Dealer Special Order (DSO). The Vendor shall document its request, and should the specified tires not be available, advise the Procuring Agency with bid submittal regarding available alternates.

2.8.2.2. All wheel mounted tires shall be electronically spin balanced, on or off the vehicle, to a minimum speed of 65 mph. Tire pressure shall be stenciled with black paint in letters or decal one-half inch high over each tire on vehicle fender or body. Upon completion of the vehicle all wheels shall be aligned to OEM specifications.

2.9. BUMPERS

2.9.1. Front bumpers shall be OEM formed-steel or aluminum type. The rear bumper shall be either the chassis OEM or converter add-on made of formed-steel or aluminum. Both the front and rear bumper shall be installed in such a manner as to transmit any collision shock loads directly to the bus underframe members. Bumpers shall be designed to protect against impact at body corners.

Rear Bumper shall be rubberized “help” type that shall return to its pre-impact shape within 10 minutes of the impact. When using the bumper manufacturer’s test procedures, the rear bumper shall provide protection at speeds up to 5 mph, over pavement discontinuities up to 1 inch high, and at accelerations up to 2 mph/sec. The “help” type rear bumper shall NOT have step indent.

2.10. FUEL SYSTEM

2.10.1. The fuel tank shall be securely mounted to the vehicle frame or underbody members to prevent movement during vehicle maneuvers but shall be easily removable for cleaning or replacement. The fuel tank capacity shall be a minimum of 33 gallons in a single tank. The fuel filler pipe shall be so designed as to permit filling to the "full" point at a high rate, from a standard dispensing pump, of foam-free fuel without splash-back, or causing the nozzle to shut off before the tank is full.

2.10.2. The fuel filler pipe cap shall be made captive to the fuel filler pipe by means of a hinge or other device. Chains, wire or cable are not acceptable unless protective plates of stainless steel are provided to protect body paint from damage. Locking type OEM fuel cap with two keys shall be supplied, with all vehicles keyed the same. A locking door for access to the fuel-filler pipe, or OEM locking door with interior control, is acceptable in lieu of locking gas cap. If available from the OEM, the tank shall be equipped with an external, hex head, brass drain plug.

OPTION G: The OEM fuel cap and fuel cap access door shall be non-locking. All options shall be priced separately in the bid.

2.10.2.1. The fuel tank shall be mounted in the OEM installed location and meet all applicable FMVSS requirements. Any deviation from the OEM location or protection of the fuel tank must be submitted with bid and approved by the Procuring Agency prior to production.

2.10.3. The fuel system as specified shall meet applicable FMVSS 301 requirements.

2.11. ELECTRICAL SYSTEM

2.11.1. General Requirements

2.11.1.1. The electrical system shall provide and distribute power to ensure satisfactory performance of all electrical components. The power generating system shall be rated sufficiently higher than the total possible concurrent electrical load to maintain the charge on the battery(s) at all operating conditions including the engine at idle, and the alternator shall have a minimum rating of 200 amps. The Vendor shall provide to the Procuring Agency both at time of bid submittal and prior to production an analysis of the estimated electrical load expressed in Amps for each system described below with the vehicle at idle and batteries fully charged:

- All vehicle lights on
- Right turn signal on
- All hazard flasher lights on
- Air conditioning on with highest fan speed

The Vendor shall also provide to the Procuring Agency at time of bid the total alternator nameplate rating(s) in Amps and whether the extra capacity alternator is provided through the OEM or is aftermarket.

2.11.1.2. Redundant grounds shall be used for all major, critical and safety related electrical equipment, except where it can be demonstrated that redundant grounds are not feasible or practicable. One ground may be the vehicle body and framing. Grounds shall not be carried through hinges, bolted joints (except those specifically designed as electrical connectors), or powerplant mountings.

Primary or major wiring harnesses shall not be located under the vehicle floor, and underfloor wiring shall be eliminated to the maximum extent practicable. Wiring and electrical equipment necessarily located under the vehicle shall be insulated from water, heat, corrosion, and mechanical damage. Wiring and harnesses shall be routed and supported independent from fluid carrying lines. Design of the electrical system shall be modular so that each major component, apparatus panel or wiring bundle is easily separable with standard hand tools or by means of connectors. Powerplant wiring shall be an independent wiring module and its replacement shall not require pulling wires through any bulkhead or removing any terminals from the wires.

2.11.1.3. Except as otherwise specified, all accessories and electrical equipment, with the exception of headlights, tail lights, parking lights, emergency flashers and clearance lights shall be wired through the vehicle ignition switch so as to be operative with the switch in the ON position. This system shall include air conditioning and wheelchair/mobility aid lift. The exterior vehicle lighting system shall be provided with a bell tone distinguished from other audible alerts which shall sound when these lights are left on with the ignition switch in the OFF position and the driver door is open. Bell tone system shall be OEM or approved equal and shall be approved by the Procuring Agency prior to production.

2.11.2. Alternator

2.11.2.1. The vehicles shall incorporate one or two high-output, heavy-duty alternator(s) with battery runout protection as needed to meet the requirements of Section 2.11.1. The Vendor shall indicate at time of bid whether the charging system requires one or two alternators. If a

non-OEM alternator is used, the alternator must have a history of proven reliability in the vehicle type and operating environment detailed in this specification. The Vendor must demonstrate that the alternator charging system will meet operational electrical load demands prior to production. Alternator over-voltage protection shall be provided.

2.11.3. Voltage Regulator

2.11.3.1. Voltage regulator shall be heavy-duty, electronic solid-state design and shall match and be compatible with the alternator/battery system.

2.11.4. Batteries

2.11.4.1. Batteries shall be dual 12 volt parallel with crossover interconnect system, OEM heavy-duty, lead acid premium construction, maintenance free type, with a total capacity of 1400 CCA, minimum. Batteries may be mounted together in the engine compartment, in a skirt mounted battery box or a stepwell battery box, or they may be split between two locations. All batteries shall be protected from weather and easily accessible for servicing and replacement. If a tray is needed to meet accessibility requirements, a positive lock shall retain the battery tray in the normal position. The battery tray shall pull out easily and properly support the batteries while they are being serviced. The inside surface of the battery compartment's access door if one is needed shall be electrically insulated, as required, to prevent the battery terminals shorting on the door if the door is damaged in an accident or if a battery comes loose. All battery locations shall provide convenient access and shall be well ventilated and self draining. All battery support, storage and access equipment shall be warranted to function properly and be free of corrosion for the designed life of the vehicle. Battery cables shall be flexible and sufficiently long to reach the batteries in extended positions without stretching or pulling on any connection and shall not lie directly on top of the batteries. The battery terminals and cables shall be color-coded with red for the primary positive, black for negative, and another color for any intermediate voltage cables.

Details of batteries including storage location(s), mounting and accessibility shall be furnished with bid submittal and approved by the Procuring Agency prior to production.

2.11.4.2. Each battery shall have a purchase date no more than 120 days from the date of shipment from the Vendor, and shall be fully maintained prior to shipment.

2.11.4.3. A manual main electrical power disconnect switch shall be provided to disconnect all power except that required for engine/transmission computer operation. Location of switch is subject to approval of the Procuring Agency prior to production. The switch shall be easily accessible for de-activation, and in a location to prevent corrosion from fumes and battery acid when the batteries are washed off or are in normal service.

2.11.5. Wiring and Terminals

2.11.5.1. OEM vehicle wiring shall remain unchanged to the greatest extent practicable consistent with requirements of these specifications. The following paragraphs refer primarily to Vendor installed systems, materials, equipment and components. In no case shall the Vendor remove or modify in any manner any OEM installed equipment to meet the requirements of Section 2.11.5 without prior approval from the Procuring Agency. The Vendor shall indicate with bid submittal if the Vendor intends to remove or modify in any manner any OEM installed equipment to meet the requirements of Section 2.11.5.

2.11.5.2. Wiring and terminals shall meet or exceed current federal and state vehicle requirements and be amply sized for both mechanical strength as well as to carry required electrical currents without significant voltage drop. Electrical components, wiring, materials, terminals and installation practices shall meet or exceed chassis OEM vehicle standards as a minimum, unless in conflict with these specifications in which case these specifications shall take precedence.

2.11.5.3. All wiring between major electrical components and terminations, except battery wiring, shall have double electrical insulation, and shall be waterproof. Double insulation shall be maintained as close to the terminals as practicable. The requirement for double insulation shall be met by wrapping harnesses with plastic electrical tape or by sheathing all wires and harnesses with nonconductive, rigid or flexible conduit.

2.11.5.4. Insulated wiring shall conform to current SAE Standards J1127 and J1128. Insulation material shall be upgraded to the next grade higher than that needed for the maximum ambient temperature of 200°F of its on-vehicle environment, per Table 1 of SAE Standard J1292, latest edition.

2.11.5.5. Non-OEM insulated wiring shall be color coded and function and/or number coded such that any wire function can be easily indentified without exception with no duplication of identification. Each wire's gauge, color, number code, function code and SAE type (GPT, HDB. SXL. etc.) shall be referenced on electrical diagrams covering all Vendor-installed electrical systems and their connections to chassis OEM electrical systems where applicable. Aftermarket air conditioning industry practice of all white insulation is acceptable only for this specific system's wiring subject to all other requirements of Section 2.11.5.

2.11.5.6. Electrical connectors shall be highest quality, heavy-duty, automotive commercial grade, pre-insulated type, or approved equal, incorporating thermoplastic insulation covering the connection of wiring and terminal. Only non-OEM electrical connectors added by the Vendor at the engine, transmission, or engine compartment or at any device exposed to weather shall be an all-weather, waterproof environmental connector with minimum temperature rating of 257 degrees F.. In no case shall the Vendor remove or replace an existing OEM electrical connector to meet this requirement without prior approval from the Procuring Agency. Terminals shall be installed with a machine crimp tool which will not release until the crimp is tight. If use of such a tool is not possible due to space limitations, manual double crimping shall be used to insure wires will not pull loose from terminals. Non-shielded blade terminals, butt connectors, and T splices are not acceptable. Push-on terminal interlocking may be provided either by female terminal detent catch, designed to engage the male blade, or by snap catches incorporated into the terminal shields. Detent engaging connectors are required for single and dual (polarized) terminals regardless of

catches in terminal shields. Multi-terminal blocks of three or more blades may utilize snap catch type block terminal shields.

2.11.5.7. Non-OEM wiring shall be continuously enclosed in non-metallic loom meeting current SAE standard J562a and be adequately supported and routed for protection from heat, water splash, moisture, solvents, corrosion, road debris, abrasion, and tension. Connectors in areas exposed to the elements or subject to moisture shall be protected by heat-shrink tubing and coated with silicone grease. If heat-shrink tubing cannot be used, such as on frame ground point, the connector shall be coated with silicone grease. Wiring shall be of sufficient length to permit proper positioning as well as replacement of terminals at least twice without excessive tension. Grommets of elastomeric material shall be provided at points where wiring penetrates metal or other materials with acute edges. Wiring shall be adequately supported and clipped. Clips shall be shielded with elastomeric material to prevent their cutting of wire insulation. Clips shall not be damaged by heat, water, solvents, or chafing.

All wiring harnesses over five feet long that contain at least five wires shall include 10 percent (minimum of one wire) extra wires for spares.

2.11.5.8. Battery cables shall be sized in accordance with SAE J2202 and shall be Type SGX meeting current SAE Standards J1127.

2.11.5.9. Grounding of components shall be through polarized, shielded terminals wired to main structural ground points. Grounding through hinged doors or covers of any type is not acceptable. Ground points shall be bolted to main structure free of paint, oil or rust, and coated with silicone grease or comparable rust inhibitor after fastening.

The battery shall be grounded to the vehicle chassis/frame at one location only, as close to the battery or batteries as possible. When using a chassis ground system, the chassis shall be grounded to the body in multiple locations, evenly distributed throughout the vehicle to eliminate ground loops. No more than four ground connections shall be made per ground stud. Electronic equipment requiring an isolated ground to the battery (i.e., electronic ground) shall not be grounded to the chassis.

2.11.5.10. All OEM circuits shall be protected by manual reset circuit breakers, blade or cartridge fuses, or fusible links. All non-OEM circuits (those added to the OEM chassis), except for those involved in engine startup, shall be protected by manual reset circuit breakers or other suitable circuit protection devices. Vendors shall provide with bid submittal a listing of the specific protection device (manual circuit breaker, cartridge fuse, etc.) used on each of the circuits added to the OEM chassis and a justification that each protection device is adequate for the circuit being protected. Circuit protection devices shall be permanently labeled by component or function and installed at a single, protected, easily accessible location within the vehicle. Fuses shall be contained in a fuse block with holders for one spare fuse of each amperage utilized and they shall be easily accessible for replacement. Location and connection of any add-on circuit breaker panel(s) shall be included in the “as built” electrical manuals and schematics, and are subject to review and final approval by the Procuring Agency prior to production.

2.11.5.11. Electrical components which may require servicing or replacement shall be readily accessible through access panels or covers. Installation of aftermarket electrical components and systems in the engine compartment shall be eliminated to the greatest possible extent. Aftermarket or OEM supplier electrical switches, relays, solenoids, circuit breakers and other electrical components shall be OEM highest quality, heavy-duty, automotive commercial grade components or approved equal.

2.11.6. Horn

2.11.6.1. The vehicles shall be equipped with OEM heaviest duty, high-and low-note, 12 volt horns, or equivalent.

2.11.7. Electrical Equipment Mounting Requirements

2.11.7.1. Electrical equipment shall not be located in an environment that will reduce the performance or shorten the life of the component or electrical system. No vehicle component shall generate, or be affected by, electromagnetic interference or radio frequency interference (EMI/RFI) that can disturb the performance of electrical equipment inside and outside the vehicle as defined in SAE J1113.

2.11.7.2. All electrical hardware shall be mounted on an insulated and easily accessed panel to facilitate replacement. The mounting of the hardware shall not be used to provide the sole ground source, and all hardware shall be isolated from potential EMI/RFI.

All electronic equipment mounted in the interior of the vehicle shall be inaccessible to passengers and hidden from view unless intended to be viewed. The hardware shall be mounted in such a manner as to protect it from splash or spray.

All electrical hardware mounted on the exterior of the vehicle that is not designed to be installed in an exposed environment shall be mounted in a sealed enclosure.

All electrical hardware and its mounting shall comply with the shock and vibration requirements of SAE J1455.

2.11.8. Electrical Components Requirements

2.11.8.1. All electrical components, including switches, relays, flashers, and circuit breakers, shall be heavy-duty designs. To the extent practicable, these components shall be designed to last the service life of the vehicle and shall be easily replaceable. Sockets of plug-in components shall be polarized where required for proper function and the components shall be positively retained. Any manual reset circuit breakers critical to the operation of the vehicle and its major operating systems, shall be mounted in a location convenient to the driver with visible indication of open circuits. All electric motors shall be heavy-duty long life type.

2.11.8.2. The vehicle shall be equipped with the OEM's standard-equipment radio (either AM-FM or AM-FM/CD) mounted in the original OEM front instrument console location. The radio mounting area shall not be encumbered by any switches or other controls installed during the vehicle conversion process. The vehicle shall be equipped with a total of four

functioning speakers, two at the front and two at the rear. Speaker locations shall be approved by the Procuring Agency prior to production.

2.11.9. Electrical Wiring Diagrams

2.11.9.1. The Vendor shall provide complete and accurate electrical wiring diagrams and schematics for the Procuring Agency review, per Material and Diagram Requirements section of Contract Document. All electrical wiring diagrams and schematics shall be exact "as built" representations of the electrical system as provided in the actual vehicles as delivered to the Procuring Agency.

3. BODY STRUCTURE

3.1. GENERAL

3.1.1. Design

3.1.1.1. The vehicle body shall be an integral unit. Sidewall slope shall not exceed approximately 5° for optimization of interior room, and to minimize direct sunlight transfer through the side windows, and solar radiation absorption into the bus passenger cabin. The exterior and body features shall be shaped to allow complete and easy cleaning by commercial vehicle washing systems. Water and dirt shall not be retained in or on any body feature to freeze or bleed out onto the vehicle after washing. Body and window frames shall be sealed to prevent leaking of air, dust, or water under normal operating conditions and during cleaning in automatic vehicle washers, for the service life of the vehicle. Accumulation on any window of the vehicle of spray and splash generated by the vehicle's wheels on a wet road shall be minimized. Exterior protrusions greater than 1/2 inch and within 80 inches of the ground shall have a radius no less than the amount of the protrusion. The rear view mirror, required lights and reflectors are exempt from the protrusion requirement.

3.1.2. Materials

3.1.2.1. The body interior and exterior materials shall be selected and fabricated to reduce maintenance, extend durability, and provide consistency of appearance throughout the service life of the vehicle. Detailing shall be kept simple; add-on devices and trim shall be minimized, and where necessary, shall be integrated into the basic design. Bright metal exterior trim shall be stainless steel or anodized aluminum. Chromium-plated trim pieces are not acceptable for exterior trim except the chassis OEM bumpers. All trim shall be beveled at ends to improve visual appearance and eliminate sharp edges.

3.2. STRUCTURE

3.2.1. Strength and Fatigue Life

3.2.1.1. The Bidder shall certify as part of the Bid Qualification and Certification Forms with bid submittal that the vehicle meets all Federal and State Regulations applicable regarding collision strength, impact resistance and passenger safety, including the requirements of FMVSS 220 with respect to static roll-over protection. The Vendor shall supply test results together with complete details of the body structure, body panels, joints, and materials. The

test data shall indicate the model year, manufacturer's name, model name, and GVWR of the vehicle tested. Written documentation outlining test procedures and results shall be prepared by a Professional Engineer and/or test laboratory certifying compliance with the requirements of this section. All documentation shall be provided by the Vendor for approval by the Procuring Agency.

3.2.2. Distortion

3.2.2.1. The vehicle, at GVWR and under static conditions, shall not exhibit deformation or deflection that impairs operation of doors, windows, lift, or other mechanical elements. Static conditions include the vehicle at rest with any one wheel on a 4-inch obstacle or in a 4-inch deep hole.

3.2.3. Resonance

3.2.3.1. All structure, body, and panel-bending mode frequencies, including vertical, lateral, and torsional modes, shall be sufficiently removed from all primary excitation frequencies to minimize audible, visible, or sensible resonant vibrations during normal service.

3.2.4. Corrosion/Rustproofing/Undercoating

3.2.4.1. The vehicle shall resist corrosion from atmospheric conditions and road salts. It shall maintain structural integrity and maintain original appearance throughout its service life, provided it is maintained in accordance with the procedures specified in the manufacturer's service manual by the Operating Agency. Materials exposed to the elements and all joints and connections of dissimilar metals (and remote from each other in the galvanic series), shall be corrosion-resistant and shall be protected from galvanic corrosion.

3.2.4.2. The entire body frame assembly, access doors, fenders, cab, underbody, wheelhousings, lower skirt panels, including closed-off body panel sections, the exterior surfaces of under floor tubing structures and all welds shall be treated and rust-proofed with a commercial grade heavy-duty rust-proofing material. All metal body parts shall be given a thorough multiple-stage anti-corrosion treatment. Zinc chromate, zinc phosphate prime paint or suitable water based alternative shall be applied to both aluminum and steel. Products used shall be listed as a qualified product under Mil Spec C-62218 and/or Mil Spec C-0083933A (MR) as applicable. Body panels that are one-side galvanized, two-side galvanized, two-side iron-zinc alloy, aluminum or tin coated, etc., or treated in any other method or procedure currently accepted by the commercial vehicle industry, are acknowledged as meeting this requirement and need no further treatment, except for finish prime/paint or undercoating where applicable.

3.2.4.3. Except as noted below, the entire body lower frame assembly, the floor structure, cab, underbody, understructure/frame, chassis, fenders, wheelhousings, fuel tank if metal, and lower skirt panels shall be completely undercoated. If any of the undercoating requirements in this specification are in conflict with OEM instructions, the OEM instructions shall prevail.

Undercoating shall be composed of a non-volatile/non-flammable resin-type base, grit and abrasive free material, dispersed in a petroleum solvent, providing a homogenous

formulation, MIL-STD specification grade undercoating material. Undercoating shall be applied to a uniform thickness throughout with no bare spots. The Vendor shall indicate with bid submittal methods to be used in meeting this requirement and shall provide a rust-proof warranty for the stated service life of the vehicle. All undercoating shall be to the satisfaction of the Procuring Agency.

3.2.4.4. Items and components that shall not be undercoated include non-metallic body panels, fenders, and stepwells, as well as the engine, transmission, driveshaft(s), differential/axle housing, brakes, power steering, lube fittings, exhaust system, heat shields, and other heat areas immediately surrounding the exhaust system.

3.2.5. Body Structure and Exterior Panels

3.2.5.1. The bus body structure shall be designed and constructed as a heavy-duty integral unit. The vehicle body assembly sidewalls, roof, side and end framing, and underfloor structure shall be so designed and constructed that they will carry their portion of the stresses imposed, and absorb excessive impacts (from other stationary or moving objects) with as little damage as is practicable. All posts in body side and roof sections shall be of durable, steel or aluminum, channel or box construction, securely fastened to the underframe structure so that the entire frame shall act as one integral unit without any movement at the joinings.

The method of attaching the body to the chassis utilizing rubber isolators is permitted provided that the body will not separate from the chassis in a severe rollover accident. The body structure end posts shall be designed to resist shear. Details of the method to attach the body to the chassis shall be provided with bid submittal.

Due to the increased weight of the wheelchair/mobility aid lift systems, the vehicle shall have adequate reinforcements installed around the side door posts, and including the bottom and the upper door header, to transfer stresses from these openings to the vehicle body primary load carrying structural members. The vehicle body shall be adequately reinforced in the passenger door and lift system areas where any modifications made to the standard bus body structure may alter the structural integrity of the vehicle. Lower body framing members that are altered must be reinforced and strength restored to prevent structural fatigue failure to the vehicle from normal paratransit operations, and to preserve the integrity of the door and lift system openings from permanent deformation as a result of minor frontal or rear collisions.

3.2.5.2. Steel, aluminum, or fiberglass reinforced plastic (FRP) roof construction are acceptable. The roof shall be an arched type, aerodynamic design, and blended into the upper body contours to present an integrated appearance. FRP roof outer shells (if used) shall be smoothly contoured, free of stress, without blemishes, rough finish or mold marks and of sufficient strength and rigidity to prevent drumming or flexing.

3.2.5.3. The body roof structure shall be supported either by integral collapse resistant steel roll cage or a matrix of fiberglass reinforced plastic with a resin hardened honeycomb craft material. If steel cage assembly is used, steel traverse and full length longitudinal members shall be provided. Roof transverse bow members shall be appropriately spaced to give maximum- uniform strength throughout the length of the roof. The body cage framing assembly shall be welded, in accordance with AWS standards, to the body upright frame

structure members or carlines to ensure the most integrated structure possible. Sidewalls shall be sufficiently reinforced to ensure proper performance of the wheelchair/mobility aid securement system per Section 3.3.10.6 of this Specification. All joints and corners where stress concentration may occur shall be adequately reinforced to support required loadings and withstand road shock, prevent vibration, and drumming or flexing in service. Mechanical fastening of the rollover cage is acceptable utilizing buck rivets, or Huck or Cherry Monobolt type rivets or equivalents. Details of mechanical fastening of the rollover cage shall be provided with bid submittal.

3.2.5.4. If applicable, all exterior panels shall be permanently attached to the framing by closed-end riveting (buck, huck, or monobolt types), welding, bolts and weld-butts or an adhesive foam or tape designed to last the designed life of the vehicle. Details showing method of attachment MUST be included with bid submittal and meet with the approval of the Procuring Agency prior to production. Panels shall be lapped unless continuously welded, and the upper or forward panel(s) shall form a watershed by being lapped over the following panel so that the sealing of the panels is not dependent on caulking alone. All metal-to-metal exterior joints and seams shall be protected by the combined application of zinc chromate and insulating compound. FRP and FRP-to-metal joints and seams shall be sealed with butyl rubber tape per the tape manufacturer's instructions. Extended steel or aluminum door frames (if applicable) shall be completely covered by the steel, aluminum, or fiberglass roof shell, and shall be integrated in such a manner so as to maintain the roof and body sidewall aerodynamic design. Lower skirt panels are to be adequately fastened, braced and reinforced to limit movement and prevent damage from ice and snow build-up.

3.2.5.5. If a steel roll cage is used then all welds used in the manufacture of the cage must be made by either a certified or factory-trained welder and comply with AWS specifications. Prior to production, the Vendor shall provide the Procuring Agency with a list of the designated welders by work station and their certification and/or training, along with quality assurance procedures to be used to monitor the welding process including periodic testing of all welds. Welding procedures and testing shall be subject to the Procuring Agency's review and approval. All body panel assemblies shall be attached to either the roll cage or the structure of the vehicle in a manner so as to form a unitized body assembly.

3.2.5.6. Body shall be thoroughly water tested and made tight to prevent leakage. The tests shall be conducted with all HVAC blower motors turned off. The roof, windows, windshields, and all doors of all Vehicles shall be water tested for a minimum of 20 continuous minutes in order that leaks may be detected and corrected. The water test should replicate a sustained driving rain. Water spray nozzles shall be located to provide an overlapping pattern to effectively test the full length of the roof, sides, and front and back of the Vehicle at a flow rate of 2.5 gallons per minute per nozzle. Written documentation outlining water test procedures and results shall be provided with bid submittal

3.2.6. Finish and Color

3.2.6.1. All exterior surfaces shall be smooth and free of visible fasteners, wrinkles, and dents, to the extent practicable. Exterior surfaces to be painted shall be properly cleaned and primed, as appropriate for the paint used, prior to application of paint to assure a proper bond between the basic surface and successive coats of original paint for the service life of the vehicle. Paint shall be applied smoothly and evenly with the finished surface free of

imperfections. All exterior finished surfaces shall be impervious to fuel, road chemicals, and commercial cleaning agents. Finished surfaces shall not be damaged by controlled applications of commonly used graffiti removing chemicals.

3.2.6.2. The exterior paint or gel-coat color shall be the brightest possible OEM white and be subject to the approval of the Procuring Agency prior to production.

3.2.6.3. The finish paint shall be the highest quality and durability automotive/transit vehicle grade paint available. Primer for metallic surfaces shall be rust resistant zinc chromate type (U.S-Federal Spec. TT-P-645, or equal), or equivalent recommended by the paint manufacturer. Primer for non-metallic surfaces (plastics, fiberglass reinforced plastic, wood, etc.), shall be specifically recommended by the paint manufacturer for the base material and must be compatible with the finish paint.

3.2.6.4. Surfaces to be painted shall be properly sanded, thoroughly cleaned, prepared, primed, and painted per paint manufacturer's direction including drying time. Finish quality shall be OEM heavy-duty commercial grade or better, free of grinding and sanding marks, dirt, pits, blows, runs, orange peel, dullness, and other imperfections. Primed and painted surfaces shall resist peeling per standard industry adhesion strength requirements. Any vehicle exhibiting poor paint adhesion shall be subject to refinishing or rejection.

3.2.7. Rain Gutters

3.2.7.1. Roof gutters shall be installed over the windows and doors unless the Contractor has another design that is more effective. Gutters shall be so designed to prevent water flowing from the roof onto the side windows, doors, and exterior mirrors. Intermediate drain holes or open ends of the gutters shall be positioned so that water will not drain onto windows or doors. Regardless of the design, when the vehicle is decelerated the gutters shall not drain onto the windshield, driver’s windows, or doors. The cross-sectional area of the gutters shall be amply sized to meet these requirements. Design and layout of roof gutters or alternative design shall be provided with bid submittal and approved by the Procuring Agency prior to production.

3.2.8. Towing

3.2.8.1. Towing devices shall be provided at rear of the vehicle that are adequate in design and construction to permit, in emergency situations, towing of the bus without distortion or failure. Alterations to the chassis shall not preclude the towing of the vehicle from the front of the vehicle in accordance with OEM Service Manual. Each towing device shall withstand tension loads up to 1-1/2 times the curb weight (CW) of the vehicle within 20° of the longitudinal axis of the vehicle. Each towing device shall accommodate a standard light commercial vehicle tow hook.

3.2.9. Rubrails

3.2.9.1. Heavy-duty transit type rubrail(s) composed of durable, flexible, resilient elastomeric material, a minimum of an inch and a quarter in width, shall be provided at the proper height, to protect both sides of the vehicle body from damage caused by minor sideswipe accidents with automobiles and other vehicles, and stationary objects. Rubrails must be

mounted to a structural hard point on the bus body, and shall be fastened with both adhesive and mechanical corrosion resistant fasteners. As an alternative, an extruded aluminum section with an elastomeric rubrail insert may be provided; an all aluminum rubrail is also acceptable provided that mounting of either design will not result in paint damage or contribute to corrosion.

3.2.10. Running Board

3.2.10.1. A running board made of either stainless steel or aluminum with anti-slip/high grip/self draining (raised diamond star pattern or perforations) shall be installed below the driver's door to aid the driver in entering and exiting from the vehicle. The running board shall be able to support the weight of a 95 percentile male. The design and installation of the running board shall be approved by the Procuring Agency prior to production.

3.2.11. Wheelhousings and Clearance

3.2.11.1. Wheelhousings shall be of sturdy heavy-duty construction, and fabricated from heavy gauge galvanized steel, stainless steel, or aluminum. Wheelhousings shall be an integrated continuously welded unit, and shall be continuously welded to the reinforced body/floor pan assembly. Sufficient clearance and air circulation, with vehicle at GVWR, shall be provided around the tires, wheels and brakes to preclude overheating when the vehicle is operating in normal paratransit operations. Adequate clearance shall be provided to enable easy removal or mounting of wheels with inflated tires.

3.2.11.2. The exterior of the wheelhouse openings shall have a heavy duty elastomeric or composition rubber fender splash guards or an approved FRP panel to preclude road splash on the side of the vehicles. The vehicle shall be equipped with heavy-duty commercial grade mud flaps at all wheel locations to also minimize side spray in wet conditions, and direct spray off exterior panels and structures to the rear of the wheels. Mud flaps shall be properly secured with large washers. Front mud flaps can be omitted if the Vendor can prove with bid submittal that other provisions provide the same or better road splash protection.

3.2.11.3. Interference between the tires and any portion of the wheelhousings or the vehicle shall not be possible in maneuvers with weights from curb weight to GVWR.

3.2.12. License Plates

3.2.12.1. Provisions shall be made to mount standard size U.S. license plates on the front and rear of the vehicle.

3.2.13. Jacking and Hoisting

3.2.13.1. It shall be possible to jack up the vehicle, at curb weight (CW), with a common floor jack when a tire is completely flat and the vehicle is on a level, hard surface without crawling under any portion of the vehicle and without relocating the vehicle. The vehicle shall withstand such jacking without permanent deformation or damage. The vehicle axles and jacking plates shall accommodate the lifting pads of conventional commercial hoist systems.

3.2.14. Fire Protection

3.2.14.1. The engine compartment cowl/firewall shall preclude or retard propagation of an engine compartment fire into the passenger compartment. The only openings allowed in the firewall shall be the standard OEM openings. Wiring may pass through the firewall only if connectors or other means are provided to prevent or retard fire propagation through the firewall. Conduit and bulkhead connectors shall be sealed with fireproof material at the firewall.

3.3. INTERIOR

3.3.1. Headroom

3.3.1.1. Headroom above the aisle and at the centerline of the left side aisle seats shall have a clear floor-to-ceiling headliner minimum distance of 72 inches. Headroom may be reduced at the rear air conditioning unit, if applicable, to no less than 67 inches within 18 inches of the rear wall. If the headroom is reduced, the air conditioning unit must be padded to protect the passengers and an ADA compliant sign and warning markers installed to alert passengers to the reduction in headroom.

3.3.2. Inner Ceiling Headliner

3.3.2.1. The inner ceiling headliner shall be durable, vandal resistant and easy to clean. The headliner panel may be constructed from steel, aluminum, fiberglass, vinyl or hard plastic and shall be white or light gray in color. If not bonded to the ceiling, the headliner shall be insulated with non-conductive tape or strip material from direct contact with the metal roof bows to prevent condensation of moisture and sweating on the underside of the headliner. The headliner shall be designed, fabricated and fastened in a manner so as to prevent or minimize vibration, flexing or drumming.

3.3.3. Floor and Floor Covering

3.3.3.1. The floor structure shall be reinforced structural steel frame and covered with a plywood sub-floor. The floor from the top step riser shall be a continuous flat plane throughout the interior with no interior wheel housings. The floor shall be butted to within 1/8-inch of the adjoining sidewall and/or structures and cover panels.

3.3.3.2. The sub-floor as assembled, including the sealer, attachments, and covering, shall be waterproof, non-hygroscopic, resistant to wet and dry rot, resistant to mold growth, and impervious to insects.

The sub-floor shall be 3/4-inch minimum, 7-ply, APA standard grade A-C plywood, installed with the A side up, and securely fastened to the steel floor structure assembly with flush type fasteners placed no more than 12 inches apart, to prevent chafing or horizontal

movement. Alternative sub-floor material may be allowed if justification can be made with bid submittal that the alternative meets or exceeds 3/4-inch minimum, 7-ply, APA standard grade A-C plywood. All floor fasteners shall be serviceable from one side only and shall meet the requirements of Sections 4.1.13. and 4.1.14. Tapping plates used for the floor fasteners shall be no less than the same thickness as a standard nut, and all floor fasteners shall be secured and protected from corrosion for the service life of the vehicle. Edges shall be properly sealed against moisture. All seams and surface irregularities shall be filled and the sub-floor shall be sanded smooth, cleaned and prepared immediately prior to installation of the floor covering. Sheet metal screws used to retain the floor shall be countersunk below material surface and shall protrude through the supporting metal structure a minimum of one-quarter inch.

OPTION I: The sub-floor shall be ¾-inch minimum marine grade A-C plywood. All options shall be priced separately in the bid.

3.3.3.3. The floor shall be finished with a high-quality commercial transit grade rubber, elastomeric or plastic type covering, laid with compatible petroleum-based adhesive and edge sealants with no seams in any traffic area. The floor area in the area of the driver's feet shall be covered in the black matting supplied by the chassis OEM. The area beneath the seats and the step risers shall be covered with 1/8 inch thick minimum, commercial grade smooth covering incorporating anti-skid surface properties. Step treads, entrance way and aisle shall be covered with 3/16 inch thick commercial transit grade non-skid, ribbed or embossed, covering. Floor covering shall be continued up the sidewalls approximately 6 inches to prevent debris accumulation and for ease of cleaning, and neatly jointed to sidewall panel covering with a durable trim strip. Color of the floor covering shall be black or in contrast to the seat colors.

OPTION J: Entire floor surface including threshold, aisle and steps shall be covered with 2.2 mm smooth black PVC material incorporating anti-skid surface properties. All options shall be priced separately in the bid.

OPTION K: Floor covering and steps shall be gray or another color other than black to be determined by the Procuring Agency prior to production. Two option prices shall be provided: one for color change to standard flooring and one for 2.2 mm smooth PVC flooring. All options shall be priced separately in the bid.

3.3.3.4. Joints and seams shall be butt type with gaps of 1/16 inches or less and shall be sealed. Covering joints shall be neatly metered. Floor covering shall be rolled to eliminate bubbles or loose areas.

3.3.3.5. A white standee line shall be provided using the same color as the step edge nosing.

3.3.4. Steps and Stepwell

3.3.4.1. The passenger door stepwell shall be of heavy-duty construction with two or three interior steps. No interior step shall be located behind the driver. The stepwell shall be of modular design, one piece fabricated stainless steel or galvanized steel to resist corrosion with a powder coated finish or corrosion resistant primer and high quality paint. The assembly shall be faired smoothly into the surrounding body floor and structure, and continuously

welded all around. Stepwell shall be weather tight and draft-free when passenger door is in the closed position. The stepwell shall be designed with coved or square corners, and shall be adequately reinforced to prevent noticeable deflection when either step is loaded over the center half with a 300-pound static load. Design of the passenger door stepwell including all steps leading to the floor and related dimensions shall be provided with bid submittal and approved by the Procuring Agency prior to production.

3.3.4.2. Steps and thresholds shall be covered with 3/16 inch thick commercial transit grade non-skid, ribbed covering identical in composition, appearance, and coloring as the interior floor covering. All step edges shall be covered with bright white molded-in step edge nosing over the full width of the step, with minimum or no taper into the butting riser covering. If screws are used for additional holding strength they shall be dome-head type stainless steel and counter sunk below material surface.

See Option J above for 2.2 mm PVC material incorporating anti-skid surface properties.

3.3.4.3. Stepwell and step dimensions, including floor covering shall be:

(a) Clear step tread width: 28 inches minimum.

(b) Step tread depth: 9-1/4 inches minimum

(c) Uniform riser height: 9 inches maximum.

(d) Ground to first step: 12 inches maximum.

(e) Projection: 1-1/2 inch maximum beyond body (as long as projection is not the widest bus dimension).

3.3.4.4. A thermostatically controlled electric grid stepwell system heater shall be provided to eliminate ice and snow build-up. The design of the stepwell heater shall be reviewed and approved by the Procuring Agency prior to production.

3.3.5. Modesty Panels, Stanchions, Handrails and Grabrails

3.3.5.1. Interior handrails and stanchions shall meet all applicable ADA and FMVSS requirements. Passenger assist grabrails and stanchions shall be constructed of seamless stainless steel or stainless steel clad tubing and designed to last the design life of the vehicle. The right and left side handrails at the entry shall be safety powder coated yellow in color but not padded. Design and location of all handrails and stanchions shall require review and approval by the Procuring Agency prior to production.

3.3.5.2. Grabrails within 48 inches of floor shall be padded with integrally molded black or gray vinyl padding. The padding shall be of an adequate design to minimize an injury to a passenger striking a stanchion in a crash condition, and to withstand normal usage as a handhold. Non-padded handrails shall have a cross-sectional diameter between 1-1/4 inches and 1-½ inches, padded handrails shall have a cross-sectional diameter between 1-½ inches and 2-1/16 inches, or shall provide an equivalent grasping surface, and have eased edges

with corner radii of not less than 1/8 inch. Handrails shall be placed to provide a minimum 1-1/2 inches knuckle clearance from the nearest adjacent surface.

3.3.5.3. Modesty panels are required at three locations: behind the driver and on each side of the wheelchair/mobility aid lift. The modesty panel located at the rear of the driver's station shall be in two sections: a solid panel matching the other modesty panels shall be provided below the horizontal cross rail; a rigid tinted Plexiglass or plastic barrier shield of at least 1/4-inch thickness shall be provided above the cross rail. Modesty panels and mountings shall withstand normal kicking, pushing, and pulling loads of 250 pound passengers without permanent visible deformation. Panels shall be attached so that there are no exposed edges or rough surfaces. Where modesty panels are provided, they shall be padded on the side facing the passengers and covered with vinyl that coordinates with the interior color of the vehicle. Design and location of all modesty panels shall require review and approval by the Procuring Agency prior to production.

3.3.5.4. An exterior grab handle/rail shall be provided at the driver’s door to assist the driver gain access to the driver’s seat.

3.3.5.5. Two overhead handrails, one on each side of the aisle, shall be provided which shall be continuous except for a gap at the doorway for wheelchair lift.

3.3.5.6. **OPTION L**: The vehicle shall be equipped with a storage device for walkers, crutches, oxygen tanks, canes or braces. The preferred area is at the rear of the vehicle. The storage device could be incorporated as part of existing stanchions or modesty panels. Design and suggested locations of this storage area shall be provided with bid submittal and approved by the Procuring Agency prior to production. The Vendor shall also indicate with bid submittal if seating layout will change as a result of this option. All options shall be priced separately in the bid.

3.3.5.7. Design and location of modesty panels, stanchions, handrails and grabrails shall be included with bid submittal and approved by the Procuring Agency prior to production

3.3.6. Passenger Doors

3.3.6.1. General

3.3.6.1.1. Documentation showing all doors, installations, seals, insulation seals, insulation and door components shall be provided with bid submittal and approved by the Procuring Agency prior to production.

3.3.6.1.2. All non-OEM door hinges and pivot points added by the Vendor shall be maintenance-free, or shall have bushings or bearings which are permanently lubricated or equipped with zerk type fittings for lubrication. If pins are provided at the door, the pins must be supported in metallic or self lubricating glass filled nylon bearing material. Lubrication requirements for all doors shall be clearly stated in the Preventive Maintenance manual. The door design shall provide for adjustments to allow proper alignment.

3.3.6.2. Front Entrance Door

3.3.6.2.1. The vehicle shall be equipped with an electrical power operated front entrance door located on the curb (right) side. The door shall be a two-leaf, swing-out type equipped with a power assist mechanism controlled by the driver. The door shall be a two-section outward folding type equipped with positioning adjustment. Positive stops to limit door travel in the open position shall also be provided. The electrically powered door system including the electric motor shall be heavy-duty and meet commercial duty cycles tested to 1 million maintenance free cycles.

The passenger door shall be operated by the driver's right hand from the driver's position by a two-position switch. Door control shall be within arms reach of a 50th-percentile female driver. The door control switch shall require the driver to hold the switch in either the open or closed position to activate the door. Releasing the switch while the door is in motion shall immediately cause door movement to cease. When fully open or fully closed, power to the door motor shall be cut regardless of the switch position. Micro switches used to control door movement and other door functions shall be heavy-duty and limited to only two.

The entry doors shall be rigid over their full height with heavy-duty, rugged, and durable hinging and attachment to the supporting structure. The door design shall provide for adjustments to allow proper alignment.

The structure of the doors, their mounting, inside and outside trim, and any exposed mechanisms shall be of durable, corrosion-resistant material which is rigidly reinforced.

The exterior forward-facing lower portion of the entry door body protrusion area shall be protected from paint and body damage caused by road debris and curbs by a 14 gauge sheet of stainless steel material. The size and location of the material shall be included with bid submittal and approved by the Procuring Agency prior to production. If the door is equipped with an interlock feature where the transmission must be placed in the park position before the door will function, a decal clearly visible to the driver shall be affixed to the dash board which advises of the procedures needed to operate the door.

3.3.6.2.2. Meeting edges of doors shall be equipped with 2-inch wide extruded elastomeric edge seals, on each door section, that overlap to form a tight seal. Upper and lower edges of doors shall be tightly sealed against entrance of air drafts and water, including spray from commercial vehicle washing equipment and during all times the vehicle is in service up to maximum speed. All materials used for weather sealing shall be designed to withstand varying temperature extremes, road splash and roadway salt, and other exterior elements without cracking, leaking, loosening or deteriorating.

3.3.6.2.3. The passenger entrance doors shall be equipped with upper and lower glazing, or single piece glazing, of adequate size and so placed to provide the driver with maximized right side vision, and to allow the driver to see and judge the curb location when stopping. Details of door glazing shall be provided with bid submittal and glazing shall conform to all FMVSS.

3.3.6.2.4. The passenger entrance door shall have a clear opening height of at least 76 inches minimum, measured from the lower step surface to the header. The clear opening width of the door shall be 27.5 inches minimum. Passenger assist grab rails shall not protrude into this opening. The opening shall be structurally reinforced for strength and rigidity.

3.3.6.2.5. Extended door frames shall be powder coated stainless steel, completely covered by the roof shell assembly, and shall be integrated in such a manner so as to maintain the roof and body aerodynamic design. As an alternative, exposed sections of door frame assembly can be encased in bright white Fiberglass Reinforced Plastic (FRP) panels in lieu of powder coating. A cushioned door header pad shall be provided on the inside, over the entrance door and covered with upholstery material that matches the interior color scheme.

3.3.6.2.6. The passenger door shall be operated by the driver's right hand from the driver's position by a two-position switch. Door control shall be within arm's reach of a 50th-percentile female driver. The door control switch shall require the driver to hold the switch in either the open or closed position to activate the door. Releasing the switch while the door is in motion shall immediately cause door movement to cease. When fully open or fully closed, power to the door motor shall be cut regardless of the switch position. Micro switches used to control door movement and other door functions shall be heavy-duty and limited to only two. The electrically powered door system including the electric door motor shall be heavy-duty and meet commercial duty cycles tested to 1 million maintenance free cycles.

3.3.6.2.7. The passenger door shall be equipped with an exterior key lock mounted at a convenient location located adjacent to the door. Location of key lock shall be approved by Procuring Agency prior to production.

3.3.6.2.8. **OPTION M:** Intentionally left blank

3.3.6.3. Emergency Door

3.3.6.3.1. The vehicle shall be equipped with a rear outward-opening door, equipped with an emergency quick-release system. Access to the rear door from the interior shall be provided between the rear seats and shall not be obstructed either by seats or by any other interior hardware.

3.3.6.3.2. The door shall be easily operated from both outside and inside the vehicle. The interior red-colored quick release handle shall be non-recessed, highly visible, and designed to prevent rattling. The emergency door shall be equipped with gas spring prop(s) or commercial retractable door spring assembly to assist in opening the door when the latch is released and to retain the doors in the full open position against the wind or when vehicle is standing on sloped surfaces. Appropriate operating instructions for the emergency use of the rear door shall be clearly written and placed in two highly visible locations inside the vehicle. One shall be at the door, the other at the right-hand dashboard area. Additionally, the door shall be permanently marked "EMERGENCY DOOR" on the inside with red letters not less than two inches high, and shall be duplicated on the exterior in red letters. Red "EXIT" sign shall be provided on the interior at each emergency exit window and at the rear emergency exit door. Lettering

shall be minimum 1-1/2 inches high. Details of the handle design, mechanism(s) used to assist in door opening, and emergency signage and location shall be included with bid submittal and approved by the Procuring Agency prior to production.

3.3.6.3.3. The emergency door shall be equipped with a warning buzzer and indicator light for door-ajar condition. The audible and visual indicators shall sound when the door is opened. The security lock on the interior side of emergency door shall be electronically connected to the ignition switch. If the vehicle is started and the door is locked, audible and visual alarm shall warn the driver the door is locked. The audible and visual alarm for the locked door may be the same indicators used for the door-ajar condition. No key lock shall be provided on the emergency door.

3.3.6.3.4. All materials used for weather sealing shall be designed to withstand varying temperature extremes, road splash and roadway salt, and other exterior elements without cracking, leaking, loosening or deteriorating. The emergency door shall be equipped with large, non-opening glazing (tinted) affixed to the upper and lower sections of the door, to provide clear visibility of the area behind the vehicle.

3.3.6.3.5. The emergency door, its mounting, inside and outside trim, and any exposed mechanisms shall be of corrosion resistant construction, and shall be heavy duty and rigid over its full height with heavy-duty, rugged, durable stainless steel piano type hinge or equivalent and attachment to the supporting structure. The meeting edges of the door shall be equipped with durable extruded elastomeric edge seals to form a tight seal with no gaps.

The entire structure shall meet all ADA requirements and warranted against rust and corrosion for seven (7) years.

3.3.6.3.6. The emergency door shall be equipped with glazing of maximum size at the lower and upper portions of the door to provide maximum visibility to the rear. Glazing shall conform to all FMVSS requirements. Size and placement of the emergency door glazing shall be included with bid submittal and approved by the Procuring Agency prior to production.

3.3.6.3.7. Extended door frames shall be powder coated stainless steel. As an alternative, exposed sections of door frame assembly can be encased in bright white Fiberglass Reinforced Plastic (FRP) panels in lieu of powder coating. A cushioned door header pad shall be provided on the inside, over the emergency door and covered with upholstery material that matches the interior color scheme

3.3.6.3.8. **OPTION N**: The vehicle shall be equipped with an emergency rear window in place of a rear outward-opening door. Access to the rear window from the interior shall be provided above the rear seats and shall not be obstructed either by seats or by any other interior hardware. The emergency window shall be equipped with glazing of adequate size to provide maximum visibility to the rear, and tinted to match that of the passenger side windows. Glazing shall conform to all FMVSS. Size and placement of the emergency window and its glazing shall be included with bid submittal and approved by the Procuring Agency prior to production.

Note: Seating layout will change as a result of Option N above, which replaces the rear emergency door with an emergency window. Seating layouts based on Option N shall also be included in Sections 1.5.1.1.1. All options shall be priced separately in the bid.

3.3.6.3.8.1. The emergency window shall be pushout type to meet FMVSS 217, and shall be one-piece, rugged sash design. Appropriate operating instructions for the emergency use of the window shall be clearly written and placed in a highly visible location inside the vehicle. Additionally, the window shall be permanently marked "EMERGENCY WINDOW" or "EMERGENCY EXIT" on the inside with red letters not less than two inches high, and shall be duplicated on the exterior in red letters. Red "EXIT" sign shall be provided on the interior at each emergency exit window. Lettering shall be minimum 1-1/2 inches high. Sign details and location shall be included with bid submittal and approved by the Procuring Agency prior to production.

3.3.6.3.8.2. The emergency window shall be equipped with a warning buzzer and indicator light for window-ajar condition. The audible and visual indicators shall sound when the window is opened.

3.3.6.3.8.3. All materials used for weather sealing shall be designed to withstand varying temperature extremes, road splash and roadway salt, and other exterior elements without cracking, leaking, loosening or deteriorating.

3.3.6.4. Wheelchair/Mobility Aid Lift Door

3.3.6.4.1. The lift system shall be located on the curb side of the vehicle, behind the front entrance door and forward of the rear wheels. Wheelchair/mobility aid access shall be through double swing-out type side doors with a handle on each door. The lift doors shall have exterior door handles with an automotive type door lock, approved by IDOT prior to production, with all lift door locks on all vehicles procured keyed the same. Upper and lower edges, and sides of doors shall be tightly sealed against entrance of air drafts and water, including spray from commercial vehicle washing equipment. All materials used for weather sealing shall be designed to withstand varying temperature extremes, road splash and roadway salt, and other exterior elements without cracking, leaking, loosening or deteriorating.

3.3.6.4.2. Wheelchair/mobility aid lift access doors shall be equipped with glazing of adequate size, of the same height as the passenger side windows (or as far as is practicable), and tinted to match that of the passenger side windows. Glazing shall conform to all FMVSS requirements.

3.3.6.4.3. The wheelchair/mobility aid lift access doorway shall have a clear opening height of at least 68 inches and width of 40 inches, minimum, measured when the lift platform is in the fully raised usable position, to the door header. The wheelchair/mobility aid lift access doorway shall also have a minimum of one inch clearance on each side of the lift between the lift and the clear opening of the doorway to allow adequate lift clearance. The minimum one inch clearance on each side of lift shall be maintained throughout the entire range of lift operation.

No protrusions of any kind shall be permitted in the minimum specified clear opening, including door hardware, lift controls or passenger assists. The opening shall be structurally reinforced for strength and rigidity.

3.3.6.4.4. Wheelchair/mobility aid access doors, their mounting, inside and outside trim, and any exposed mechanisms shall be of corrosion resistant construction, mounted on heavy-duty, rugged, and durable stainless steel hinging and attachment to the supporting structure. Doors shall open and close without binding, sagging or flexing. If applicable, the door design shall provide adjustments to allow proper alignment.

The entire structure of the door shall be warranted against rust and corrosion for a period of seven (7) years.

Lift doors shall be equipped with over center gas spring props or commercial retractable door spring assembly to retain the doors in the full open position when the lift is deployed, against the wind or when vehicle is standing on sloped surfaces. The hold-open device shall be attached and remain captive with the door. The Vendor shall provide detail on design of the door and the hold-open device with bid submittal and approved by the Procuring Agency prior to production.

3.3.6.4.5. Extended door frames shall be powder coated stainless steel completely covered by the roof shell assembly, and shall be integrated in such a manner so as to maintain the roof's (and body) aerodynamic design. As an alternative, exposed sections of door frame assembly can be encased in bright white Fiberglass Reinforced Plastic (FRP) panels in lieu of powder coating. A cushioned door header pad shall be provided on the inside, over the lift system entrance doors and covered with upholstery material that matches the interior color scheme.

3.3.7. Windows

3.3.7.1. Side windows, with the exception of filler windows, shall be equipped with split upper transom slider type opening windows consisting of only one sliding section per window. The slider section shall be no less than 6 inches high and 6 inches wide. The side window area shall be as large as practicable to provide passengers with an unobstructed exterior view. Window sash shall be constructed of anodized or powder coated aluminum with black color finish. Windows shall incorporate durable plastic or nylon (or other similar material) tracks that will not permit metal-to-metal or glass-to-metal contact. School bus type windows are not acceptable for this application. The windows or sash shall not rattle when in either the open or closed position.

3.3.7.2. The windows shall be securely mounted to the main structural framing of the body. The window opening shall meet the applicable provisions of FMVSS 217. The side windows shall be easily replaceable and shall be sized so that they are interchangeable to the maximum extent possible.

3.3.7.3. The vehicle shall be equipped with emergency side windows in accordance with the requirements of FMVSS 217. The windows shall have full emergency push-out capabilities, be equipped with quick release latches and warning buzzer per FMVSS 217, and designed to allow quick resetting by the vehicle operator. Access to emergency push-

out windows shall not be restricted by seat backs or any other interior item. The warning buzzer and related parts shall be heavy duty and activated by magnetic switches mounted at the sides of the windows with no moving parts; bullet type switches are not allowed. Emergency push-out instructions shall be clearly marked on a decal affixed to each emergency window within the viewing plane of seated passengers including wheelchair/mobility aid passengers to indicate proper use and operation. Red "EXIT" sign shall be provided on the interior at each emergency exit window and at the rear emergency exit door. Lettering shall be minimum 1-1/2 inches high. Sign details and location shall be subject to final approval by the Procuring Agency prior to production.

3.3.7.4. Windshield glazing shall be laminated safety glass uniformly tinted a neutral color as provided by the OEM. All other glazing shall meet FMVSS and other applicable codes pertaining to door and window glazing, and shall be uniformly tinted a bronze or dark gray color with 31 percent transmittance.

3.3.7.5. All windows shall be fitted with durable firmly installed weather seals to prevent the entrance of air and water, including spray from commercial vehicle wash equipment and driven rain. All materials used for weather seals shall be designed to withstand varying temperature extremes, road splash, salt and other exterior elements without cracking, leaking, loosening or deteriorating. Edges of all glazing shall be finished to a minimum SAE 04 edging to prevent cutting into rubber seals and channels.

3.3.7.6. Windshield, windows and glazing shall meet all applicable FMVSS requirements. Details of the window design and installation shall be included with bid submittal and approved by the Procuring Agency prior to production.

3.3.8. Insulation

3.3.8.1. The bus body shall be completely insulated to minimize thermal transfer. Any insulation material used between the inner and outer body panels shall be fire-resistant and sealed to minimize entry of moisture and to prevent its retention in sufficient quantities to impair insulation properties. Insulation properties shall be unimpaired by vibration compacting or settling during the life of the vehicle. The insulation material shall be non-toxic, non-hygroscopic and resistant to fungus and breeding of insects. Fiberglass insulation shall be sealed in bags. Any insulation material used inside the engine compartment shall be fire-resistant and shall not absorb or retain oils or water.

3.3.8.2. The combination of inner and outer body panels on the sides, roof, and ends of the vehicle, and any material used between these panels shall provide thermal insulation sufficient to meet the interior temperature requirements of these Technical Specifications. The vehicle body shall be thoroughly sealed so that drafts cannot be felt by the driver or passengers during normal operations with the passenger doors closed.

3.3.8.3. The combination of inner and outer body panels, and any material between them, shall provide sufficient sound insulation to minimize vehicle-generated and outside-source-generated noise transmission into the vehicle cabin. The engine compartment shall be insulated from the passenger compartment with OEM or Vendor insulation package to minimize transmission of noise, heat and fumes.

3.3.8.4. Insulation placed between inner and outer body panels shall be sufficient to provide an overall panel insulating factor of R-6, minimum. Insulation shall be installed without gaps between the body sidewall, upper roof extensions, and inner ceiling headliner.

3.3.9. Interior Trim and Finish

3.3.9.1. The interior shall be simple, modern, and free from superficial design motifs. It shall have no sharp depressions or inaccessible areas and shall be easy to clean and maintain. All interior materials, panels, coverings, treatments and trim shall be flame-retardant in conformance with FMVSS 302, scuff-resistant, and treated to be easily cleaned (graffiti-resistant).

3.3.9.2. All interior panels, coverings, treatments and trim shall be securely fastened to body structure components to prevent loosening, vibrating and drumming. All panels with the exception of roof shall be flush fit for a smooth appearance. All joints shall be covered by an overlap-offset molded into panels, trim strips or moldings. All protruding hazardous surfaces, abrasive and sharp edges and corners, fastenings or other objects that can catch a passenger's clothing or cause injury shall be eliminated.

3.3.9.3. Interior lower side panels below the windows shall be either white or a medium to light gray. Upper trim panels and interior ceiling panel shall be either white or a medium to light gray.

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3.3.9.4. Interior color scheme coordination, treatments, color shades and density, trim and finish are subject to the approval of the Procuring Agency prior to production.

3.3.9.5. All roof panels shall be securely fastened with screws or with screws and suitable bonding material as long as access to wiring and other items located inside the roof area is not restricted. In cases where ceiling sections are bonded to the roof, the bonding shall be vacuum pressed or equivalent method in such a way to prevent delimitation. All interior access panels to the roof shall be securely fastened with screws to facilitate removal and replacement.

3.3.9.6 An interior storage compartment with positive latching mechanism shall be provided above and forward of the windshield extending as deep and wide as possible for maximum storage capacity. Access to the compartment shall be provided through an access door. The door shall be held open by a suitable hold-open device. The interior of the compartment shall have a finished appearance with no rough surfaces or protrusions. The Vendor shall provide details regarding the design of the interior storage compartment, its location, interior finish, access door, and the hold-open device with bid submittal and approved by the Procuring Agency prior to production.

3.3.10. Seats and Seating

3.3.10.1. General

3.3.10.1.1. The vehicle shall be designed to accept basic seating configurations with defined capacity and comfort.

3.3.10.1.2. All passenger seats must be equipped with certified seat belts with heavy-duty seat belt retractors hidden under the seat for all seated positions per Section 3.3.10.5. Wheelchair/mobility Aid positions shall be equipped with a tie-down securement system(s), per Section 3.3.10.6. The double seat located directly behind the wheelchair/mobility Aid lift shall be equipped with anchors to secure up to two removable child seats in accordance with FMVSS 225.

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3.3.10.1.3. All transverse mounted forward facing seats shall be arranged to provide passenger hip-to-knee room clearance of 27 inches, minimum. Care shall be taken in locating seating positions within the vehicle to ensure passenger leg and foot room is optimized in the area of the wheelhousings.

3.3.10.1.4. Forward facing, single and/or two passenger, foldaway seats shall be provided at the wheelchair mobility aid positions. These seats shall pivot 90° so as to fold vertically flat against the wall. During any of the folding motions these seats shall not come into contact with any mounting brackets or other hardware that may cause the seats to rip, tear or become discolored. Seat assembly when in the stored position shall extend a maximum of 12 inches from the wall measured at the floor. The seats, when in stored position shall not, to the maximum extent practicable, obstruct an emergency egress window.

Each seating position shall have cushions that are 17 1/2 inches wide and a minimum 17 inches deep with backs that are 17 to 22 inches high.

3.3.10.1.5. The Vendor shall provide with bid submittal floor plan/seating arrangement drawings that are to scale, and meet the passenger seating requirements of Section 1.5.1.1.1. Drawings, as a minimum, shall show the location and dimensions of all seating positions, driver's position, aisles, doors, stepwell, windows, wheelhousings, modesty panels, stanchions, grabrails, and other passenger assists. In addition, all major body interior dimensions must be shown. Proposed optional seating arrangement shall also be approved by the Procuring Agency prior to production (See Section 1.5.4.2).

3.3.10.2. Arrangement for Vehicle

Seating shall comply with requirements of Section 1.5.1.1.1

3.3.10.3. Driver's Seat

3.3.10.3.1. The driver's seat shall be standard OEM seat with recline feature with heavy-duty commercial grade fabric upholstery, high-back feature and minimum 300 lb. capacity. The seat shall meet the requirements of FMVSS 302, and seat anchorage and lap and shoulder belt system shall meet applicable Federal and State requirements. Access to the driver's seat shall be unobstructed by the modesty panel or stanchion.

3.3.10.3.2. The color of the driver's seat shall be a shade of gray to match, or coordinate and harmonize with, the color of the passenger seats and the interior gray color scheme of

the vehicle. Seat belt color shall be OEM colors to match that of the interior color scheme.

3.3.10.3.3. Description of driver's seat, including make and model, shall be provided with bid submittal.

3.3.10.3.4. **OPTION P:** The vehicle shall be equipped with an aftermarket driver's seat as an upgrade to the OEM seat meeting all basic requirements of Section 3.3.10.3. The seat shall mount to the OEM seat base and use the OEM seat belt, pre-tensioner and air bag system. The seat shall be air suspension type if available requiring no outside supply of air. If the air suspension feature is not available, mechanical suspension type shall be provided to aid in vibration dampening. Regardless of suspension type, other seat features shall include adjustable back recline, an adjustable headrest where permitted, adjustable lumbar support, and adjustable right-hand armrest. Details of the optional driver's seat shall be provided with bid submittal. All options shall be priced separately in the bid.

3.3.10.4. Passenger Seats

3.3.10.4.1. All forward facing fold-away type passenger seats shall be cantilevered requiring no outboard support leg. Hard rubber style arm rests shall be provided on aisle only for all forward facing seats. Cloth or vinyl armrests are not allowed. Foldaway seats for the wheelchair/mobility aid positions shall be "notch-back" with a molded thermoplastic back panel. All seats shall conform to applicable FMVSS requirements. All interior seats shall be level or slightly elevated to prevent passengers from sliding off.

Seats shall conform to the following dimensions:

Width per passenger	17 ½ inches
Height of seat cushion	16-18 inches above floor
Depth of seat	17 inches minimum
Height of seat back	17-22 inches
Hip-to-Knee room	27 inches minimum

3.3.10.4.2. Seat upholstery including seat cushion trim, seat sides, and front of the back cushion shall be heavy-duty transit grade 32 oz. vinyl. Inserts for the seat cushions only shall have sufficient texture (Level 4) to minimize passengers from sliding in their seats, and shall be flat woven material that is moisture repellant, anti-microbe, and anti-bacterial. Seats shall include a thermoplastic back panel molded in such a way (notch-back) as to provide increased hip-to-knee room.

Seat upholstery color shall be a light grey color to harmonize with the interior color scheme of the vehicle, and shall be of sufficient contrast to that of the floor to provide for depth perception by visually impaired passengers. Seat bottoms and backs shall be of matching color and pattern. All seat materials shall meet the requirements of FMVSS

302 regarding flammability. Samples shall be provided with bid submittal and approved by the Procuring Agency prior to production.

OPTION Q: Intentionally left blank.

3.3.10.4.3. Each foldaway seat shall be equipped with a locking device to prevent the seat from inadvertently folding up. The locking device shall be constructed to enable manual release to prevent accidental return during use. The width of the foldaway seat, when in the stored position, shall not exceed 12 inches.

3.3.10.4.4. Integrally molded yellow vinyl or self skinned molded foam padded grab handles shall be provided individually on each seat back or across the top of the back of all forward facing seating positions, except the rearmost position. The grab handles shall have a cross-sectional diameter between 1-1/4 inches and 2-1/2 inches or shall provide an equivalent grasping surface, and have eased edges with corner radii of not less than 1/8 inch. Grab handles shall be placed to provide a minimum 1 1/2 inches knuckle clearance from the nearest adjacent surface.

3.3.10.4.5. All metal surfaces of the seat frame assembly and support(s) shall be chemically-cleaned, iron-phosphated, and electrostatically painted and baked to provide a rugged, long-lasting, rust-resistant surface. All hazardous surfaces shall be padded or protected by high-impact thermoplastic enclosures. All seats shall be mounted on wall and floor tracks, or shall be anchored through the floor with 3/8-inch grade-5, minimum, bolts and nuts with lockwashers, and reinforcement washers or plates, or by a method providing equivalent strength.

3.3.10.4.6. Passenger seats, including seat coverings, cushions, and structure shall essentially meet all applicable Federal and State requirements.

3.3.10.5. Passenger Restraints

3.3.10.5.1. Both the lap belt and, when provided, shoulder belt assemblies shall be so designed incorporating provisions to be easily adjustable, and of sufficient length to accommodate passengers ranging in size from the 5th-percentile female to the 97-½ percentile male, and including persons of a very stocky nature and short and tall stature. Two (2) 24 inch extension belts shall be provided to accommodate passengers requiring additional belt length.

Each seating position shall be individually equipped with Federally certified passenger restraint pelvic (lap) belts, including the foldaway seats, to retain passengers in a secure position during normal operations, and shall be in compliance with FMVSS 208. All lap belts are to be equipped with positive heavy-duty retractors hidden under the seat for all seated positions. All lap belts and retractors shall have a five year warranty. Lap belts shall be black in color. Floor anchored seat belts shall not be used.

3.3.10.5.2. Restraint belt design, material and hardware, up to their point of attachment, shall comply with the requirements of FMVSS 209. Seat belt assembly anchorage shall comply with the requirements of FMVSS 210. Written documentation outlining test procedures and results shall be prepared by a Professional Engineer and/or test

laboratory certifying compliance with the requirements of this section. All documentation shall be provided with bid submittal.

3.3.10.5.3. The Vendor shall provide the part numbers for all replacement seat belts and seat belt extensions including those used for the wheelchair/mobility aid securement system at vehicle delivery.

3.3.10.5.4. The Vendor shall also provide with each vehicle a seatbelt cutter.

3.3.10.6. Wheelchair/Mobility Aid Securement System

3.3.10.6.1. A combination wheelchair/mobility aid/occupant "L" track system compliant with applicable ANSI/RESNA WC-18 standards shall be provided for five (5) wheelchair/mobility aid positions for the standard configuration and four (4) wheelchair/mobility aid positions for the Option A configuration (see Section 1.5.1.1.1). Regardless of the number of wheelchair/mobility aid positions being specified, the vendor is only required to supply two automatic retracting/self-tensioning securement systems complete with combination upper torso (shoulder) and lap belt assembly. Additional sets may be obtained through Option R. IDOT wants to make sure that the option for additional automatic securement systems includes the combination upper torso (shoulder) and lap belt assembly and is modifying the option accordingly. In no case shall manual securement belts be provided. The securement system shall be so designed, configured and installed to provide for accommodation of the broadest possible population and spectrum of wheelchair/mobility aid sizes and designs of varying widths equipped with both, solid tires and large-section pneumatic tires, including the newest design lightweight wheelchairs with cambered wheels, and for electrically propelled wheelchairs. Use of the securement system shall not cause damage to any part of the wheelchair/mobility aid.

OPTION R: The Procuring Agency may elect to equip more than two wheelchair/mobility aid position with automatic tightening securement systems. The securement system shall comply with all applicable requirements of this section and include the combination upper torso (shoulder) and lap belt assembly as described in Section 3.3.10.6.3. The option price shall be based on each additional set.

OPTION S: The Procuring Agency may also elect to select a belt storage system located under flip seats to keep securement belts off the floor when not in use and to eliminate storage bags and boxes. This under seat storage device shall work with L-Track fittings and meet the requirements as specified in Section 3.3.10.6.9. The option price shall be based on each set. Details shall be provided with bid submittal. All options shall be priced separately in the bid.

3.3.10.6.2. The system shall be so designed and configured that the belts used to secure the occupant shall not be required to also secure the wheelchair. The securement system shall secure common wheelchairs and mobility aids and shall be easily attached by a person familiar with the system and mobility aid and having an average dexterity. To assist the person in securing the wheelchair/mobility aid, the securement system shall have a ratcheting feature with tightening knobs to allow a person of average strength to tighten the securement system. When the wheelchair/mobility aid or mobility aid is

secured in accordance with manufacturer's instructions, the securement system shall limit the movement of an occupied wheelchair or mobility aid to no more than 2 inches in any direction under normal vehicle operating conditions. The system shall positively secure the wheelchair/mobility aid with two front, and two rear, adjustable belt type hold-down assemblies. Each hold-down assembly shall be attachable into an “L” track system that is recessed and flush-mounted into the vehicle floor. The tie-down anchorage assemblies shall meet all applicable Federal and State requirements. The rear hold-down belt assembly(s) shall be equipped with a ratcheting device with tightening knobs to tension the belt, after the initial snug-up..

3.3.10.6.3. A combination upper torso (shoulder) and lap belt assembly that attaches directly into the rear wheelchair/mobility aid tie-down belt attachment hardware shall be provided as part of the system for use by wheelchair or mobility aid users. Such seat belts and shoulder harnesses shall not be used in lieu of a device that secures the wheelchair or mobility aid itself. The shoulder belt shall be attached to an upper anchorage point located on the side of the vehicle body at the appropriate height and longitudinal rearward displacement, in relation to the seated wheelchair/mobility aid passenger for maximum effectiveness, and shall be in accordance with all applicable provisions of ADA 49 CFR subpart B, 38.23 paragraph (D)(7) and the securement system manufacturer's specifications and instructions. The securement belts must be easily identified and permanently marked with either stencils or sewn labels as to their location of use as follows: "LAP", "SHOULDER" where necessary. A Velcro tie strap to match the color of the belt shall be provided at each shoulder belt to secure it to the wall when not in use and prevent it from swinging when the vehicle is in motion.

3.3.10.6.4. The wheelchair/mobility aid "L" track shall be manufactured from 6000-series aluminum alloy with corrosion resistance rating of A. The “L” track system shall be securely fastened to the vehicle floor using no less than 5/16” diameter corrosion-resistant, high-strength fasteners and an attachment method that conforms to instructions provided by the securement manufacturer. The tracks used in this system shall be designed with a radius located at the end of each track to facilitate track cleaning. The shoulder belt anchor bracket shall be securely attached to the vehicle body structural members, using additional reinforcements if necessary to prevent pull-out. Documentation and diagram(s) showing design and location of wheelchair/mobility aid "L" track system shall be provided with bid submittal. Both the L track and securement system shall be from the same securement manufacturer.

3.3.10.6.5. The forward and rearward track of the "L" track securement system for the first wheelchair position behind the driver shall be 36 inches in length and that all floor tracks be perpendicular to wall. The clear width between tracks for the first wheelchair/mobility aid position behind the driver shall be 54 inches. The clear width between tracks for each remaining wheelchair/mobility aid position shall be a minimum of 48 inches. To extent possible, no floor tracking shall extend beyond the passenger seat envelop when those seats are in the down position.

3.3.10.6.6. Both the lap belt and shoulder belt assemblies shall be so designed incorporating provisions to be easily adjustable, and of sufficient length to accommodate passengers ranging in size from the 5th-percentile female to the 97 1/2 percentile male, and including persons of a very stocky nature and short and tall stature. Shoulder belts shall

be retractable type, self storing and permanently attached to the wall and/or floor. The securement system shall also accommodate the above passenger population distribution when dressed in bulky winter clothing, with nearly equivalent securement effectiveness as is achievable and practicable. An adjustable height shoulder belt shall be included as part of the belt assembly to meet these requirements. Failure to meet these criteria shall deem the system to be in non-compliance with these specifications, and may be cause for rejection of the system by the Procuring Agency.

3.3.10.6.7. When not being used for securement, or when the securement area can be used by standees, the securement system shall not interfere with passenger movement, shall not present any hazardous condition, shall be reasonably protected from vandalism, and shall be readily accessed when needed for use.

3.3.10.6.8. The wheelchair/mobility aid securement system shall meet the requirements of WC18, SAE J2249, FMVSS, ADA, and any other existing regulations for Wheelchair Tiedowns and Occupant Restraints for Use in Motor Vehicles. Documentation showing compliance with all existing regulations shall be provided with bid submittal. Written documentation outlining test procedures and results shall be prepared by a Professional Engineer and/or test laboratory certifying compliance with the requirements of this section. The wheelchair/mobility aid/passenger securement/restraint system, configuration and installation shall also require approval of the Procuring Agency prior to production.

3.3.10.6.9. A set of clear, concise, user instructions for the operation of the securement system, printed on durable heavy paper material or plastic, shall be furnished with each securement system to remain in the bus. An L-track compatible storage system shall be provided under the foldaway seats to store the two wheelchair/mobility aid securement systems when not being used. Although there are more wheelchair/mobility aid positions, the Vendor is only required to provide two; additional sets will be purchased separately using Option S as needed. Storage bags will not be allowed. The storage unit(s) shall not interfere with, or cause an inconvenience to seated passengers. Storage unit location(s) shall be agreed upon by the Vendor and the Procuring Agency prior to production.

3.3.10.6.10. The wheelchair/mobility aid/passenger securement/restraint system, configuration and installation shall also require approval of the Procuring Agency prior to production.

3.3.11. Interior Lighting

3.3.11.1. Passenger Cabin Area Lighting

3.3.11.1.1. A transit grade LED overhead lighting system shall be provided for illuminating the passenger compartment area to satisfy performance requirements of this section. The system shall produce a uniformly comfortable lighting intensity at the reading level for all seat and wheelchair/mobility aid positions, if the vehicle is so equipped. The system shall provide no less than 12 foot-candles illumination on a square-foot plane at an angle of 45 degrees from horizontal, centered 30 to 33 inches above the floor, and 24 inches in front of the seat back at each seating position. Floor surface illumination in

the aisle areas shall be illuminated to no less than 10 foot-candles with a minimum of 2 foot-candles at the entry and exit.

3.3.11.1.2. Lighting fixtures shall be located to achieve lighting performance as required in section 3.3.11.1.1. Lighting fixtures, on either side, shall not extend forward of the driver's rear barrier. Lighting system fixtures (and lenses) shall be designed and located to minimize side glare into the driver's eyes and casting reflections onto the windshield. Lamp fixtures shall be durable commercial quality units with frosted prismatic lenses. Lamp fixtures and lenses shall be fire-resistant and shall not drip flaming material onto seats or interior trim if burned. The light fixture(s) and lens shall be totally enclosed, sealed and splash-proof. Interior lighting shall be operable through a separate driver-controlled, dash panel-mounted switch only when the engine ignition switch is in the "ON" or "Accessories" position.

3.3.11.1.3. Interior lights shall be electrically grounded to the vehicle through separate grounding wire(s) and shall not rely solely on the fixture itself for grounding.

3.3.11.2. Entrance Stepwell Area Lighting

3.3.11.2.1. The front passenger entrance area as well as the entrance door stepwell area shall be illuminated by transit quality LED lamp(s) with clear prismatic lenses. The lighting intensity of the front stepwell area shall be adequate to light the stepwell and step treads with a minimum of 2 foot-candles of illumination, at all times, measured on the step tread, and illuminate the ground surface and/or curb area for a distance of 3 feet from the bottom step edge outward in all directions. The light(s) shall be hooded, or shielded, to protect driver's and passengers' eyes from glare. The light fixture(s) and lens shall be totally enclosed, sealed and splash-proof, and designed to provide ease of cleaning as well as lens, lamp and housing removal. Light(s) shall be located and mounted in a manner to be protected from damage caused by passengers kicking the lens(s) or fixture(s), and shall not be a tripping hazard to passengers boarding or alighting. The light(s) shall be located and positioned to preclude the light beam from casting a shadow of one step onto another step tread.

The stepwell and curb light(s) shall activate only when the engine ignition switch is in the "ON" position, only when the front entrance door is open. Additionally, a driver-controlled override switch shall be provided to illuminate the stepwell and curb light(s) when the front entrance door is open or closed, and during day or night operations.

3.3.11.3. Driver's Area Lighting

3.3.11.3.1. The driver's area shall have a LED overhead light to provide illumination and it shall illuminate the lower one-half of the steering wheel to a level of 10 foot-candles. This light shall be controlled by a switch convenient to the driver, and operable when the engine ignition switch is in the "ON", "OFF" and "ACCESSORIES" positions.

A driver courtesy light shall be provided to illuminate the driver's entrance area with a low-level light intensity of 1 to 2 foot-candles of illumination, when the driver's door is opened. The driver's courtesy light shall be switched with the entrance door control and be energized at all times.

3.3.11.4. Wheelchair/Mobility Aid Lift Area Lighting

3.3.11.4.1. The wheelchair/mobility aid lift system shall be equipped with LED lights to provide at least 2 foot-candles of illumination measured on the lift, when deployed at the vehicle floor level and within an area of a 4-foot radius outside of the door opening, for the lift system during wheelchair/mobility aid passenger loading and off-loading operations. The lights shall automatically activate when the lift doors are opened and the lift system power master control switch is in the "ON" position. The preferred method for illuminating the lift area is by the use of two flush mounted automotive type lamps mounted near or around the wheelchair/mobility aid lift door. The lighting intensity level shall be sufficient to safely perform wheelchair/mobility aid passenger loading and unloading and comply with ADA standard CFR 38.31 (c). The lights must not be unduly high intensity so as to cause excessive glare or blinding of the operator or wheelchair/mobility aid passenger.

3.3.12. Driver Controls

3.3.12.1. All switches and controls necessary for the operation of the vehicle shall be conveniently located in the driver's area and shall provide for ease of identification and operation. All non-chassis OEM switches and controls (if applicable), added by the Vendor shall be essentially within the hand reach envelope described in SAE Recommended Practice J287, Driver Hand Control Reach, with seat belt fastened.

3.3.12.2. Controls and switches shall be logically organized, and located and mounted in convenient groupings according to function. It is preferred that added switches and controls, warning lights, instruments, etc. (if applicable), be mounted in a separate cluster panel that is mounted to, or adjacent to, the vehicle dash panel and convenient to the driver. All switches and controls shall be marked with permanent, easily read identifiers that shall illuminate when the parking lamps or headlamps are lit.

All non-chassis OEM supplied switches shall be either nickel plated, high quality toggle type switches or durable commercial grade rocker switches which are illuminated in the "ON" position. The panel shall have illuminated legends and markings or legends shall be lit when the parking lamps or headlamps are lit. All switches and controls shall be chassis OEM and/or heavy-duty transit quality components. All panel-mounted switches and controls shall be easily replaceable, and wiring of these switches and controls shall be easily serviceable. If the chassis OEM has a blank for the installation of radio, these blanks should not be utilized for the installation of switches. Switches and controls shall be dust-and water-resistant. Type, quality and location of all switches and controls are subject to approval of the Procuring Agency prior to production.

3.3.12.3. The following controls, in addition to OEM controls, shall be provided:

(a) Passenger door control (if OPTION M, Section 3.3.6.2.8. is selected)
(b) Passenger cabin interior lighting control
(c) Heating, ventilation, and air conditioning system control

3.3.13. Instrumentation

3.3.13.1. The vehicle shall be equipped with a complete set of OEM standard instruments, meters, and gauges, mounted in the driver's dash panel, to report status of engine and ancillary system functions. Illumination of instrumentation shall be simultaneous with exterior lighting functions, with brilliance controlled by the light intensity control (integrated with the exterior lighting control switch), or by a separate variable control switch. The following instrumentation is to be provided as part of the OEM equipment:

(a) Speedometer equipped with odometer
(b) Ammeter or voltmeter
(c) Engine oil pressure gauge
(d) Engine coolant temperature gauge
(e) Fuel tank level gauge

3.3.13.2. Non-OEM digital type instrumentation, or light-bar type instrumentation may be acceptable, but a request for such instrumentation must be submitted with bid and approved prior to award.

3.3.13.3. If the vehicle is supplied with a two battery system, the voltmeter gauge shall be installed and wired in such a manner to indicate the operating voltage across both batteries.

3.3.13.4. The vehicle shall also be equipped with the full complement of OEM warning and indicator lights, including those required by Federal regulations. All gauges shall be backed-up by warning ("tell-tale") indicator lights if chassis OEM standard or available option. For example:

(a) Alternator not charging
(b) Low engine oil pressure
(c) Hot engine coolant temperature
(d) Low fuel level
(e) Engine shutdown system (for diesel engine Option B, Section 2.2.1.1.)

3.3.13.5. The vehicle shall also be equipped with an audible buzzer tone indicating that the key has been left in the ignition switch when engine is not running, and an audible bell tone indicating the parking lights or headlights left have been left on when the driver’s door is opened. The two buzzers shall be distinguishable from one another.

3.3.13.6. **OPTION T -** An engine hour meter shall be provided and installed to record the hours the engine is running. All options shall be priced separately in the bid.

3.3.13.7. The vehicle shall be equipped with OEM cruise control that the driver can set to maintain a specified vehicle speed only if the cruise control feature is offered as standard equipment by the OEM. If the cruise control feature is offered as an OEM option, the cost of that option shall be identified by the Vendor with bid submittal. Also, if the cruise control feature is part of an OEM option package that includes other features that can not be excluded from the package, the additional features and related costs shall be identified by the Vendor.

3.3.13.8. All instrumentation and other wiring located under dash panels shall be properly secured.

3.3.14. Interior Climate Control

3.3.14.1. Performance

3.3.14.1.1. The heating, ventilating and air conditioning (HVAC) system shall be the heaviest duty dash panel mounted units available from the chassis OEM and shall comply with all applicable FMVSS requirements. The HVAC system shall maintain an average passenger compartment temperature between 65° F and 80° F with a relative humidity of 50 percent or less. The system shall maintain these conditions in ambient temperatures of 10° F to 95° F with ambient humidities of 5 to 50 percent, while the vehicle is running in intensive stop and go operations with a full load of passengers. In ambient temperatures of 95° F to 100° F with relative humidities lower than 50 percent, the system shall maintain a temperature gradient of 15° F, while the vehicle is running in intensive stop and go operations with a full load of passengers.

In ambient temperatures of 10° to minus 10° F, the interior temperature shall not fall below 60° F, while the vehicle is running in intensive stop and go operations, with no passengers. The temperatures measured from a height of 6 inches below the ceiling shall be within +/-5° F of the average temperature at the top surface of the seat cushions. Temperatures measured more than 3 inches above the floor shall be within +/-10° F of the average temperature from front to rear of the vehicle, shall not vary more than +/-5° F from the average.

3.3.14.1.2. The heating system shall be capable of meeting the performance requirements of this Specification tested in accordance with the procedures of SAE J638, Test Procedures and Ratings for Hot Water Heaters for Motor Vehicles. A rear fuel-fired auxiliary (coolant) heating system shall be provided with Option D (Diesel Option, Section 2.2.1.1.) with a minimum 17,000 BTU/hr. rating and an in-line heater booster pump, automatically activated by the heater switch to improve heating. Exhaust from the auxiliary heater shall be secured and terminate at the same fashion and location as the chassis exhaust system.

Approximately 60 to 70,000 BTU/hr. shall be provided in total with approximately 20,000 BTU/hr. provided by the front system distributed to direct sufficient heat for defrosting as well as driver comfort. High-capacity rear hot water heater(s), with a combined output of about 45,000 BTU/hr. shall be located at the rear area of the vehicle mounted on the floor or wall; location(s) shall be approved by the Procuring Agency prior to production. The heaters shall distribute heat in at least 180 degree direction with the outlets shielded or the air diffused to prevent blowing of hot air directly onto the passengers' legs. To protect the heater cabinet from corrosion, the cabinet for the heaters shall be mounted on spacers.

3.3.14.1.3. The air conditioning system shall be capable of reducing the passenger compartment temperature from 95° F to 75° F within 30 minutes after engine start-up under the following conditions: Engine speed shall be limited to normal fast idle speed (in the range of 1,000 to 1,500 RPM's), that may be activated by a driver controlled switch or device; the vehicle shall be heat-soaked (parked) in direct sunlight, with the ambient

temperature at 95°F and humidity less than 50 percent, for at least one (1) hour. There shall be no passengers aboard and the door(s) shall be closed. Inlet of outside air may be cut-off during the cool-down period.

The vehicle shall also be equipped with the high-output rear-located air conditioning system in addition to the OEM dash air conditioning system. The system can use the OEM compressor, but shall be separately operable from the driver's seat position, subject to approval by the Procuring Agency prior to production.

It is estimated that the climate control system (both front and rear units in combination) will require a total output capacity of 55,000 BTU/hr., minimum, in the cooling mode.

The air conditioning system shall feature dual compressors driven off the engine. All lines and hoses within the engine compartment must be routed and secured so as not to interfere with access to other engine systems particularly those involved in routine servicing.

3.3.14.1.4. The Vendor shall follow and adhere to the air conditioning system manufacturer's recommended procedures for installation, evacuation and charging/recharging procedures to ensure proper system performance.

3.3.14.2. Air Flow

3.3.14.2.1. Air velocity shall not exceed 100 feet per minute directed on any passenger. The climate control system, operating in the heating/ventilation/defroster and cooling modes, shall deliver sufficient air flow into the driver's area including the area around the driver's feet and legs, to provide a comfortable environment under all specified ambient climatic conditions. The defroster or climate control system shall maintain visibility through the driver's side window and the front entrance door window.

3.3.14.3. Operating Equipment and Design

3.3.14.3.1. Control of HVAC functions shall be through a minimum three-speed blower fan control switch, variable temperature adjustment control, outside-air/recirculation-air diverter selector control, and adjustable dash panel mounted air outlet nozzles. Control of the functions, both the front and rear systems, shall be independent and separately operable and located for ease of operation from the driver's seat position. The function control switch shall have an indicator light to indicate "on" and the heater/ac switches are to be properly labeled. The rear auxiliary heating system shall incorporate an inline shut-off valve installed under the vehicle body in a protected area whose handle is clearly distinguishable with red or yellow colored handle, and a decal denoting valve location and method of operation. Details of the rear auxiliary heating system and shut-off valve shall be approved by the Procuring Agency prior to production. Both the front and rear climate control systems shall shut down automatically when the engine ignition system is turned off.

3.3.14.3.2. Heat rejection of the air conditioning system shall be through an outside street-side skirt-mounted condenser unit. A/C condenser shall be protected from snow and ice build-up with a splash apron. Winter covers shall be provided with each vehicle. The

condenser shall be protected from road debris and other hazards by use of metal shrouds. All exposed A/C lines shall be protected by split loom or other protective covering.

Condenser fans shall be powered by independent heavy-duty sealed and permanently lubricated, permanent magnet ball bearing electric motors. Internally or externally mounted pressure controls and a system sight glass, placed in a readily accessible location, must be provided unless an orifice tube is used as the refrigerant expansion device. The unit assembly must be of heavy-duty transit grade construction utilizing corrosion-resistant metal.

3.3.14.3.3. The heater/ventilator/defroster unit located in the driver's area shall be the highest capacity unit available for this type and size of vehicle and shall operate independently of the passenger area unit.

3.3.14.3.4. All non chassis OEM electrical relays, fuses, circuit breakers, etc. shall be heavy-duty type and located in a weather proof, but easily operable electrical panel or box inside the vehicle for reliability and ease of repair. All refrigeration fittings shall be heavy-duty type, and hose fittings shall be equipped with stainless steel clamps conforming to SAE J2064. "0"-ring type fittings may also be used. All refrigeration and heater supply lines that enter the passenger compartment shall be aluminum, steel, or flexible tubing, enclosed in such a way to harmonize with the interior to prevent injury to passengers in the event of a line failure.

Run-off water from the rear evaporator drain pan must be piped to drain off at the rear underside area of the vehicle. All air conditioning and heater hoses, and electrical wiring that pass within 12 inches of the vehicle's engine exhaust system, shall be shielded in a manner to prevent heat damage to them, and protected from damage from roadway debris, and ice and snow accumulation. Grommets of elastomeric material shall be provided at points where refrigerant and hot water heater lines and hoses penetrate metal or other materials with acute edges. All lines and hoses shall be adequately supported and clipped with clips that are shielded with elastomeric material to prevent abrading, chafing or cutting of lines and hoses. Drain cocks shall be installed in the system at lowest points. All HVAC electrical wiring shall meet the requirements of Section 2.11 of this Specification.

3.3.14.3.5. The Vendor shall supply a design layout drawing(s) showing the configuration of the interior climate control system, and supply specifications and performance data. The Vendor shall provide certification that the climate control system is adequately sized for the vehicle, and can meet the performance requirements of this Specification. Documentation and certification shall be provided with bid submittal. The climate control system design and operation shall also be approved prior to production.

3.3.14.4. Ventilator/Escape Hatch

3.3.14.4.1. The vehicle shall be equipped with one roof mounted heavy-duty transit type combination ventilator and emergency escape hatch, symmetrically located in the vehicle roof. Each vent/escape hatch shall incorporate five-position ventilation and an elastomeric gasket to prevent water and air leaks when in the closed position. Hinging

of the unit in the escape or exit mode shall be toward the front of the vehicle to prevent damage from wind pressure if left unlatched.

3.3.14.5. **OPTION V** - Intentionally left blank

3.3.15. Interior Mirrors

3.3.15.1. A non-glare, day-night feature rear view mirror shall be provided. In addition, an adjustable 8” round convex design “fisheye” or 6” X 9” convex rear view mirror shall be firmly mounted yet pivot above the standard (OEM if applicable) rear view mirror to provide the driver with a full view of the vehicle interior. The mirror shall be sized and positioned to allow drivers access to their seat without hitting their head on the mirror. Mirror size, position shall require the prior approval of the Procuring Agency prior to production.

3.3.16. Driver's Sun Visor

3.3.16.1. An adjustable, (OEM if applicable) sun visor shall be provided for the driver's side of the windshield and side window. The visor shall store out of the way and shall not obstruct air flow from the climate control system or interfere with other equipment and shall not restrict vision of the rearview mirrors. Visor adjustments shall be made easily by hand and, shall maintain their set position, unaffected by vehicle vibrations or when vehicle is operated over rough roadways.

3.3.16.2. The passenger (right) side visor shall be removed and its mounting covered and neatly trimmed-out in a smooth, professional manner.

3.3.17. Driver's Coat Hook

3.3.17.1. A coat hook shall be provided in a convenient location in the driver area. It shall be located so as not to restrict driver's interior or exterior field of view, or field of view through the interior rear view mirrors, when in use.

3.3.18. Windshield Wipers/Washers

3.3.18.1. Windshield wipers and washers shall be OEM standard heavy-duty system for paratransit vehicles of this type and size. Wipers shall be controlled by an adjustable "OFF/INTERVAL/LOW-SPEED/HIGH-SPEED" position switch. Windshield washer system shall evenly deposit washing fluid on the windshield, and when wipers are on, shall wet the entire wiped area. The washer supply reservoir shall be located for ease of filling from outside the vehicle, and shall not be restricted by aftermarket installation if applicable. The reservoir itself shall incorporate a sight gauge or shall be translucent for easy determination of fluid level.

3.3.19. Safety Equipment

3.3.19.1. The vehicle shall be equipped with the following fire, first aid, and emergency equipment;

3.3.19.1.1. 20-unit size first aid kit with mounted bracket.

3.3.19.1.2. Ten pound, UL approved, dry chemical fire extinguisher with a type A-B-C rating, equipped with a visible gauge, and a mounted bracket.

3.3.19.1.3. ICC triangular reflector (disabled vehicle warning device) with mounted bracket which may be stowed in the rear of the vehicle.

3.3.19.1.4. Mini bio-hazard response kit shall be provided to protect the user from contact with potentially infectious material. Mounting bracket shall also be provided.

3.3.19.2. Emergency equipment shall conform to the requirements of FMVSS 125, Warning Devices. Equipment items shall be stored in a location where they do not interfere with, or pose a hazard to passengers. The location and mounting of these equipment items shall require the approval of the Procuring Agency prior to production.

3.3.20. Interior Signs

3.3.20.1. Priority Seating Signs.

3.3.20.1.1. The Vendor shall provide and install sign(s) which indicate that seats in the front of the vehicle are priority seats for persons with disabilities, and that other passengers should make such seats available to those who wish to use them. At least one set of forward-facing seats shall be so designated.

3.3.20.1.2. Each securement location shall have a sign designating it as such. Characters on signs required by this section shall conform to all applicable ADA requirements.

3.3.20.2. Overhead Clearance Sign

3.3.20.2.1. A decal shall be permanently affixed to the dash board or overhead, clearly visible to the driver, which advises of the minimum overall height clearance requirements of the vehicle.

3.3.21. **OPTION W:** Inside Passenger Signal System

3.3.21.1. As an option, a passenger chime system may be installed. The passenger chime system shall consist of yellow tape switches or yellow pull cords installed over the full length of the passenger compartment. The tape switches or cords shall be easily accessible to all passengers, including standees. An activation mechanism shall be provided at each of the wheelchair securement areas that conforms to all applicable ADA requirements. All options shall be priced separately in the bid.

3.3.21.2. The chimes shall only sound one time to stop continuous usage by passengers. A light indicating passenger "Stop Requested" shall remain lit until passenger(s) alights or the driver manually cancels by turning the "Chime" switch off. A "Stop Requested" annunciator light shall also be installed in the dash to alert the driver to the stop requested condition.

All options shall be priced separately in the bid. The option price is based on providing a complete passenger stop requested system with chime accessible to all ambulatory passengers seated or standing , and an activation mechanism provided at five wheelchair securement areas.

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3.3.22. **OPTION X:** Public Address System

3.3.22.1. As an option, a public address system may be installed. The Vendor shall provide and install a public address (P.A.) system as indicated below. All options shall be priced separately in the bid.

3.3.22.2. Amplifier shall be solid state of sufficient power and quality that operator's voice can be easily heard and understood during normal operation of vehicle. Amplifier shall be secured in a protective housing, firmly attached. Location and arrangement shall be approved by the Procuring Agency prior to production.

3.3.22.3. Four speakers of sufficient power and quality shall be flush mounted in the ceiling or elsewhere to provide a good distribution of sound throughout the passenger compartment. Speakers shall be covered by a corrosion resistant bezel and grille. Location and arrangement shall be approved by the Procuring Agency prior to production.

3.3.22.4. A water proof exterior speaker shall be installed either at the right front corner or under the vehicle and facing the right front corner for use with boarding passengers. Speakers shall be covered by a corrosion resistant bezel and grille.

3.3.22.5. Power switch shall be mounted on instrument panel or the power box for the PA system; location shall be approved by the Procuring Agency prior to production. Switch shall be a three position toggle switch to provide operation for interior, exterior and amplifier off. Location shall be approved by the Procuring Agency prior to production.

3.3.22.6. Provide boom microphone and mounting bracket on left window post. Mounting location and arrangement shall be approved by the Procuring Agency prior to production. The microphone gooseneck must be stiff enough to support the microphone in any desired position.

3.3.22.7. The Vendor shall provide necessary noise suppression to prevent interference from alternator, fluorescent lighting and other sources.

All options shall be priced separately in the bid.

3.4. EXTERIOR

3.4.1. Exterior Lighting and Warnings

3.4.1.1. The vehicle shall be fully equipped with a standard exterior lighting system (OEM chassis standard if applicable), and additional exterior lights, in compliance with FMVSS and State requirements, including a rear centered mounted ancillary brake light, rear reflectors, and side reflectors at the rear, intermediate and front positions. Control of clearance or marker lights shall be integrated into the headlight/parking light control switch electrical circuit. Roof mounted clearance and marker lights shall meet applicable regulations and shall be heavy-duty transit type units recessed or armored to prevent damage from overhanging tree and branches.

3.4.1.2. The vehicle shall be equipped with daytime running lights where the headlights and other lights operate automatically when the vehicle is started ONLY if these lights are supplied by the OEM. If the OEM does not offer daytime running lights, then the Vendor shall NOT install them.

3.4.1.3. One (1) side signal lamp shall be installed on each side, either immediately behind entrance door and driver's window or forward of the rear wheel wells at a height above ground that conforms to FMVSS requirements. Location is subject to review and final approval of the Procuring Agency prior to production.

3.4.1.4. The flasher unit for directional light signals and hazard warning flashers shall be replaceable from inside the vehicle as a simple plug-in heavy-duty unit if available in that configuration from the chassis OEM.

An additional set of four-inch warning lights shall be added to the rear body mounted to be most visible to anyone approaching from the rear. The standard OEM front and rear hazard warning flashing lights, including the additional hazard lights added at the rear, shall be activated by either the OEM hazard warning flasher switch, by opening the passenger entrance door, or wheelchair/mobility aid lift access doors when the engine is operating. If the OEM chassis flasher system cannot be integrated with the additional set of warning lights a separate flasher can be added, activated by opening the passenger entrance door or wheelchair/mobility aid lift access doors when the engine is operating. This flasher unit shall be replaceable from inside the vehicle as a simple plug-in heavy-duty unit. Location of the additional set of warning lights and flasher system is subject to review and final approval of the Procuring Agency prior to production.

3.4.1.5. Visible and audible warnings shall be provided to inform following vehicles or pedestrians of reverse operation. Visible reverse operation warning shall conform to SAE Recommended Practice J994-Type C or D. Hazard warning system shall be in compliance with the requirements of FMVSS 108.

3.4.1.6. All exterior lights added by the PVM shall be LED unless otherwise not available.

3.4.1.7. All exterior lighting shall be indexed to ensure proper orientation on vehicle, and sealed to prevent water intrusion.

3.4.1.8. All exterior lighting shall be approved by the Procuring Agency prior to production.

3.4.1.9. A backup warning system shall be installed that automatically activates to warn the drive of an object within at least seven feet behind the vehicle when then vehicle is in reverse gear. Location of the various system components and details regarding operation shall be provided to the Procuring Agency with bid submittal.

3.4.1.10. **OPTION Z:** A backup camera system shall be installed that automatically activates when the vehicle starts and is placed in reverse gear. The system shall include a color LCD monitor with minimum five-inch screen and water-resistant color camera with minimum 120-degree field of view. Location of the various system components and details regarding

operation shall be provided to the Procuring Agency with bid submittal. All options shall be priced separately in the bid.

3.4.2. Exterior Mirrors

3.4.2.1. The vehicle shall be equipped with heavy-duty corrosion-resistant, fully adjustable exterior rear view mirrors meeting the requirements of FMVSS 111. The mirrors shall be at least 5 inches x 9 inches in size. A convex mirror shall either be incorporated into rear view mirror design or a separate convex mirror at least 4 inches in diameter shall be mounted above or below exterior mirrors to help maximize the visibility of the rear and side of the vehicle. The mirrors shall be mounted on breakaway, polished stainless steel or black powder coated steel, mounting brackets or support arms. Mirrors shall be firmly mounted to the brackets or arms to prevent vibration and loss of adjustment, but not so firmly attached to the mount or arm that the vehicle is damaged when the mirror is struck in an accident. The mirrors shall provide an undistorted view to the rear of the vehicle, and mirror mounting brackets shall not obstruct the driver's field of vision. The right side mirror shall be mounted and located so as to prevent contact with boarding and alighting passengers or pedestrians. The right-side mirror shall also be fully visible to the driver through the wiper contact area of the windshield. Notification that non-OEM mirrors and installation will be used shall be included with bid submittal. All exterior mirrors shall be approved by the Procuring Agency prior to production.

The exterior mirrors shall be adjustable from the driver's seat by means of single electric control lever. To minimize frost and ice build up in the winter months, the exterior mirrors shall be electrically heated. The heater element shall be controlled by a switch easily accessible to the driver located either on the dash, overhead console or driver’s door; location shall be approved by the Procuring Agency prior to production.

3.4.3. Exterior Decals

3.4.3.1. All exterior decals shall be black or white, depending upon location, elastomeric, pigmented film, die-cut, pre-spaced, with pressure sensitive adhesive. In addition to those markings specified elsewhere in these technical specifications, the following shall be provided in one inch letters located on both sides of the vehicle. Final layout and location subject to Procuring Agency approval prior to production.

"This Vehicle Purchased with Federal Transit Administration and Illinois Department of Transportation Funds"

3.4.4. **OPTION BB:** Destination and Route Signs

3.4.4.1. As an option, destination and route sign system may be installed. The system shall be a roller curtain type capable of displaying up to 50 separate readings with 15 characters per reading. The destination or route information shall be displayed on the exterior of the vehicle. Each vehicle shall have illuminated signs on the front and boarding side of the vehicle. All options shall be priced separately in the bid.

3.4.4.2. The rollers shall be driven by electric motor(s) and the controls shall be by momentary toggle switch accessible to the driver from the interior at the sign. A peep hole shall be provided for the driver to view the reading while making reading changes.

3.4.4.3. Characters on signs shall conform to all applicable ADA requirements.

3.4.4.4. All destination and route sign wiring shall be properly secured.

3.4.5. **OPTION CC:** A bicycle rack shall be installed at the front exterior of the vehicle capable of carrying two bicycles. It shall not be greater than 27 inches deep nor more than 55 inches wide, shall accommodate bicycles with wheelbases of up to 44 inches, wheel sizes from 20 inches to 29 inches (excluding tandems and recumbent bicycles) and tire widths up to 2.35 inches. The bicycle rack shall also support a static load of 250 pounds, shall latch securely in both the stowed and the deployed positions, and have a powder coated finish. All options shall be priced separately in the bid.

3.5. WHEELCHAIR/MOBILITY AID LIFT SYSTEM

3.5.1. General

3.5.1.1. An ADA/FMVSS 403 & 404 compliant wheelchair/mobility aid lift system shall be provided, shall be able to be operated completely by a manual back up pump, shall not rattle when stored in the upright position under rural driving conditions, and shall meet all requirements of Section 3.5.2.

Because of the nature of its intended use, the lift system must be ruggedly built, operate in a positive but smooth manner, be of safe but fail-safe design, and be highly reliable throughout its useful life. The controls must be simple to operate with no complex phasing operations required, and the loading/unloading operations shall be under the surveillance and complete control of the driver/operator. The wheelchair/mobility aid lift system shall not present a hazard, nor inconvenience passengers. When not in use, the lift system shall be stowed in a secure manner and be padded as necessary so as not to present a hazard to any on-board passengers.

3.5.1.2. The device shall have a useful operational life of at least seven years, shall function with maximized mean-time-between-failure (MTBF) or adjustments, under the environmental climatic conditions outlined in this Specification.

3.5.2. Operating Equipment and Design

3.5.2.1. The wheelchair/mobility aid lift system shall be installed in the curb side of the vehicle, behind the front entrance door and forward of the rear wheels, with a minimum of structural body modification. Cutting of OEM chassis structural members is prohibited. All changes required to the basic body/chassis structure shall provide for adequate reinforcing and load redistribution. The Vendor shall certify with bid submittal that the installation is adequate to withstand the loads and stresses imposed by regular lift operation on a sustained basis.

3.5.2.2. Wheelchair/mobility aid lift construction shall be a modular steel box frame type design providing rigidity independent of the vehicle body for reinforcement and lift alignment.

The lift shall be tested to a static load of add pounds minimum, and be capable of safely lifting 1,000 pounds minimum continuously throughout the full range of passenger operation. All power units, operating joints, linkage and mounting points to the body shall be certified by the manufacturer in a written test report as being adequate for this loading.

3.5.2.3. The lift platform shall be of steel or aluminum construction and the surface shall be expanded metal or hole-punched metal grating. The platform surface shall be free of any protrusions over 1/4 inches high and shall be slip resistant. The platform shall have a minimum clear usable width of 34 inches measured 2 inches above the platform surface and a minimum clear length of 51 inches.

3.5.2.4. Lifts shall accommodate persons using walkers, crutches, canes or braces or who otherwise have difficulty using steps. The platform may be marked to indicate a preferred standing position. Platforms on lifts shall be equipped with powder coated handrails on two sides, which move in tandem with the lift, and which shall be graspable and provide support to standees throughout the entire lift operation. Handrails shall have usable yellow grips at least 8 inches long with the lowest portion a minimum 30 inches above the platform and the highest portion a maximum 38 inches above the platform. The handrails shall be capable of withstanding a force of 100 pounds concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure. The handrail shall have a cross-sectional diameter between 1-1/4 inches and 1-1/2 inches or shall provide an equivalent grasping surface, and have eased edges with corner radii of not less than 1/8 inch. Handrails shall be placed to provide a minimum 1-1/2 inches knuckle clearance from the nearest adjacent surface. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

3.5.2.5. The wheelchair/mobility aid lift controls shall be interlocked with the vehicle brakes, transmission, or door, or shall provide other appropriate mechanisms or systems, to ensure that the vehicle cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks or systems are engaged.

3.5.2.6. The lift shall be inoperable unless the lift access doors are in the open position, the engine ignition switch is in the "ON" position, vehicle parking brake has been applied, and transmission shift lever is in the "PARK" position. An instruction placard shall be provided for the driver describing the necessary steps and procedures to use the lift. At a minimum, a properly labeled green light shall be illuminated on the dash to indicate to the driver that all required steps have been properly completed and lift use is authorized. The lift shall be subject to demonstration by the Vendor prior to production and at delivery.

3.5.2.7. The lift platform fold-in function shall be inoperable with 50 pounds or more of weight positioned anywhere on the platform.

3.5.2.8. All parts of the lift structure and platform intruding into the vehicle body/passenger cabin area shall be properly protected and padded to protect the lift occupant and passengers on board the vehicle from bodily injury. Appropriate padding and/or guards are required at the lift door header to prevent injury to the lift occupant. There shall be no pinch points or

shear points on the lift or its mechanisms where a hand or foot, of either a passenger onboard the vehicle or a wheelchair/mobility aid lift occupant, can be injured. The installed lift shall be free from resonant vibrations, rattles and other objectionable noises in the stowed position when the vehicle is operated over rough streets and roads. The lift design, construction and installation shall minimize metal-to-metal contact points.

3.5.2.9. The Vendor shall supply installation drawings and details of the wheelchair/mobility aid lift system installation including layout, dimensions, safety features, and controls to the Procuring Agency with bid submittal.

4. GENERAL CONDITIONS, DESIGN PRACTICES AND CONSTRUCTION

4.1. The vehicle and components shall be designed to the highest commercial grade heavy-duty automotive vehicle practices, constructed in accordance to the latest standards in use by the industry, and use heavy-duty paratransit quality materials and commercial grade components intended for the life span of the vehicle in the manufacturing, construction, and final assembly of the vehicle.

4.1.1. All tubing fittings shall be high-quality, heavy-duty, transit/industrial grade type. Different brands of fittings may be used with essentially comparable standards of quality, design, and performance, but the same type of fitting must be used in the same location throughout the order of the vehicles. Long tubing nuts shall be applied where space conditions permit.

4.1.2. All piping, tubing, hoses, electrical harnesses, cables, and wiring shall be properly bracketed and clipped with insulated clips. Heating hoses shall be secured with insulated P-clamps. Electrical harnesses shall be secured every 18 inches maximum. The location of all P-clamps used for heating hoses shall be approved by the Procuring Agency prior to production.

4.1.3. All mounting of assemblies and sub-assemblies, including the power plant and accessories, shall be mechanically isolated to minimize the transmission of vibration to the body structure.

4.1.4. Rubber seals on ventilator doors, compartment cabinet doors, and passenger doors shall be secured and retained in recessed, shaped channels or by door lips to hold rubber seals firmly in place.

4.1.5. All burrs and sharp edges shall be dressed so as to prevent injury to passengers, operators and maintenance personnel.

4.1.6. Castings and forgings shall be true and free from significant imperfections.

4.1.7. Clevises shall be threaded on or pinned to allow removal, and not be welded to the rods.

4.1.8. Lumber and wood products shall be thoroughly air seasoned or kiln dried; shall be straight grained; and shall be free from rot, knots, checks, and other defects which may impair its strength or durability or mar its appearance. Lumber shall be dressed on all sides to full dimensions. Exposed wood of any type shall not be used except where specified.

4.1.9. Welding shall conform with AWS standard quality procedures and where visible have a finished appearance.

4.1.10. All insulations, plastics, and synthetic materials shall be fire-retardant, self-extinguishing, non-toxic, and meet the requirements of FMVSS 302.

4.1.11. All surfaces to which springs are attached shall be of such a pattern so as to prevent excessive grooving or wear of the parts.

4.1.12. Jack-shafts or spindle brackets which require removal for maintenance shall be bolted on rather than welded to the vehicle frame structure.

4.1.13. All aftermarket bolts, nuts, screws, and washers shall be corrosion resistant cadmium plated, zinc plated or any other approved method for corrosion resistant hardware except where otherwise specified. All cap screws, nuts and bolts shall be SAE, Grade-5 minimum, material. Bolt projections through nuts shall not be excessive. Should there be a reason for excessive bolt projection, the bolts shall have double nuts. Bolts used with nylon insert locknuts shall be sized to extend at least two full threads through the locking ring but shall not extend more than two threads beyond the length of the next longer bolt.

4.1.14. All sheet metal screws shall comply with ASTM and ASA recommendations relative to quality, use and installation.

4.1.15. Bosses on components or units of light construction, with threaded sections in which fittings or pipes are connected, shall have hexagon or square shoulders which can be held with a wrench so as to eliminate damage to the unit.

4.1.16. All non-painted, exposed aluminum fabricated components and parts shall be anodized, except as otherwise specified or granted by exception.

4.1.17. The Vendor shall provide the OEM operator's manuals, non-OEM body service manuals and added equipment manuals at vehicle delivery. All technical documentation including wiring schematics provided shall be based on the exact vehicles and equipment exactly as built for the Procuring Agency. Technical documentation that depicts vehicles and equipment not representative of those delivered to the Procuring Agency is not acceptable. One set of technical documentation shall be provided with each vehicle. An additional set of the technical documentation listed above shall be provided to the Procuring Agency, and one set to each RMC. In addition, one copy of the OEM Parts Manual shall be provided to the each RMC. Information on items such as voltage regulator, governors, engine tune-up data, and other pertinent data shall be furnished to allow time to prepare service and inspection forms for initial vehicle inspection upon delivery.

4.1.18. All air, oil, and water lines and openings into equipment component units shall be sealed, plugged or adequately protected against entrance of contaminants until connected.

4.1.19. Removal and replacement of aftermarket assemblies and subassemblies shall be easily conducted by conventional shop methods and practices.

4.1.20. If the Procuring Agency identifies a failure of identical items covered by warranty and occurring within the first 3 years in 20 percent or more of the vehicles delivered, the Vendor shall be notified and required to evaluate and repair the item on all vehicles delivered under this contract. This provision shall not apply to the OEM chassis or to defects caused by noncompliance with

the Vendor's recommended normal maintenance procedures. The warranty on defective non-OEM items and/or systems shall be extended to the time and/or miles of the original warranty. If the Vendor becomes aware of a fleet defect, recall, or technical bulletin which may involve vehicles delivered under this contract, the Vendor MUST notify the Procuring Agency and all agencies receiving vehicles. Failure to notify may result in the Vendor being liable for the repair of the system and in the termination of the contract.

4.1.21. The gap between any exterior panels shall not exceed 3/16” prior to caulking to maintain professional fit and finish. All caulking shall be kept to a minimum and shall not be used to fill any gap larger than 3/16".

5. IN-PLANT QUALITY ASSURANCE AND WARRANTY PROVISIONS

5.1. QUALITY ASSURANCE ORGANIZATION

5.1.1. Structure

5.1.1.1. In-Plant Control

The Vendor must have and maintain an effective in-plant quality assurance program. The quality assurance program must be in writing and have defined objectives and procedures. The quality assurance function shall exercise quality control over all phases of production from initiation of design through manufacture and preparation for delivery. The function shall also control the quality of supplied articles.

5.1.1.2. Authority and Responsibility

For production of vehicles for the Procuring Agency, the quality assurance management shall have the authority and responsibility for reliability, quality control, inspection planning, establishment of the quality control system, and acceptance/rejection of materials and manufactured articles in the production of the equipment. Quality assurance must be separate from production and report directly to senior management.

5.1.2. Functions

For production of vehicles for the Procuring Agency, the quality assurance program shall have the following minimum functions.

5.1.2.1. Work Instructions

The quality assurance program shall verify inspection operation instructions to ascertain that the manufactured product meets all prescribed requirements.

5.1.2.2. Records Maintenance

The quality assurance program shall maintain and use records and data essential to the effective operation of its program, including proof of compliance with Buy America requirements. These records and data shall be available for review by the resident Inspectors. Inspection and test records for this procurement shall be available for a minimum of one (1) year after inspections and tests are completed, or for the duration of the warranty period, whichever is longer.

5.1.2.3. Corrective Actions

The quality assurance program shall detect and promptly assure correction of any conditions that may result in the production of defective equipment. These conditions may occur in designs, purchases, manufacture, tests or operations that culminate in defective supplies, services, facilities, technical data or standards.

5.1.3. Standards and Facilities

The following standards and facilities shall be basic in the quality assurance process.

5.1.3.1. Configuration Control

The Vendor shall maintain drawings and other documentation, including specific records of items included in the Pre-Award Buy America certification, that completely describe a qualified system that meets all of the options and special requirements of this procurement. The quality assurance program shall verify that the system and its components are manufactured in accordance with these control drawings and documentation. Information pertinent to this section shall be available to Procuring Agency upon request.

5.1.3.2. Measuring and Testing Facilities

The Vendor shall provide and maintain the necessary gauges and other measuring and testing devices for use by the quality assurance program to verily that the components conform to all specification requirements. These devices shall be calibrated at established periods against certified measurement standards that have known valid relationships to national standards.

5.1.3.3. Production Tooling as Media of Inspection

When production jigs, fixtures, tooling masters, templates, patterns and other devices are used as media of inspection, they shall be proved for accuracy at formally established intervals and adjusted as necessary.

5.1.3.4. Equipment Use by Resident Inspectors

The Vendor’s gauges and other measuring and testing devices shall be made available for use by the Resident Inspectors to verify that the components conform to all specification requirements. If necessary the Vendor’s personnel shall be made available to operate the devices and to verify their condition and accuracy.

5.1.4. Control of Purchases

5.1.4.1. Supplier Control

The Vendor shall require that each supplier maintain a quality control program for the services and supplies that it provides. The Vendor’s quality assurance program shall inspect and test materials provided by suppliers for conformance to specification requirements. Materials that have been inspected, tested and approved shall be identified as acceptable to the point of use in the manufacturing or assembly process. Control shall be established to prevent inadvertent use of nonconforming materials.

5.1.4.2. Purchasing Data

The Vendor shall ensure that all applicable specification requirements are properly included or referenced in purchase orders of articles to be used on the equipment.

5.1.5. Manufacturing Control

The Vendor shall ensure that all basic production operations as well as all 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 working environments, if necessary.

5.1.5.1. Completed Item
A system for final inspection and test of completed components shall be provided by the quality assurance program. It shall measure the overall quality of each completed component.

5.1.5.2. Non-Conforming Materials
The quality assurance program shall monitor the Vendor's system for controlling non-conforming materials. The system shall include procedures for identification, segregation and disposition.

5.1.5.3. Statistical Techniques
Statistical analysis, tests and other quality control procedures may be used when appropriate and accepted in the quality assurance process.

5.1.5.4. Inspection Status
A system shall be maintained by the quality assurance program for identifying the inspection status of completed components. Identification may include cards, tags or other normal quality control devices.

5.1.6. Inspection System

The quality assurance program shall establish, maintain and periodically audit a fully documented inspection system. The system shall prescribe inspection and test of materials, work in progress and completed articles. As a minimum, it shall include the following controls.

5.1.6.1. Inspection Stations
Inspection stations shall be at the best locations to provide for work content and characteristics to be inspected. Stations shall provide the facilities and equipment to inspect structural, electrical and other components and assemblies for compliance with the design and Buy America requirements.

Stations shall also be at the best locations to inspect or test characteristics before they are concealed by subsequent fabrication or assembly operations.

5.1.6.2. Inspection Personnel
Sufficient trained inspectors shall be used to ensure that all materials, components and assemblies are inspected for conformance with the qualified component design.

5.1.6.3. Inspection Records

Rework or rejection identification shall be attached to inspected articles. Articles that have been reworked to specified drawing configurations shall not require special identification. Articles rejected as unsuitable or scrap shall be plainly marked and controlled to prevent installation on the assembly line. Articles that become obsolete as a result of engineering changes or other actions shall be controlled to prevent unauthorized assembly or installation. Unusable articles shall be isolated and then scrapped. Discrepancies noted by the Vendor or Resident Inspector during assembly shall be entered by the inspection personnel on a record that accompanies the vehicle, major component, subassembly or assembly from the start of assembly through final inspection. Actions shall be taken to correct discrepancies or deficiencies in the manufacturing process, procedures or other conditions that cause articles to be in nonconformity with the requirements of the contract specifications. The inspection personnel shall verify the corrective actions and mark the discrepancy record. If discrepancies cannot be corrected by replacing the nonconforming materials, the Procuring Agency shall approve the modification, repair or method of correction to the extent that the contract specifications are affected.

5.1.6.4. Quality Assurance Audits

The quality assurance program shall establish and maintain a quality control audit program. Records of this program shall be subject to review by the Procuring Agency.

5.1.7. Resident Inspector

The Procuring Agency may choose to be represented at the Vendor's plant by Resident Inspectors. They shall monitor, in the Vendor's plant, the manufacture of vehicles built under this procurement. The Resident Inspectors shall be authorized to approve the pre-delivery acceptance tests, Buy America compliance and to release the vehicles for delivery. Upon request to the quality assurance supervisor, the Resident Inspectors shall have access to the Vendor's quality assurance files related to this procurement. These files shall include drawings, material standards, parts lists, inspection processing reports and records of defects. No less than 30 days prior to the beginning of vehicle manufacture, the Resident Inspectors shall meet with the Vendor's quality assurance manager. They shall review the inspection procedures and checklists. The Resident Inspectors may begin monitoring vehicle construction activities two (2) weeks prior to the start of vehicle fabrication. The Vendor shall provide office space for the Resident Inspectors in close proximity to the final assembly area. This office space shall be equipped with desks, secured internet access, outside and intra-plant telephones, file cabinet, chairs, and clothing lockers sufficient to accommodate the Resident Inspector staff. The presence of these Resident Inspectors in the plant shall not relieve the Vendor of its responsibility to meet all of the requirements of this procurement.

5.2. ACCEPTANCE

5.2.1. Responsibilities

Fully-documented tests shall be conducted on each production item following manufacture to determine its acceptance to the Procuring Agency. These acceptance tests shall include pre-delivery inspections and testing by the Vendor and the Resident Inspectors, and inspection and testing by the Procuring Agency after the equipment has been delivered and/or installed. A designated area of sufficient space, lighting and equipment including a floor jack shall be

provided to the Resident Inspector to carry out acceptance testing and final inspection. Access to a vehicle lift shall also be provided.

5.2.2. Pre-Delivery Tests

The Vendor shall conduct acceptance tests at its plant on each vehicle following completion of manufacture and before delivery to the Procuring Agency. These pre-delivery tests shall include visual and measured inspections, as well as testing the total assembly operation. The tests shall be conducted and documented in accordance with written test plans. Bidders shall submit such written test plans with their bid. Additional tests may be conducted at the Vendor's discretion to ensure that the completed assemblies have attained the desired quality and have met the requirements of the technical specifications. This additional testing shall be recorded on appropriate test forms provided by the Contractor. The pre-delivery tests shall be scheduled and conducted with sufficient notice so that they may be witnessed by the Resident Inspector, who may accept or reject the results of the tests. The results of pre-delivery tests and any other tests shall be filed with the assembly inspection records for each vehicle. The underfloor equipment shall be made available for inspection by the Resident Inspectors using a pit or vehicle-hoist provided by the Contractor. A hoist, scaffold, or elevated platform shall be provided by the Vendor to easily and safely inspect vehicle roofs. Delivery of each vehicle shall require written authorization of a Resident Inspector. Authorization forms for the release of each vehicle for delivery shall be provided by the Contractor. An executed copy of the authorization shall accompany the delivery of each vehicle.

5.2.2.1. Inspection: Visual and Measured

Visual and measured inspections shall be conducted with the vehicle in a static condition. The purpose of the inspection testing is to verify overall dimensional and weight requirements, to verify that required components are included and are ready for operation, and to verify that components and subsystems that are designed to operate with the vehicle in a static condition will function as designed.

5.2.2.2. Total Vehicle Operation

Total vehicle operation shall be evaluated during road tests. The purpose of the road tests is to observe and verify the operation of the vehicle as a system and to verify the functional operation of the subsystems that can be operated only while the vehicle is in motion. The road test shall include brake stopping performance measurements by using a portable decelerometer or other similar test device. Each vehicle shall be road tested for a distance deemed suitable by the resident Inspector. A check of all stored fault codes shall be made following the road test. Observed defects shall be recorded on the test forms. The vehicle shall be retested when defects are corrected and adjustments are made. This process shall continue until defects or required adjustments are no longer detected. Results shall be pass/fail for these vehicle operations tests.

5.2.3. Post-Delivery Tests

The Procuring Agency may conduct acceptance tests on each delivered vehicle at the delivery location. These tests shall be completed within 30 days after vehicle delivery and shall be conducted in accordance with written test plans. The purpose of these tests is to identify defects that have become apparent between the time of vehicle release and delivery to the Procuring Agency. The post delivery tests shall include visual inspection, Buy America certification, and

vehicle operations. Vehicles that fail to pass the post-delivery tests are subject to non-acceptance. The Procuring Agency shall record details of all defects on the appropriate test forms and shall notify the Vendor of non-acceptance of each vehicle within five (5) working days after completion of the tests.

5.2.3.1. Visual Inspection

The post-delivery visual inspection is similar to the inspection at the Vendor's plant and shall be conducted with the vehicle in a static condition. Any visual delivery damage shall be identified and recorded during the visual inspection of each vehicle.

5.2.3.2. Vehicle Operation

The road tests for total vehicle operation are similar to those conducted at the Vendor's plant. Operational deficiencies of each vehicle shall be identified and recorded.

5.3. WARRANTY REQUIREMENTS

5.3.1. Vendor Warranty

Warranties in this document are in addition to any statutory remedies or warranties imposed on the Vendor. Consistent with this requirement the Vendor warrants and guarantees to the original Procuring Agency each complete vehicle and specific subsystems and components at a minimum as follows.

5.3.2. Complete Vehicle

The complete body conversion is warranted to be free from defects for 12 months or 12,000 miles, whichever comes first, beginning on the date of acceptance, or conditional acceptance of each bus. The warranty is based on regular operation of the vehicle under the operating conditions prevailing in the Procuring Agency's locale.

5.3.3. OEM Warranty

The OEM chassis and all OEM-supplied components are warranted to be free from defects for the standard new vehicle warranty period beginning on the date of acceptance, or conditional acceptance of each vehicle. The warranty is based on regular operation of the vehicle under the operating conditions prevailing in the Procuring Agency's locale.

5.3.4. Body Structure

The body structure and all structural elements of the vehicle are warranted to be free from defects and to maintain structural integrity for seven years or 150,000 miles, whichever comes first. Primary load carrying members of the vehicle structure shall be warranted against corrosion failure and/or fatigue failure for the design life of the vehicle

5.3.5. Non-OEM Components Warranty

The following non-OEM components, if provided, shall be warranted to be free from defects as follows:

Alternator/Voltage Regulator - 24 months or 50,000 miles

Destination Sign System - Two years

HVAC System - Two years

Wheelchair Lift - One year parts and labor; three year parts

The following non-OEM components shall be warranted to be free from rust and corrosion as follows:

Door and Door Frames - Seven years

5.3.6. Warranty Plan and Procedures

A complete warranty plan shall be provided with bid submittal. At a minimum, the warranty plan shall address the following warranty activities:

a) Extension of the warranty period (i.e., due to lack of parts or information needed to complete the warranty repair).

b) Conditions that cause a voiding of warranty.

c) Exceptions and additions to warranty (i.e., normal wear items, etc.).

d) Procedures to follow when a warranty defect is detected.

e) Repair procedures including repairs to be performed by the Vendor, repairs to be performed or contracted by the Procuring Agency, how parts are to be supplied, and which defective components are to be returned or examined by the Vendor.

f) Procedures for filing failure analysis reports of safety-related parts or major components removed from vehicles under the warranty period by the Vendor to determine if a fleet defect could affect fleet operation.

g) Reimbursement for parts and labor.

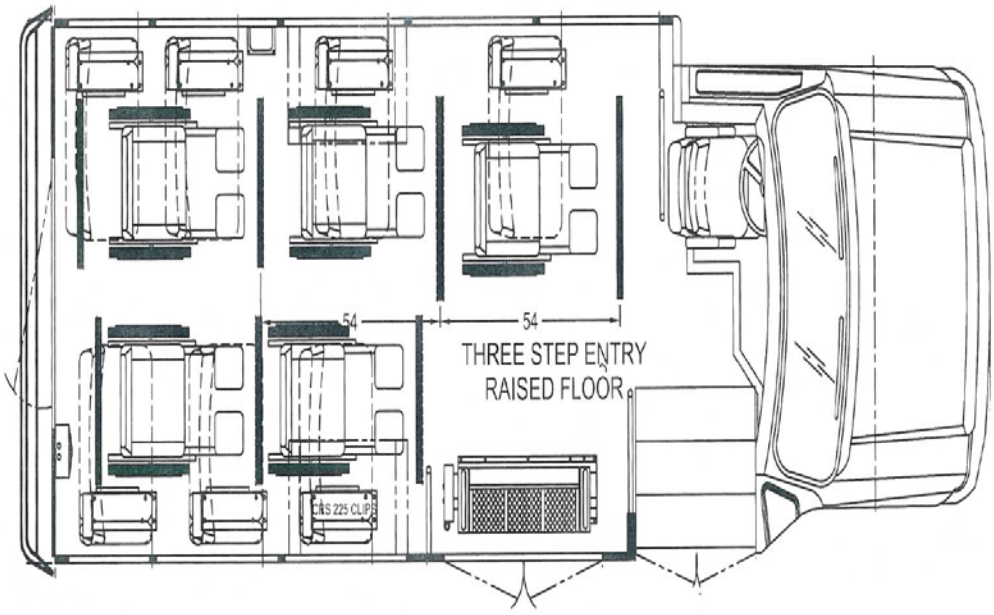
h) Warranty coverage period for the replacement of parts and repairs made under the original warranty period.

i) Identification of locations/facilities for warranty repairs.

j) Maximum response time for delivery of OEM and non-OEM parts that are not in stock at warranty repair facilities.

k) To the extent possible and practicable, the RMC shall be authorized to participate in warranty repairs and to purchase spare parts from the Vendor.

Attachment: A
Medium Duty Paratransit Vehicle Sample Seating Diagram
Note: not shown to scale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