



**VEHICLE SPECIFICATIONS
LOW FLOOR PARATRANSIT VEHICLES
(CLASS F AND G)**

ATTACHMENT A-2

**Morongo Basin Transit Authority
Lead Agency for the
California Association for Coordinated Transportation
Vehicle Purchasing Cooperative**

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SPECIFICATIONS FOR PARATRANSIT BUS

1.0 **SCOPE**

- 1.1 The basic vehicle, both chassis and body, must be a current year factory production cutaway model that is catalogued by the manufacturer and for which manufacturer's published literature and printed specifications are currently available. The bus manufacturer shall be ISO 9001:2000 certified.
- 1.2 This specification is intended for use in the purchase of a complete vehicle unit and all equipment and accessories necessary for its operation. All parts shall be new. All parts, equipment, and accessories shall be completely installed, assembled and/or adjusted as required. Each unit is to be equipped with a right side mobility aid ramp and door.
- 1.3 FTA Circular 4220.1F does not require a Local Government Purchasing Schedule such as this solicitation to specify a minimum or maximum quantity to be ordered. Upon request the results of a CalACT survey among its membership regarding the vehicle types to be offered will be provided.

2.0 **APPLICABLE STANDARDS, LAW AND REGULATIONS**

- 2.1 The following standards, law and regulations of the issue in effect on the date of the Invitation for Bid form a part of this specification to the extent specified herein. The bus is required to meet all regulations, standards and laws including revisions, at time of bus acceptance and through the term of the contract.
 - Federal Motor Vehicle Safety Standards (FMVSS)
 - Code of Federal Regulations Title 49, Chapter V-National Safety Bureau, Part 38 Subpart B, Part 567, 568, 571 and 665
 - California Vehicle Code and CCR Title 13 regulations as applicable to transit vehicles
 - California Health and Safety Code
 - California Air Resources Board and Environmental Protection Agency Standards and Guidelines
 - OEM Body Builders Standards and Guidelines
 - National Fire Protection Agency Regulations 52
 - Society of Automotive Engineers (SAE) and International Standards Organization (ISO)

- 2.2 **ALTOONA BUS TESTING:** Bidders for Low Floor vehicles will provide documents to verify vehicles offered are delivered in compliance with 49 CFR 665. Altoona test must be completed and a satisfactory test report (Hardcopy and electronic version on CD) provided to the Cooperative's prior to final acceptance of the first vehicle by a recipient. No vehicles with Class 1 or 2 failures are acceptable. Correspondence detailing remedial action taken to mitigate any Class 3 structural failures must be provided to the satisfaction of the MBTA. Failure to comply with these requirements will result in nullification of conditional award.

Altoona tests for hybrid or CNG vehicles performed on standard floor versions of the proposed low floor vehicles are not acceptable as per 49 CFR, 665.5 (2) (Major change in configuration/Modified mass produced chassis). A separate Altoona test or correspondence from the FTA demonstrating the proposed vehicle's compliance with this requirement must be presented to the Cooperative. Offerors may not offer buses using the FTA's demonstrator model test exemption for five (5) or less vehicles for sale under this contract.

3.0 VEHICLE CLASSES:

Vehicles solicited for in this attachment are as follows:

CalACT Class F (Low Floor Ford Cutaway): This specification is for a Mid Size Low Floor Commercial bus of the "Body-on-Chassis" type on Ford chassis suitable for transporting both ambulatory and non-ambulatory passengers in both rural and urban areas. The bus shall have a standard power ramp to facilitate entry by passengers including those in a wheelchair. The bus shall meet all requirements of the Americans with Disabilities Act even though the specific items may not be listed in detail in this specification. The bus shall be of the Low Floor type with air suspension both front and rear. The bus shall have a kneeling feature to lower the bus a minimum 4" when the passenger door is opened. The standard bus shall have a 12V electric pump compressor to inflate the air suspension. The bus must be rear wheel drive without the use of a drop box or transfer case.

CalACT Class G (Low Floor GM): This specification is for a Mid Size Low Floor Commercial bus of the "Body-on-Chassis" type on GM chassis suitable for transporting both ambulatory and non-ambulatory passengers in both rural and urban areas. The bus shall have a standard power ramp to facilitate entry by passengers including those in a wheelchair. The bus shall meet all requirements of the Americans with Disabilities Act even though the specific items may not be listed in detail in this specification. The bus shall be of the Low Floor type with air suspension both front and rear. The bus shall have a kneeling feature to lower the bus a minimum 4" when the passenger door is opened. The bus shall have an engine driven air compressor with a reserve tank, air dryer and spitter valve. The bus must be rear wheel drive without the use of a drop box or transfer case.

Base vehicles to be proposed for both classes are for vehicle available from proposer with the maximum seating capacity and/or length available from the manufacturer. Offeror to provide lengths, seating plans and configurations available that it proposes to offer via this contract and show applicable credits if any for units of lesser capacities. Configurations not proposed and priced are to be considered a cardinal change and are not to be sold under this contract.

4.0 SPECIFICATION REQUIREMENTS

These specifications apply to all components of vehicle Classes F and G unless otherwise stated within specifications.

- 4.1 **VEHICLE LOADING:** In no case shall the vehicle GVWR or the front or rear gross axle weight rating (GAWR) or any components therein, exceed the OEM Chassis rating, when the vehicle with all options installed is fully loaded with passengers 150 lbs. per ambulatory seated passenger and driver, 250 lbs per mobility aid passenger. A weight distribution schematic and loading calculation must be shown for each floor plan and submitted with bid for each floor plan offered. Loading calculations must be made with full tanks of fuel.
- 4.11 **UNLADEN WEIGHT:** A copy of a weight certificate from a state (state of final builders location will be accepted for these purposes) certified scale showing the unladen weight of the vehicle, with a full fuel tank, must be submitted at time of delivery.
- 4.2 **ENGINE:** California approved gasoline electronic fuel ejection (EFI) fuel management system.
- 4.25 **CNG:** For Ford Only. Proposer desiring to offer CNG as an option for low floor bus, must meet Altoona testing requirements in compliance with 49 CFR part 665 to the satisfaction of the Cooperative. When available the 6.8L E450 engine to be OEM gaseous prepped. Areas where the alternate fuel system impacts the standard specifications (for gasoline/diesel fueled vehicles) may be waived for this contract. This includes such things as: gross vehicle weight rating, payload, engine displacement, emission rating, cargo volume and others directly affected by the fuel system modifications. The bidder may be required to substantiate the reasons for downgrading the base requirement. A minimum of 27-gallon gas equivalent capacity in three 3600 psi tanks shall be installed between the frame rails on the chassis. The CNG tanks shall have a production date of no more than 24 months from date the bus is delivered. The tanks shall be Type III aluminum and carbon fiber construction, twenty (20) year life that complies with NGV2-2007 and FMVSS 304. All fittings and hoses are to be stainless steel or flex tubing approved for use with CNG at 3600 psi. All lines are to be supported with split block high pressure retaining devices and or rubber insulated line clamps approved for use with CNG at 3600 psi. All fasteners are to be Grade 8 fasteners and installed in a manner that is compliant with applicable sections identified in 2.1. Conversion shall include dust and gravel shields to protect tanks and valves. Vehicle shall have OEM gas ready engine. The system shall be installed by Engine System Manufacturers approved installers and include the following:
- a) NGV-2 3600 psi rated fill receptacle sized at buyers choice, no extra cost
 - b) Electronic tank shut off valves.
 - c) Exterior fuel pressure gauge
 - d) Locking fuel door
 - e) Lockout switch for fuel filler door to prevent starting with fuel door open

Proposer to offer as options, a Kidde Aerospace & Defense (KAD) or approved equal Automatic Fire Sensing and Suppression System (AFSS) complete with fire detector(s), control panel, manual activation switch and engine compartment and battery compartment and methane detection system. The purpose of the AFSS is to ensure coach and passenger safety and survivability in the event of fire. The AFSS shall detect fires in protected areas. Upon fire detection the AFSS shall immediately activate an audible and visual alarm in the vehicle operator's area. After a 15 second delay, the AFSS shall shutdown the vehicle engine and discharge extinguishing agent into the protected areas. The vehicle operator shall have the capability to extend or terminate the engine shutdown and extinguisher discharge delay. The completed AFSS shall be tested and certified by KAD. The test shall determine that the system has been properly installed and will function as intended; a Certification Report from KAD shall be provided indicating such at time of delivery.

- 4.3 **HYBRID ELECTRIC DRIVE SYSTEMS:** All vehicles shall be approved and marketed by the original equipment manufacturer. Proposer desiring to offer hybrids as an option for low floor bus, must meet Altoona testing requirements in compliance with 49 CFR part 665 to the satisfaction of the Cooperative. Proposer if offering Hybrid option must meet Full factory literature, parts, service, technical support and warranties shall be available, equal to Azure Dynamics hybrid electric drive system. Drive system must be installed as per Hybrid's Body Builders Guide and provide a process for the hybrid electric drive manufacturer to sign-off of the hybrid system. The Hybrid Electric Vehicle (HEV) shall be primarily propelled by an internal combustion engine and also convert energy normally wasted during coasting and braking into electricity which is stored in a battery until needed by the electric motor. The HEV shall not need to be plugged into an external source of electricity to be recharged. Conventional gasoline and regenerative braking shall provide all the energy the vehicle needs. The HEV shall be capable of sustained highway speeds.

The system shall also include the following:

- a) 100 kW AC induction w/ regenerative braking
- b) 120 kW inverter
- c) 288V, 60kW, 8.5 Ah, maintenance-free nickel metal hydride Automatic high voltage disconnect in case of vehicle collision.
- d) The bus body builder must provide adequate shielding to protect the hybrid components from road debris and collision.
- e) Electronic 5-Speed Torqueshift Auto O/D Transmission

Manufacturers of low floor vehicles may propose alternative hybrid systems that are compliant with Altoona testing requirements per section 2.2. Proposed systems shall be fully described, documented and supported by manufacturer's design and test data. Acceptance of this option shall be at the discretion of the MBTA.

- 4.4 **TRANSMISSION:** Minimum Four speed automatic transmission incorporating an OEM installed air to oil type auxiliary transmission oil cooler and filler extension neck for adding fluid.

- 4.5 **BRAKES**: Dual hydraulic power-assisted system with disc-type brakes on the front wheels and drum or disc-type on the rear wheels. A foot operated parking brake shall be supplied with a warning light on the dashboard.
- 4.6 **SPRINGS/AIRBAGS**: The front and rear springs or airbags as applicable, shall have a ground load rating equal to or exceeding the GVWR of the vehicle. Shim or comparable method that is recommended by the OEM shall be installed on the ramp side of the vehicle to keep the bus level.
- 4.7 **SHOCK ABSORBERS**: Each chassis shall be equipped with front and rear, heavy-duty, double-acting gas filled shock absorbers, the highest rating available from the OEM.
- 4.8 **STEERING**: Each vehicle shall be equipped with OEM power-assisted steering. Steering shall incorporate an OEM factory installed tilt wheel feature, proposer must offer optional cruise control.
- 4.9 **WHEELS**: Each vehicle shall be equipped with seven OEM white matching steel-disc wheels. The rated capacity shall equal or exceed the GVWR of the vehicle. Rear dual wheels will have a brass valve extension installed and secured to the outside on each set of rear wheels to check and fill air pressure.
- 4.9 **TIRES**: Seven OEM steel-belted radial ply tires of equal size and rating. The combined load rating of the tires shall equal or exceed the GVWR of the vehicle. The spare tire and wheel shall be shipped and delivered with the vehicle unless optional spare tire is carrier is selected.
- 4.95 **BUMPERS**: A rear anti-ride bumper shall be installed, equal to Romeo RIM, HELP and must have the HawkEye reverse assistance system integrated into the bumper and continue to operate after repeated 5-mph impacts.
- 5.0 **AXLES**: The sum of the front and rear axle ratings shall equal or exceed the GVWR of the vehicle. The rear axle shall be single-speed type.
- 5.1 **DRIVESHAFT**: Protective metal guard(s) for the driveline shaft(s) shall be provided to prevent a broken shaft from touching the ground or any brake/fuel line and prevent the shaft from contacting the floor of the bus.
- 5.2 **ELECTRICAL**: The electrical system shall be a 12-volt system. All electrical accessories except mobile radio, lights, and mobility aid ramp must be wired through the ignition, and must shut off when the ignition is shut off. A wiring diagram must be submitted upon vehicle delivery that will match the as-built wiring for each vehicle. The fuse box must be properly labeled to identify each circuit with a corresponding label identifying the function attached to the fuse box cover. Mating harness and harness connectors shall use matching wiring and coding.
- 5.21 **WIRING AND SWITCHES**: All switches and wiring circuits shall be protected with either fuses or circuit breakers. All fuses and circuit breakers shall be labeled for identification and installed above the driver seat with a lockable cover (metal or plastic). A diagram detailing the circuits must be installed on the inside of the cover. The OEM Chassis electrical protection may not be altered or

modified in any way. All contractor-installed switches shall be of heavy-duty design. Switches or wiring installed on the engine cover must include quick disconnect harnesses and no electrical, stationary or mechanical device may block the removal of the engine cover inside the bus. All electrical terminals shall be heavy-duty, pressure - type terminals. Wire connections shall be crimped with Packard type connectors. All terminals shall be of the full ring type, sized for the terminal screw or stud. All wire terminals exposed to weather must be weather protected by heat shrink tubing, or approved equal. Samples to be provided for review prior to bid award. There shall be no exposed wiring inside the vehicle. All wiring must meet SAE standard requirements. All electrical wiring shall be automotive stranded and shall be loomed; color, number and or function coded every six inches with a schematic showing function code. No wires of the same color, number or function code in the same loom or harness. All harnesses that are added to the vehicle will be secured to the frame at a maximum of 24" intervals. Plastic wire ties are not acceptable. Added P-Clamps will be made available for appropriate support/protection as deemed necessary by the Cooperative. All wires or harness which pass through holes or by sharp edges shall be ran through loom or rubber grommets. All wiring connections shall be done with Packard connectors. No butt connectors will be allowed.

- 5.22 CHARGING SYSTEM: The vehicle charging system will use a OEM 12-volt alternator with the highest output alternator available from the chassis OEM.
- a) A fast idle system equal to Intermotive Gateway shall be installed. The fast idle system must be able to automatically increase the engine speed to 1,500 RPM on gas engines and 1200 RPM on diesel. The fast idle shall engage only when the vehicle is in Park and the vehicle is not in motion (must sense vehicle movement) and activate when vehicle voltage drops below 12.5 volts, the chassis A/C is commanded on, or when the coach A/C (non OEM) system is turned on. A manual switch/button shall be located convenient to the driver to engage the system when the vehicle is in Park and vehicle is not in motion, as described above.

5.23 LIGHTS: Unless otherwise indicated, all lights, taillights, brake-lights, turn-signal lights, collision avoidance lights, clearance marker lights, and back-up lights, shall be voltage regulated light emitting diode (LED) lights. Vehicle to be equipped with:

- a) OEM daytime running lights.
- b) Taillights will be grommet mounted and recessed. Taillights shall not protrude more than 2" from the body. A pair of amber hazard and conventional lights shall be provided. Rear lights shall include a pair of red taillights and red stoplights which may be combination lights (equal to a dual filament bulb).
- c) LED side signal lights, with marker, shall be provided independently, or be incorporated into the center of the bus. Location shall be in front of the rear wheel opening and provide visibility from behind the rear wheel opening.
- d) LED Clearance marker lights shall be installed either recessed or surface mounted and armored, facing the front, rear, and each side at rear.

- e) Center mounted LED light will be provided and mounted above rear window.
- f) Two (2) LED back-up lights, one mounted on each side of the body rear cap, shall be provided.
- g) LED step lighting will be provided, mounted to provide light for the entire step-well and portion of the ground area outside the bus. The step lights shall be extinguished when the front door has closed. Raised floor step lighting shall be provided by one LED Strip light mounted in the step riser. (Must be recess mounted to protect from accidental damage by passengers contacting light while using step.) Exterior step light shall be mounted away from wheel splash and provide light a minimum of three (3) feet beyond the first step on the ground area outside the bus.
- h) Vehicle shall be equipped with an LED rear center brake light.

5.24 **BATTERIES:** Each vehicle shall have two maximum capacity chassis OEM batteries of equal capacity and rating. Proposer to describe to installation method and location of batteries to the approval of the Cooperative. Hybrid vehicles require that the two OEM batteries supplied with the chassis be installed as per the electric hybrid manufacturer's instructions and body builder's guide.

5.25 **BATTERY TRAY:** A locking weather protected sliding type battery box shall be installed on the curbside adjacent to the passenger door with stainless steel bearing slides slides that provides for a latched tray to hold the battery in place and at a safe distance while the battery is being serviced. The battery tray slides shall have the ability to carry twice the weight of the bus batteries. The battery tray shall have adequate drain holes (a minimum of four) and have the ability for the battery to extend a minimum of 3 inches beyond the opening of the battery compartment. Battery hold-downs should be properly sized and prevent the battery from shifting or moving in the battery tray. All battery securement devices and securement hardware, including slides and tray shall be stainless steel and be self-locking or tension retaining hardware. Battery box must be designed with full support under the tray. Battery trays that are built without structural support underneath will not be accepted. A minimum of one locking latch shall secure the battery door. Sufficient means shall be provided to hold the door in the open position. A diagram showing the configuration of the battery cable installation shall be installed to the inside of the battery

5.26 **GROUNDING:** Three added grounds shall be installed on the vehicle; all shall be # 0 or #2 gauge. One ground shall be installed between the engine and the OEM frame. The second ground between the Cutaway Body frame and the OEM frame, and a third between the ramp pump housing and the side battery, grounds must be continuous, without splices. Third ground may be deleted if the vehicle does not require a separate hydraulic pump. For all ground connections, paint or foreign material must be removed and a coating of dielectric material applied to the cleaned surface where each ground attaches.

5.3 **FUEL TANK:** Gasoline Fuel tank(s) shall be the largest available capacity from OEM. The chassis OEM fuel system shall not be modified and be fully compliant with California Air Resources Board standards.

- 5.4 **INSTRUMENT PANEL:** The instrument panel shall have lamps sufficient to illuminate all instruments. All instruments shall be accessible for maintenance and repair and shall be mounted so that each instrument and all indicator lights are clearly labeled and visible to the driver. Lights in lieu of the listed gauges will not be acceptable. Decals or Dymo Labels are not acceptable. Each vehicle instrument panel shall be equipped with at least the following:
- a. Ammeter or voltmeter
 - b. Oil pressure gauge
 - c. Fuel capacity gauge
 - d. Engine temperature gauge
 - c. Speedometer
 - e. Emergency brake warning light
- 5.5 **BACK-UP ALARM:** Shall be connected with back-up lights to produce an intermittent sound to warn others while bus movement is in reverse, Equal to ECCO 530 or 575.
- 5.6 **BODY MODIFICATIONS:** The Vendors must be certified by the National Traffic Safety Administration to manufacture or alter vehicles in accordance with the Code of Federal Regulations, Title 49, and Parts 567-568. On "cutaway" conversions added bodies must be securely fastened to the basic vehicle structure and bolted securely through chassis rail flange at floor and with added reinforcing plates or comparable method. Method of attachment must conform to chassis OEM body builders' requirements. Attachments through bus side rails are not allowed. No welded securement to the basic vehicle structure will be acceptable. All OEM requirements must also be met. Vehicles that do not comply with these requirements will be rejected.
- 5.7 **STRUCTURE:** The vehicle body shall incorporate a welded steel or aluminum body frame or shall be constructed to provide maximum protection to passengers in case of rollover accident or a crash accident to the side or rear of the bus. The inside and outside body panels should be fabricated of contoured steel, fiberglass, fiberglass reinforced plastic with resin-hardened honeycomb, or aluminum. The frame shall be attached to the understructure and securely attached to the chassis so that the entire vehicle will act as one unit without any movement at the joints. The entire unit shall be adequately reinforced with structural steel to carry the required loads and withstand road shocks. The entire frame structure of bus body and attaching members shall have anti-corrosion product applied prior to mounting the bus body.
- 5.71 **ROOF CONSTRUCTION:** The roof construction shall be of sufficient strength to prevent vibration, drumming or flexing. The roof is to be designed and installed in a professional manner that is smooth and without bumps, waves or has an imperfection due to installation or material that will not allow the pooling of water. Roof shall be one-piece design from the front cap to the rear cap and extend over the sides of the bus.
- 5.72 **BUS BODY:** The entire unit shall be adequately reinforced and shall meet requirements of FMVSS 220, School Bus Rollover Protection. A current

certification must be furnished with the bid. The test results shall not be more than two (2) years old on the production model bid unless the structure has not been significantly modified as defined by 49 CFR 665.

- a) All exterior seams shall be constructed to shed water without leaking into the vehicle. All higher panels, including roof, must lap over their lower adjacent panels. In no case shall sealing of panels be dependent on caulking alone. All exterior joints and seams shall be protected by caulking, butyl rubber tape, or other approved material. No water leaks in the body will be acceptable. Testing shall be done with water nozzles appropriately placed to test the entire conversion. Minimum 20-psi water pressure for testing is required for a minimum of 10 minutes.
- b) The body shall be free of cracks, dents, defects or physical damage.
- c) All rivets, screws, bolts, nuts, washers, clamps and other types of fasteners used in the construction process, including those that would be exposed to the elements on the exterior and interior of the unit shall be properly plated to resist corrosion. No sheet metal screws shall be permitted. Fastener materials shall be compatible with materials being fastened. Where self-tapping fasteners are used, body panels shall be reinforced with steel backing, aluminum backing or stainless steel backing.

5.8 **SEATING:** All seating, including driver, shall meet the following requirements: Seat material shall be compliant with Docket 90-A, FTA Recommended Fire Safety Practices for Transit Bus and Van Materials Selection. Foam cushions, seat and back, shall be molded polyurethane with a minimum density of 2 lbs. per cubic ft and need not comply with Docket 90-A. However, all cushions must be fully enclosed by the seat fabric, vinyl or flame blocker material. Cloth seat fabric shall be a minimum 100,000 double rub woven material, anti-bacterial and anti-microbial; the seat fabric shall have a moisture repellent treatment that prevents liquids from passing through fabric. Vinyl seat material shall be minimum level 3 vinyl (36 oz. per running yard).

All seats shall meet the following minimum requirements:

- a) All applicable FMVSS requirements, including FMVSS 207, 209,210, and 302 for all seats and seat belts to be installed in the bus. Documentation of current model testing with seats installed as specified within shall be provided prior to award. Testing by an American Association for Laboratory Accreditation or equal, accredited test facility of individual components independent of the vehicle will be accepted if done on a representative floor, and vendor can validate that test results meet all FMVSS requirements, and could be duplicated in the production vehicle. Any alterations to OEM seats or mounts that affect these tests must also be tested. Detailed seat installation instructions and test data must be made available to the State prior to award of the contract. This test is required for all seats, including optional seats installed over wheel wells that buyers may choose.

- b) Cushion and seat cover shall be of the slipcover type, removable and replaceable without removing the entire seat.
- c) Under seat retractable seatbelts, equal to Freedman USR, shall be provided for all seats. Driver seatbelt shall be OEM lap/shoulder belt. Two 24" belt extenders shall be provided with each vehicle.
- d) All exposed metal surfaces shall be powder coated.
- e) All seats shall have not less than 27" hip to knee room spacing between seats. All seats shall have a minimum cushion depth of 17", and a thickness of not less than 2.5". Seat bottom cushion height shall be 17.5", plus or minus ½ inch, as measured from floor to top of the cushion.
- f) All passenger seats are to have molded energy absorbing grab handles at the top of each forward facing seat. The handles must be securely attached to a welded seat frame structure. Seats along rear wall do not require grab handles. Aisle seats are to include black folding US arms, or equal.
- g) A minimum clear aisle of 14". This must be maintained with any optional seat chosen as well. There shall not be a mobility aid position blocking the aisle or directly in front of the mobility aid ramp except when there is a rear ramp. Random movement to any seat position for ambulatory passengers must be maintained.
- h) Folding seats must be equal to Freedman mid/high back, three step folding seat. Folding seats must be installed so that rubbing/chaffing does not occur during fold operation. Seat cover must not touch sidewall or structure during fold/unfold. Optional folding seats placed over a mobility aid tie down space shall include Freedman T.D.S.S. (tie down storage system). Folding seats must be mounted to steel structure that is an integral part of the final stage builders under floor structure, minimum thickness 1/8th inch. Steel plating for seat securement must be designed into floor, added steel plating similar to large washers would not be accepted. All Seat mount bolts and wheel chair shoulder harness mount bolts that are not fastened to seat track will be mounted to the above required structural steel members. No fasteners will be allowed within 1-½ inches of any flat steel components edge. This requirement does not apply to fasteners through box beam type of structure.
- i) All seats and restraints in the vehicle as specified must comply with current FMVSS standards, including 207, 209, 210, and 302. Documentation of current model testing and seats as specified within shall be provided prior to award. Testing by an American Association for Laboratory Accreditation or equal, accredited test facility of individual components independent of the vehicle will be accepted if done on a representative floor, and vendor can validate that test results meet all FMVSS requirements, and could be duplicated in the production vehicle. Any alterations to OEM seats or mounts that affect these tests must also be tested. Detailed seat installation instructions and test data must be made available to the State prior to award

of the contract. This test is required for all seats, including optional seats installed over wheel wells that buyers may choose.

- j) A one-piece filler/cover shall be provided in tracking between fixed seat placements on the floor and wall tracks. Any order that deletes fixed seats will also automatically delete the floor track for that seat. Floor track will not be installed in any area not covered by a fixed seat. Track can extend 6 inches to the rear of the fixed seat area to allow for seat adjustment by end user to better accommodate their needs.
- k) The Bidder shall provide floor plan and seating drawings, which are to scale and meet passenger-seating, and loading requirements. Drawings, at a minimum, shall show the location and dimensions of all seating positions, drivers position, aisles, doors, modesty panels, stanchion, grab rails, tie down locations, and other passenger assists. In addition, all major body interior dimensions must be shown. Proposed seating plans must be approved by each procuring agency prior to production, and must comply with standards established with the original seating proposals. This requirement does not preclude other optional seating requests as long as they meet all the requirements set forth in this specification, such as aisle width and hip to knee.

l) **Passenger Seats**

All passenger seats shall be individual modules similar to Freedman Feather Weight Mid/Hi, or equal, one or two position bench type modules of not less than 17.5 inches in width. All fixed seats shall be forward facing, mounted for easy removal and have an individual cushion. All back cushions shall be contoured to provide full lumbar support, color coordinated with the interior vehicle color. Prior to award, the Contractor shall submit a sample of the upholstery and cushion material to the Cooperative for approval. Seats shall be available in cloth or vinyl, at buyer's choice at no extra cost. Driver seat can be cloth or vinyl, independent of Passenger Seat Material Choice, also at buyer's choice with no extra cost.

m) **Driver Seat**

Vehicle to be equipped with Freedman Sport adjustable bucket seat with right hand armrest. Upholstery shall be color coordinated with passenger seats. Seat trim will include all OEM or equal Upholstery color will be grey cloth unless specified by the buyer to match passenger seats at no additional cost. Seat trim will include all OEM trim, even if an optional seat or seat base is ordered.

5.9 **FLOORS:** The floor overlay shall have a minimum of 5/8" 7 ply APA certified A/C (A side up) exterior grade plywood, or 5/8" thick one piece engineered wood, fastened to the cross sills. All edges are to be properly sealed for moisture. Finished surface is to be sanded and filled where needed to create a smooth surface for the final floor overlay material.

5.91 **FLOOR COVERINGS:** Proposer to describe floor coverings available with base vehicle and any available options to the purchasing agencies.

- 6.0 **REAR EMERGENCY EXIT:** The rear emergency window shall be large enough so that in conjunction with the rear view mirrors, blind spots are not created. Seat backs shall not intrude in required emergency exit window or door openings. Low back seats shall be used on rear wall when raised floor option is chosen.
- 6.1 **ENTRY DOOR:** All vehicles shall be equipped with an electric front entrance door. Doors shall be a two-section outward opening, equipped with 2" elastometric material on each section that overlaps a minimum of 1.5" to form a tight seal. The entrance door for low floor designed buses shall be a minimum of forty-two inches wide with a thirty-six (36) inches wide clear opening with no obstructions for the ramp and wheelchair passengers. Clear entry door dimensions shall be 36" wide by 75" high. Entrance door system shall include exterior keyed entry. A rain molding shall extend over the doorframe to prevent water intrusion. The operation of the entrance shall be controlled from the driver's position. The entry doors shall open to a minimum of 90 degrees. The door glass shall be see-through, tinted (AS-2) safety glass, and shall be full-length sections. The door mechanism must be accessible through a service door above the doors or removable panel. Entry door shall not be operable unless the vehicle is in park.
- 6.2 **ENTRY STEPS:** Steps shall not be allowed on low floor buses. Height from ground to passenger entry shall be a maximum of 11" when kneeled. Bus must be capable of kneeling a minimum of 4 inches.
- 6.21 **DRIVERS RUNNING BOARD/ASSIST:** The driver's door entry area shall be equipped with a running board. Running board shall be a minimum of 6.5" at front, maximum of 12" at rear. This will be measured from the OEM body at the flange at the bottom of the rocker panel. Running Board shall extend from the front edge of the front door opening to the rear of the OEM cab. Running board must be designed to hold 300 pounds without permanently changing shape, and be slip resistant diamond plated aluminum, or equal.
- 6.3 **MODESTY PANELS, STANCHION AND HANDRAILS:** An entry door modesty panel and stanchion post shall be installed at the left rear of the step well and in front of the curb side row of seats. A stanchion with modesty panel to rear of front mounted ramp is required when a front ramp is selected and another behind the driver. Stanchions shall be constructed from the floor to the ceiling. The lower 30" portion shall be constructed of a gray Formica laminate, or equal, with plastic edge molding, the color to match the interior. A 30"(minimum) handrail shall be installed on both sides of the entry door made of 1.25" 304 stainless steel that can be used by passengers standing at ground level to aid in boarding the bus as well as those passengers that are leaving the bus. The handrail must be able to be used continually for help in boarding and deboarding the bus. Note: grab handles must not affect the clear entry door width. Two overhead grab rails using 1.25" diameter 304 stainless steel are required on both sides of the vehicle to run the full length of the available seating, handrail shall terminate into ceiling with radiused stainless steel ends without connections/elbows. All stanchions and handrails shall be securely fastened into structural members at all mounting

points. A smoked plexiglass panel, 3/8" thick shall be provided behind driver from top of driver's seat to within 6" of bus ceiling. Panel must not impair driver's seat adjustments. Panel may be incorporated into stanchion and guardrail behind driver and must provide cutout area for handhold and be shock mounted to prevent rattle. Cutout area for handhold must have no sharp edges and all corners shall be radiused. Panel must have required marking for compliance to Title 13.

- 6.4 **INTERIOR PANELING:** All interior walls shall be paneled, including doors. All panels shall be the same color and coordinated with the interior colors of the vehicle. All interior panels may be made of scuff-resistant, vinyl-coated aluminum, textured paint on steel, or laminate/FRP finished material. Panels shall be securely installed to prevent noise/rattles.
- 6.5 **WINDOWS:** All windows, except the windshield, rear and doors, shall be egress transit type or a top T-slide panel type, a minimum of 860 square inches. All side windows, except street side rear that shall be fixed, shall be top vented to allow for ventilation. All side windows shall provide a clear view to the outside from each seat position. Windows shall be installed in the double entry doors, on the curbside of the vehicle. Caulking around windows shall be used only as a seal, not to make up for body defects or out of tolerance window openings. All rear and passenger glass is to be tinted to a maximum of 31% light transmission in the passenger compartment. A steel plate adequate to support shoulder straps anchorages must be installed above the windows.
- a) Placement and installation of the windows shall not diminish the structural integrity of the vehicle. Structural reinforcement shall be added to compensate for the reduced structural rigidity. All windows, including emergency exit window, shall comply with the FMVSS 217. There shall be at least one emergency exit window on each side of the bus, with their location indicated by a red LED light mounted above each exit window. Windows shall be placed to maximize access to emergency exit windows, while minimizing seat back interference with exit windows. Driver's door and entry door shall not be considered as an emergency exit.
- 6.6 **INSULATION:** Foam sprayed insulation, or equal, equivalent to 1.5" thickness shall be installed in the roof, rear wall, rear caps, sidewalls and extended door sections including ramp doors. Front cap area shall be insulated with astro-foil reflective insulation. If additional insulation is necessary to meet this requirement the insulation shall be glued to the chassis body to prevent sagging. The insulating material of the body and sidewalls shall be of sufficient thickness to contact the inner and outer walls, insuring positive insulation vapor barrier (equivalent to 1.5 inches thickness). Insulation shall comply with all Federal requirements and shall pass the testing requirements specified in the Federal Transit Administration (FTA) Recommended Fire Safety Practices for Transit Bus and Van Materials Selection.
- 6.7 **PAINT AND TRIM:** Exterior surfaces shall be properly cleaned and primed as required by the paint manufacturer. Painted surfaces shall be impervious to diesel fuel, gasoline, and commercial cleaning agents. Paint shall be high quality

acrylic white enamel that matches the OEM paint scheme (non fiberglass body). Entire vehicle to be OEM white, any other colors (including two-tone) will be at buyers cost.

- 6.8 **FRONT CAP:** The exterior front cap must be of solid one-piece reinforced molded fiberglass covered with a gel-coated exterior surface.
- 6.9 **UNDERCOATING:** The entire underside of the body including floor members, side panels below floor level (if metal), and fender wells shall be undercoated, at the time of manufacture, with a nonflammable resin type polyoleim coating for bus applications. All openings in the floorboards and firewall shall be sealed.
- 6.91 **WHEEL HOUSING:** The wheel housing shall be constructed of a minimum 16 gauge galvanized steel, or stainless steel and provide ample tire clearance during all operating conditions. Fenders and splash aprons (underskirt) of durable construction shall be provided so as to provide maximum deflection of the wheel splash. There shall be sufficient wheel well clearance for snow chains. Front and rear tire mud flaps are required.
- 6.95 **AIR CONDITIONING:** All vehicles require an OEM integral front air conditioner and an auxiliary rear air conditioner. Rear systems shall be completely independent of the front system, and sized as follows; Class F and Class F and G Gasoline and Diesel vehicles require auxiliary systems capable of producing a minimum 60,000 BTU equal to or better than Trans/Air TA 73 Evaporator, SMC3L Condenser, 13 CID Compressor or ACT 50 HD compressor, EZ-5 Evaporator, with 13 CID compressor and CF 32 condenser or Carrier model AC-813MAX system comprised of a 13 cid compressor, EM- 1 Evaporator and CM-3 Condenser. Additional A/C systems from manufacturers not listed that meet the above requirements shall be listed as an option. No tie in A/C systems will be allowed.
- a) All compressor installations must be completed with mounting hardware supplied by A/C manufacturer, and done without affecting the performance of OEM cooling system, including fan shroud. All controls for both air conditioners shall be located for ready access by the driver. Cooling shall be specified in BTU at 100° F. ambient temperature. The condenser for the air conditioner shall be skirt mounted and shall have fans cooling the condenser. Automatic reset breakers or fuses shall and fully enclosed in a loom. The cable shall be properly supported throughout the vehicle with insulated straps and mechanically attached to the vehicle body to protect the condenser. High and low pressure switches shall be equipped to protect the compressor. The air conditioning system shall use refrigerant R134A. Non-OEM refrigerant hoses to be SAE J-2064 Goodyear Type F, Aeroquip Type E or Ecofrigo Type D incorporating thermoplastic lining to reduce leakage. Fittings to be all steel using corrosion resistive coating. Added refrigerant lines shall have a minimum of fittings, any fittings solely for the purpose of joining 2 or more short hoses in place of one longer hose will not be accepted. A label must be placed in the engine compartment detailing manufactures name, refrigerant type and quantity, compressor oil type and quantity. The evaporator and condenser must be matched to the compressor as per

manufacturers recommended installation instructions. All A/C and heater hoses shall be adequately supported with P-Clamps at a maximum spacing of 24". No hoses may cross over the exhaust system without shielding equal to OEM required shielding for floor protection. All hoses must be a minimum of 6 inches away from the catalytic converter and 4 inches away from exhaust pipes and muffler. All A/C systems must be independent of the OEM A/C system. No "tie-in systems will be allowed."

- a) Evaporator drain shall run downhill from evaporator housing. Elbow, or turn down, shall be a minimum of ½ inch below the outlet on the housing. Drains must be installed to prevent puddles of water from being retained in the system.
- b) Class G Hybrid shall have TM16 compressor, EM-1 evaporator and KR-3 roof mounted condenser. Drive system shall be AC24LS motor using a Dmo C445 motor controller or equal.

7.0 **HEATER:** Each vehicle shall have a front mounted integral high output heater and a rear floor high output auxiliary heater mounted behind the rear wheel housing or under a rear seat. The rear heater shall be equipped with two brass ¼ turn valves and/or electronic controlled pump/valves. ¼ turn valves to be clearly marked on the outside of the bus as to its location. The valves shall be located below or behind the driver's entry step well. (Final location to be confirmed at preproduction meeting) The total output of the auxiliary heater system shall be 35,000 BTU for types E and F.

- a) Comfort; Placement shall be designed to maximize passenger comfort foot spacing while seated for user behind seat and user in seat which has heater under it. The placement of the heater must be approved by the procuring agency. If user chooses a location that is not protected then a protective permanent barrier to protect against impacts with mobility aids shall be provided around the heater.
- b) Heaters are to be controlled by two individual three-position switches (off, low, high). All controls for both heaters shall be located for ready access by the seated driver. All hoses, drains and wiring must be covered and adequately supported with plastic/rubber coated steel clamps secured at a minimum of two-foot intervals. All heater hoses are to be silicone, with clamps designed for use with silicone hoses. Combustion heaters are not acceptable

7.1 **MOBILITY AID RAMP:** Low floor buses shall be equipped with a power operated entrance ramp located at the ambulatory passenger door and shall be manufactured by Braun Mobility, Ricon, or equal. The ramp shall be ADA compliant and have minimum width of 34" and minimum length of 62" when deployed. Vehicle shall be capable of deploying the ramp at raised and kneeled positions. Ramp shall provide an incline ratio of no more than 6:1 when deployed from street level. Ramp operation shall be fully ADA compliant and controls shall be easily accessible from the driver's position and capable of deployment from a curb side control switch(es).

- 7.3 **RAMP ENTRY DOOR:** The ramp entrance door shall be the same as the ambulatory passenger door and shall be swing out type electrically operated and a minimum of forty-two inches wide with a thirty-six (36) inches wide clear opening with no obstructions for the passengers. Clear entry door dimensions shall be 36" wide by 75" high. The inside outward most leading edge of both entry door panels shall be equipped with grab handles to assist passenger loading.
- 7.5 **CONTROL INTERLOCK:** The controls for the ramp shall be interlocked with the vehicle emergency brakes and transmission to ensure the vehicle cannot be moved when the ramp is not stowed and so the ramp cannot be deployed unless the interlocks are engaged. The interlock shall be a fully automatic, solid state, microprocessor-controlled unit (Ref. Intermotive ILIS 501) or approved equal capable of self-diagnosis. Interlock shall utilize an LED display panel to show subsystem status
- 7.61 **PARK CRANK ONLY MODULE,** to prevent starting vehicle in neutral equal to Intermotive, PCOM module.
- 8.0 **MOBILITY AID SECURITY AND OCCUPANT RESTRAINT SYSTEMS:** Each vehicle shall be equipped with forward facing mobility aid securement and occupant restraint system as indicated by Table 1. The system(s) shall be capable of securing a variety of common mobility aid designs and accommodate a wide range of occupant sizes. The Contractor shall provide detailed instructions to include a training video from the securement manufacture for mobility aid placement, tie-down belt operation, and torso belt placement.
- a) Mobility aid securement and occupant restraint system(s), including all attachment hardware, straps and anchorages, shall meet or exceed the following requirements:
- * 30 mph/20 G Impact Test criteria per SAE J2249
 - * 36 CFR Part 1192 and 49 CFR Part 38 and 571 (ADA)
- b) The securement system shall be QRT MAX (8300 series knob less) retractor, the QRT Deluxe 8100 series (dual knob) retractor, Surelock Titan or approved equal. These will be by agency choice. Retractors MUST be AUTOMATIC SELF-LOCKING and SELF-TENSIONING. Agency shall have a choice of post style anchors (Slide-n-Click or Solo) or flanged "L" continuous track mounted type (with end caps), capable of securing a variety of common mobility aid designs and accommodate a wide range of occupant sizes. The Contractor shall provide detailed instructions for mobility aid placement, tie-down belt operation, etc. The Track shall be installed in a location/manner that will maximize usable area while still meeting the track manufacturers installation requirements. End caps shall be installed with bolts, with large washers under the floor at securement nuts. Each vehicle shall come with two retractable tie-down systems.
- c) A closable box shall be provided for storage of securement systems, torso pads, and accessories. Final location and type of design to be determined at

preproduction meeting. The system anchorages and /or track shall be recessed and attached with flush fasteners in accordance with the requirements of the system manufacturer. A copy of the manufacturers installation instructions must be provided prior to award. Any deviation from track installation will require written approval from securement manufacturer that the installation will not alter required testing in Section 8.0.

8.3 OCCUPANT RESTRAINT SYSTEM: For each mobility aid securement system installed in the vehicle, a corresponding occupant restraint system shall also be provided. The occupant restraint system shall consist of adjustable lap (pelvic) belt and an adjustable shoulder belt with a minimum of 12" height adjustment, and shall meet all applicable Federal Motor Vehicle Safety Standards (FMVSS), as amended. An additional four 12" straps per wheelchair positions to aide in tying down mobility aids are to be provided for each tie down position including optional positions added to the bus. Each strap must meet SAE J2249.

8.4 SECUREMENT/RESTRAINT SYSTEM ACCESSORIES

- a) A web cutter for emergency use shall be provided with each vehicle.
- b) One torso pad approximately 8" X 12" with thickness of approximately 1" and belt shall be supplied to secure mobility aid users while riding on the mobility aid ramp.

8.5 ADDITIONAL EQUIPMENT: The following shall be furnished and installed in each unit. The mounting of any of the following items shall not interfere with passenger entry or exit:

- a) One 5-pound ABC fire extinguisher conveniently mounted. The fire extinguisher is to be inspected and certified by a California inspector authorized to do so by the Sate Fire Marshall at time of delivery.
- b) A minimum 16-unit First Aid Kit meeting the requirements of Title 13, California Code of Regulations (13 CCR) Section 1243 mounted per buyer's instructions
- c) Three bi-directional emergency reflective triangles that conform to the requirements of FMVSS No. 125.
- d) MIRRORS: A fully adjustable convex type 6"X 9" passenger view mirror mounted just above the windshield to the right of the steering wheel area. Mirror must provide full passenger seating area viewing. Two hinged exterior rear view mirrors, split view model, with remote control for flat portion adjustment, turn signal mounted on the exterior of the mirror housing, and black powder coat finish. Mirror mount must include reinforcement mounting plate that is inside the fender with through rivets into the fender. Convex rear view mirror shall be provided for right and left hand mirrors, and shall offer extra wide angle viewing. OEM mirrors mounted on the windshield shall not be removed.

- e) Sufficient interior lighting (a minimum of six LED or incandescent type) to illuminate the driver, passenger, entry area and the interior aisle to a minimum of eight candlepower measured at floor level. The switch for these lamps shall be mounted in the dash, back lighted, and labeled
- f) Exhaust: The tailpipe routing shall be configured so that it exits the vehicle on the street side with a turn down at the end of the pipe. Exhaust hangers shall be heavy duty and bolted to the frame. All altered exhaust joints shall be welded with a continuous seam. Aluminized steel exhaust tubing shall be used for exhaust modifications.
- g) TWO-WAY RADIO ANTENNA PREP: Roof access for installing radio antenna with 5/8" I.D. conduit with antenna pull wire terminating behind drivers seat. Access compartment must have an access panel/door. Cooperative must approve final design and placement. Panel/door must be color coordinated with interior of bus. See attached picture for currently accepted design, by Viking Marine.
- h) Manual: A complete operations manual will be provided that covers the conversion features on the vehicle as listed in this specification. The manual will provide complete, comprehensive instructions for the mobility aid accessories, mobility securement, and all options.
- i) Brake Max, or DuraTrans Programmable Overdrive Controller (Ref. Intermotive) or approved equal to allow for programming of shift patterns for overdrive/tow-haul feature. Brake Max for Tow/Haul equipped vehicles, DuraTrans for Non tow/Haul equipped vehicles.
- j) One blood borne pathogen protection kit incorporating a body fluid cleanup kit.
- k) Chrome retractable coat hook in as accessible location to the driver seat location.

8.6 PAINTING, DECALS AND MONOGRAMS: All signs required by State and Federal law shall be affixed to each vehicle exterior and interior.

8.7 PARTS BOOKS, MANUALS AND DRAWINGS: The following shall be provided at time of delivery. The information shall be organized in a three ring binder format with each section clearly identified. A draft copy must be available for review and acceptance prior to preproduction meeting.

- a) A complete set of operating instructions, troubleshooting guide, inspection and service guide and detailed manufacturers parts list.
- b) A complete "as built" electrical wiring diagram covering all electrical equipment and electrical circuits installed, complete with wiring codes for **each** vehicle ordered.

- c) All manuals for the bus accessories, to include complete parts guide, and equipment to include mobility aid ramp, air-conditioning system, tie downs, seating, heater, etc.
- d) The Contractor shall have available complete bus maintenance manuals to include the engine, transmission and OEM chassis as well as a complete parts manual for each component. The contractor shall keep the manuals up-to-date and available to the Buyer for a period of three years after the date of acceptance of the buses under the contract.
- e) **Low Floor Vehicle Training:** In cooperation with CalACT, a comprehensive training course shall be provided to purchasing agencies. The course shall provide information to maintenance staff on service requirements and troubleshooting techniques and include an orientation session for Drivers and/or trainers describing ramp use and operating procedures for the low floor vehicles. Training to be provided at a location convenient to purchasing agency's staff.

9.0 Base Price (Pre-tax as specified in this submission). Mark "No-Bid" if your firm is not proposing for a particular vehicle class

9.1 Class F _____

9.2 Class G _____

NOTE-PRICING IS NOT TO BE PROVIDED WITH INITIAL SUBMISSION, MBTA WILL REQUEST THIS INFORMATION AND PROVIDE FURTHER INSTRUCTIONS WHEN APPROPRIATE

10.0 OPTIONS

Provide pricing for each of the following options:

- a) Folding Seat equal to Freedman Notch Back with top grab handle, armrest, color, fabric and foam to match standard seat specification.* _____
- b) 34"-36" equal to Freedman's Feather Weight Mid-Hi Flip Seat.* _____
- c) 17"-18" equal to Freedman's Feather Weight Mid-Hi Flip Seat.* _____
- d) Child Restraint Seat
Integrated Child Restraint seat, Freedman I.C.S. (or approved equal) for transportation of children up to 60 lbs. Seat must be rigid high back with integrated child harness built into the seat frame. Seat must be seat belt ready and be able to properly secure an infant carrier seat for a child under one year and less than 20 lbs. Seat must meet FMVSS Standard 213 * _____
- e) Roof Vents: Equal to Transpec six way adjustable _____
- f) Additional Mobility aid position(s) with tie downs (to match std) _____
- g) Energy absorbing HELP Front bumper. (N/A on GM) _____
- h) Credit for each seat left out of standard vehicle. _____
- i) Locking rear door with alarm and window in place of rear window. _____
- j) Removable fuel pump access plate in floor. _____

- k) Locking fuel door. * _____
- l) Armored marker lights, and side turn signal. _____
- m) Recaro SHS Driver Seat. * _____
USSC 9500 Driver Seat _____
- n) A drive line brake retarder of ample size for the chassis shall be installed as recommended by the retarder manufacturer for the vehicle ordered integrated with OEM foot control. (Not to be offered with GM) _____
- o) Largest available OEM diesel. _____
Hybrid if applicable _____
CNG if applicable _____
- p) 75,000 BTU minimum auxiliary A/C system equal to Trans/Air model 774 Super (TA 77 Evaporator and SC4 Condenser) or ATC Model 93-21HD (EZ 9 Evaporator and CS 32 Condenser) with 13 CID compressor.*
(Lowest priced of systems offered is to be evaluated)
List additional A/C systems offered (Manufacturer/size and price):

- q) Amerex fire suppression system meeting requirements of 4.25 _____
- r) Transign Electric Roller Curtain Sign. (installed with roller curtain)* _____
- s) Apollo 250GB DVR System with GPS (4 Camera)* _____
- t) Twin Vision Front and Side LED Destination Signs. _____
- u) Passenger Stop Request system with Stop requested Sign _____
- v) Pentex 200 amp alternator _____
- w) Road Speed Limiter: Ref Brand: InterMotive Speed Sentinel II. _____
- x) Transmission driven air compressor (for suspension) _____

- y) Engine driven air compressor (for suspension if not std) _____
- z) Sportworks bike rack* _____
- aa) Automatic stop start system: Ref Brand: Intermotive Eco-Star _____
- bb) Quality AM/FM CD radio w/ mp3, installed antenna and 4 speakers _____
- cc) Kidde AFSS and methane detection per section 4.25.* (CNG only) _____
- dd) Cruise control _____

***This option price to be evaluated.**

**NOTE-OPTION PRICING IS NOT TO BE PROVIDED WITH INITIAL SUBMISSION,
MBTA WILL REQUEST INFORMATION WHEN APPROPRIATE**

11.0 Antenna Access Plate



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