PDRTA Low Floor Cutaway Buses

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**PEE DEE REGIONAL TRANSPORTATION AUTHORITY (PDRTA)**

Request for Proposals (RFP) # 1117-01

**PROPOSAL TITLE:** Up to Two (2) 18+ Passenger Low Floor Cutaway Style Vehicles

**PROPOSAL NUMBER:** 1117-01

**PROPOSAL OPENING:** January 5, 2018 3:00 PM (EST)

**CONTRACT DURATION:** 24 months from Date of Awarded Contract

The proposal must be fully and properly executed by an authorized person. By signing you certify your express authority to sign on behalf of yourself, your company, or other entity and full knowledge and acceptance of the REQUEST FOR PROPOSALS, Appendix A (Standard Clauses for South Carolina State Contracts), Appendix B (Federally Required and other Contract Clauses), and that all information provided is complete, true and accurate. Proposers are requested to retain Appendix A and Appendix B for future reference.
PDRTA

REQUEST FOR PROPOSAL FOR TRANSIT BUSES

PDRTA RFP #0917-01

1.1 REQUEST FOR PROPOSALS .................................................................................................................. 7

1.1.1 SOLICITATION DATA .......................................................................................................................... 7
1.1.1.1 PDRTA AND CONTRACTING OFFICER ....................................................................................... 7
1.1.1.2 SCOPE ........................................................................................................................................... 7
1.1.1.3 SOLICITATION SCHEDULE ......................................................................................................... 7

1.1.2 PRE-PROPOSAL .................................................................................................................................. 7
1.1.2.1 PRE-PROPOSAL CONFERENCE ................................................................................................. 7
1.1.2.2 OFFEROR COMMUNICATIONS AND REQUESTS ...................................................................... 8
1.1.2.3 ADDENDA TO RFP ...................................................................................................................... 8
1.1.2.4 CONDITIONS, EXCEPTIONS, RESERVATIONS OR UNDERSTANDINGS ......................................... 9
1.1.2.5 SOUTH CAROLINA STATE BUSINESS ENTERPRISES ............................................................... 9

1.1.3 INSTRUCTIONS TO OFFERORS ....................................................................................................... 9
1.1.3.1 DUE DATE .................................................................................................................................. 9
1.1.3.2 TECHNICAL PROPOSAL REQUIREMENTS ............................................................................... 9
1.1.3.3 PRICE PROPOSAL REQUIREMENTS .......................................................................................... 11
1.1.3.4 PROPOSAL PACKAGING ........................................................................................................... 11
1.1.3.5 DBE CERTIFICATION ............................................................................................................... 12
1.1.3.6 MODIFICATION OR WITHDRAWAL OF PROPOSALS ............................................................... 12

1.1.4 PROPOSAL EVALUATION, NEGOTIATION AND SELECTION ........................................................ 13
1.1.4.1 OPENING OF PROPOSALS ......................................................................................................... 13
1.1.4.2 EVALUATION COMMITTEE ...................................................................................................... 13
1.1.4.3 PROPOSAL SELECTION PROCESS ........................................................................................... 13
1.1.4.4 EVALUATION PROCEDURES .................................................................................................. 16
1.1.4.5 CONFIDENTIALITY OF PROPOSALS ........................................................................................ 18

1.1.5 RESPONSE TO PROPOSALS ............................................................................................................ 19
1.1.5.1 ACCEPTANCE/REJECTION OF PROPOSALS ......................................................................... 19
1.1.5.2 SINGLE PROPOSAL RESPONSE .............................................................................................. 19
1.1.5.3 CANCELLATION OF PROCUREMENT .................................................................................... 19
1.1.5.4 PROTESTS .................................................................................................................................. 19
1.1.5.5 AVAILABILITY OF FUNDS ....................................................................................................... 21

1.1.6 PRE AND POST AWARD PURCHASER REQUIRED FORMS ............................................................ 22
1.1.6.1 REQUEST FOR CLARIFICATION ............................................................................................. 22
1.1.6.2 ACKNOWLEDGMENT OF ADDENDA ....................................................................................... 24
1.1.6.3 PRE-AWARD COMPLIANCE CERTIFICATIONS ......................................................................... 25
1.1.6.4 OFFEROR SERVICE AND PARTS SUPPORT DATA .................................................................... 28
1.1.6.5 DEBARMENT AND SUSPENSION CERTIFICATION (LOWER TIER COVERED TRANSACTION) ......................................................................................................................... 29
1.1.6.6 LOBBYING CERTIFICATION .................................................................................................... 30
1.1.6.7 DBE CERTIFICATION .............................................................................................................. 34
1.1.6.8 CERTIFICATE OF COMPLIANCE WITH BUS TESTING REQUIREMENT .................................... 35
1.1.6.9 OPEN TRADE CERTIFICATION .............................................................................................. 36
1.1.6.10 IRAN DIVESTMENT ACT OF 2014 CERTIFICATE OF COMPLIANCE ........................................ 37
2.4 PAYMENT ............................................................................................................ 58

2.5 SERVICE AND PARTS ............................................................................................ 58
   2.5.1 TRAINING ....................................................................................................... 58
   2.5.2 ENGINEER / SERVICE REPRESENTATIVES ..................................................... 59
   2.5.3 DOCUMENTS ................................................................................................. 59
   2.5.4 PARTS AVAILABILITY GUARANTY .................................................................. 59
   2.5.5 INTERCHANGEABILITY ..................................................................................... 60
   2.5.6 SURVIVABILITY ............................................................................................... 60

2.6 AUDIT AND INSPECTION OF RECORDS .................................................................. 60

2.7 RISK .......................................................................................................................... 62
   2.7.1 INSURANCE ....................................................................................................... 62
   2.7.2 PERFORMANCE BOND ...................................................................................... 62
   2.7.3 PRODUCTION OF DOCUMENTS ........................................................................ 62
   2.7.4 INDEMNIFICATION ........................................................................................... 62
   2.7.5 MATERIALS/ACCESSORIES RESPONSIBILITY ................................................ 63

2.8 SOUTH CAROLINA OPEN TRADE CLAUSES .......................................................... 63

2.9 POLICIES FOR PRIME CONTRACT ......................................................................... 63
   2.9.1 PRE-AWARD AND POST-DELIVERY AUDIT REQUIREMENTS ......................... 63
      2.9.1.1 CERTIFICATIONS REQUIRED ....................................................................... 63
      2.9.1.2 BUY AMERICA REQUIREMENTS ................................................................. 64
      2.9.1.3 FEDERAL MOTOR VEHICLE SAFETY STANDARDS (FMVSS) ...................... 64

3.1 CONTRACTOR’S IN-PLANT QUALITY ASSURANCE REQUIREMENTS ....................... 64
   3.1.1 QUALITY ASSURANCE REQUIREMENTS ........................................................ 64
     3.1.2 QUALITY ASSURANCE ORGANIZATION ...................................................... 64
        3.1.2.1 ORGANIZATION ESTABLISHMENT ......................................................... 64
        3.1.2.2 CONTROL ................................................................................................. 64
        3.1.2.3 AUTHORITY AND RESPONSIBILITY ......................................................... 64
     3.1.3 QUALITY ASSURANCE ORGANIZATION FUNCTIONS .................................. 64
        3.1.3.1 MINIMUM FUNCTIONS ............................................................................. 64
        3.1.3.2 WORK INSTRUCTIONS ........................................................................... 65
        3.1.3.3 RECORDS MAINTENANCE ....................................................................... 65
        3.1.3.4 CORRECTIVE ACTION .............................................................................. 65
     3.1.4 STANDARDS AND FACILITIES ....................................................................... 65
        3.1.4.1 BASIC STANDARDS AND FACILITIES ....................................................... 65
        3.1.4.2 CONFIGURATION CONTROL ................................................................... 65
        3.1.4.3 MEASURING AND TESTING FACILITIES .................................................. 65
        3.1.4.4 PRODUCTION TOOLING AS MEDIA OF INSPECTION ................................ 65
        3.1.4.5 EQUIPMENT USE BY RESIDENT INSPECTORS ....................................... 65
     3.1.5 CONTROL OF PURCHASES ............................................................................. 65
        3.1.5.1 MAINTENANCE OF CONTROL .................................................................. 65
        3.1.5.2 SUPPLIER CONTROL ............................................................................... 66
1.1 REQUEST FOR PROPOSALS

1.1.1 SOLICITATION DATA

1.1.1.1 PDRTA AND CONTRACTING OFFICER

The Pee Dee Regional Transportation Authority
313 S. Stadium Rd., Florence, SC 29506

Contracting Officer: Tavorous Collins, Purchasing Agent

Telephone No.: (843) 519-0885  Fax No.: (843) 665-7552
Email: tcollins@pdrta.org  www.pdrta.org

1.1.1.2 SCOPE

PDRTA requests proposals for the manufacture and delivery of two (2) 18 passenger low floor cutaway transit buses/spare parts in accordance with the terms and conditions set forth below. The Contract shall be a firm-fixed price Contract for the provision of a base order of two (2) 18+ passenger low floor cutaway transit buses with related spare components, and options over a 24 month period.

1.1.1.3 SOLICITATION SCHEDULE

The following is the solicitation schedule for Offerors:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Date(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad for SCBO and Transit Talent</td>
<td>October 30, 2017</td>
</tr>
<tr>
<td>Pre-proposal Conference</td>
<td>November 30, 2017 11:00AM</td>
</tr>
<tr>
<td>All Technical Questions and Requests for Approved Equal</td>
<td>December 15, 2017 11:00AM</td>
</tr>
<tr>
<td>PDRTA Response to Questions and Requests For Approved Equal</td>
<td>December 29, 2017</td>
</tr>
<tr>
<td>Proposal Due Date</td>
<td>January 5, 2018 3:00PM</td>
</tr>
<tr>
<td>Interviews &amp; Bus Inspection</td>
<td>January 11 or 12, 2018 8:00AM-5:00PM</td>
</tr>
<tr>
<td>Contract Intent to Award</td>
<td>January 22, 2018</td>
</tr>
</tbody>
</table>

*All meetings shall be held at PDRTA, 313 S. Stadium Rd. Florence, SC 29506 unless otherwise indicated.

1.1.2 PRE-PROPOSAL

1.1.2.1 PRE-PROPOSAL CONFERENCE

A pre-proposal conference will be held by the PDRTA at 313 S. Stadium Rd. Florence SC 29506, on November 30, 2017 at 11:00AM.
Prospective Offerors must submit written questions to Tavorous Collins, Purchasing Agent by December 15, 2017 11:00AM. Prospective Offerors are reminded that any changes to the RFP will be by written addenda only and nothing stated at the pre-proposal conference shall change or qualify in any way any of the provisions in the RFP and shall not be binding on the PDRTA.

1.1.2.2 OFFEROR COMMUNICATIONS AND REQUESTS

All correspondence, communication and/or contact in regard to any aspect of this solicitation or Offers shall be with the Contracting Officer identified in “PDRTA and Contracting Officer” (Section 1.1.1.1) above, or his/her designated representative. Offerors and their representatives shall not make any contact with or communicate with any members of the PDRTA, or its employees and consultants, other than the Contracting Officer in regard to any aspect of this solicitation or Offers.

At any time during this procurement up to the time specified in “Solicitation Schedule” (Section 1.1.1.3), Offerors may request, in writing, a clarification or interpretation of any aspect of the RFP or any addenda to the RFP. Such written requests shall be made to the Contracting Officer and may be transmitted by email. The Offeror making the request shall be responsible for its proper delivery to the PDRTA per “PDRTA and Contracting Officer” (Section 1.1.1.1) on the form provided in “Request for Clarification” (Section 1.1.6.1). The PDRTA will not respond to verbal requests except those made at the pre-proposal conference, which shall be tentative responses. Any verbal response at a pre-proposal conference that is not confirmed by an addendum shall not be official or binding on the PDRTA. Any responses to such written requests shall be provided by PDRTA in the form of addenda only. Only written responses provided as addenda shall be official and all other forms of communication with any officer, employee or agent of the PDRTA shall not be binding on the PDRTA.

If it should appear to a prospective Offeror that the performance of the Work under the Contract, or any of the matters relating thereto, is not sufficiently described or explained in the RFP or Contract documents, or that any conflict or discrepancy exists between different parts thereof or with any federal, state, local or PDRTA law, ordinance, rule, regulation, or other standard or requirement, then the Offeror shall submit a written request for clarification to the PDRTA within the time period specified above.

1.1.2.3 ADDENDA TO RFP

The PDRTA reserves the right to amend the RFP at any time. Any amendments to or interpretations of the RFP shall be described in written addenda. Prospective Offerors, or their agents, shall be responsible for ensuring that they have received all addenda. Notification of any addendum will be emailed to all prospective Offerors officially known to have received the RFP to the email address provided by each prospective Offeror. Failure of any prospective Offeror to receive the notification or addendum shall not relieve the Offeror from any obligation under its proposal as submitted or under the RFP, as clarified, interpreted or modified. All addenda issued shall become part of the RFP. Prospective Offerors shall acknowledge the receipt of each individual addendum and all prior addenda in their proposals. Failure to acknowledge in their proposals receipt of addenda may, at the PDRTA’s sole option, disqualify the proposal.

If PDRTA determines that the addenda may require significant changes in the preparation of proposals, the deadline for submitting the proposals may be postponed by the number of days
that PDRTA determines will allow Offerors sufficient time to revise their proposals. Any new
Due Date shall be included in the addenda.

1.1.2.4 CONDITIONS, EXCEPTIONS, RESERVATIONS OR UNDERSTANDINGS
Proposals stating conditions, exceptions, reservations or understandings (hereinafter
“deviations”) relating to the RFP may be rejected. Offerors may propose alternates either within
one overall proposal or by submitting more than one proposal. Any alternate proposal shall
include a price proposal in accordance with “Price Proposal Requirements” (Section 1.1.3.3).

Any and all deviations must be explicitly, fully and separately stated in the proposal by
completing form(s) provided in “Form for Proposal Deviation” (Section 1.1.6.9), setting forth at a
minimum the specific reasons for each deviation so that it can be fully considered and, if
appropriate, evaluated by the PDRTA. All deviations not found by the PDRTA to be
unacceptable shall be evaluated in accordance with the appropriate evaluation criteria and
procedures, and may result in the Offeror receiving a less favorable evaluation than without the
deviation.

1.1.2.5 SOUTH CAROLINA STATE BUSINESS ENTERPRISES
It is the policy of the State of South Carolina to maximize opportunities for the participation of
State of South Carolina disadvantaged business enterprises, including minority and women-
owned business enterprises as bidders, subcontractors and suppliers on its procurement
contracts.

Information on the availability of South Carolina State subcontractors and suppliers is available from:
http://www.scdot.org/doing/businessDevelop_SCUnified.aspx

1.1.3 INSTRUCTIONS TO OFFERORS

1.1.3.1 DUE DATE
Sealed proposals, an original and 4 copies (total 5) must be received at the address shown in
“PDRTA and Contracting Officer” (Section 1.1.1.1) by 3:00 PM January 5, 2018 to be
considered. Proposals received after the date and time specified shall not be opened nor
considered for award. Proposals and subsequent offers shall be valid for a period of 180 days.

1.1.3.2 TECHNICAL PROPOSAL REQUIREMENTS
Whenever an item in the specification is identified by reference to brand name, such
identification is intended to indicate the quality and characteristics of products that will be
satisfactory. If it is proposed to furnish an “or equal” item, it will be the proposer’s responsibility
to provide material such as catalog cuts, drawings, and manufacturer’s specifications that will
allow PDRTA to determine whether the item meets the standard specification. Any Requests for
Approved Equals from the specifications shall be submitted to PDRTA Purchasing Agent
(tcollins@pdrtta.org) by December 15, 2017 at 11:00AM. The Request for Approved Equal form
is located on page 23 of the RFP.

1.1.3.2.1 Offeror Qualifications Statement
The Offeror shall submit the information necessary for the PDRTA to determine that the Offeror meets the qualifications listed in “Qualifications Requirements” (Section 1.1.4.3.1). The submittals shall include:

A. A letter of commitment from an underwriter confirming that the Offeror can be bonded for the required amount.
B. A letter of commitment from an underwriter confirming that the Offeror can be insured for the required amount.
   - A Table of Organization of Offeror’s engineering, management, sales, manufacturing and service organizations and resumes of key personnel.
   - A narrative describing Offeror’s manufacturing facilities.
   - A narrative describing Offeror’s spare parts procurement and distribution system.
   - A narrative describing Offeror’s Quality Assurance Program.
   - A narrative describing Offeror’s production plan, schedule and capacity.
   - A narrative describing Offeror’s after-sales support capabilities.
   - A list of ten client references including contact name and title, address, voice telephone number and e-mail address.

1.1.3.2.2 Technical Proposal

The Offeror shall submit the information necessary for PDRTA to evaluate the proposed bus. The submittals shall include:

- Appendix C – Bus Information: lists the minimum detailed information requirements for PDRTA to evaluate a proposed bus, subsystems and components.
- Deviations from the Technical Specifications: provide a list of all proposed deviations, utilizing Form 1.1.6.9 “Form for Proposal Deviations” in order of occurrence by page number and section number. This list should include the listed specification, the proposed deviation and sufficient technical data to enable the request to be evaluated. Each deviation will be evaluated and scored based on the evaluation criteria.
- Appendix D – Job and Task Times: lists the intended time to complete various tasks. Offeror shall provide the actual times.
- Warranty Offering: provide a description of the base warranty offering and as listed in Appendix F.
- Design Reliability Data: provide a list of design criteria, construction factors and components that enhance vehicle reliability and maintainability of the proposed bus.
- Component/Life Cycle/Cost Data: provide a list of the intended life and projected replacement cost for the life of the bus for the components listed in Appendix F.
- Vehicle Life Data: provide data to substantiate that the bus structure and components meet or exceed the life cycle requirements of 150,000 miles or 5 years, whichever comes first.
- Recommended Spare Parts Inventory: provide a complete master list of parts, which the manufacturer considers to be the minimum available inventory to be maintained at a PDRTA facility to support and maintain the proposed bus. Each part description shall include an OEM part number if applicable, Offeror’s part number and an estimate of delivery or lead time.
- Maintenance Facility Requirements: provide a list of special facilities or modifications to existing facilities that may be necessary to service the proposed bus.
• Tools and Equipment Requirements: provide a list of tools and equipment necessary to maintain the proposed bus.
• Maintenance Staff Training Plan: provide the planned curriculum, amount of time and class size to train the PDRTA maintenance and operation instruction staff with regard to maintenance, troubleshooting and repair of the proposed bus. The narrative shall include a list of training aids and materials to be used in various classes.
• Delivery Dates: A listing of the tentative delivery dates for the buses of the base order. This submittal must include the information necessary to determine that the delivery dates are attainable.

1.1.3.3 PRICE PROPOSAL REQUIREMENTS
PDRTA is seeking pricing for an initial purchase of two 18+ passenger low floor cutaway transit buses and associated spare components. Although significant weight within the “price” criteria will be placed on “the cost of a complete single bus”, all pricing (training, options, etc.) as submitted will be used in proposal evaluation, determining basis of award and assessing life cycle costs (where applicable). (Refer to 1.1.4.3.2)

The Offeror is required to complete and execute the Pricing Schedule of Form (Appendix H) and provide the same in the price proposal.

PDRTA is exempt from payment of State of South Carolina and local taxes. Neither the Pricing Schedule nor any requests for payment pursuant to this Agreement to the Procuring Agency shall include any federal, state or local tax unless such a tax is specifically required to be imposed upon said Pricing Schedule or request for payment by the laws and/or regulations of the federal government or any state government. PDRTA will furnish the necessary exemption certificate.

1.1.3.4 PROPOSAL PACKAGING REQUIREMENTS
Proposals shall be submitted in two (2) separately sealed packages. Each package shall be marked as specified below and shall contain the entire proposal documents required and no other documents. Package No. 1 shall contain information required in Section 1.1.3.2. Package No. 2 shall contain information required in 1.1.3.3. These same requirements shall apply to any Best and Final Offers that may be requested.

RFP 1117-01 PACKAGE NO. 1

TECHNICAL PROPOSAL

PDRTA: Bus Procurement – 18+ passenger Low-Floor Cutaway

1. Letter of Transmittal
2. Technical Proposal
3. References and Other Information (if provided by Offeror)

SUBMITTED BY: (Offeror's Name and Address)

RFP 1117-01 PACKAGE NO. 2
Proposal packages shall be addressed and delivered to the address specified in "PDRTA and Contracting Officer" (Section 1.1.1.1)

1.1.3.5 DBE CERTIFICATION
Pursuant to Title 49, Code of Federal Regulations, part 26, an Offeror, as a condition of being authorized to respond to this solicitation, must certify by completing "DBE APPROVAL CERTIFICATION" (Section 1.1.6.7), that it has on file with the Federal Transportation Administration (FTA) an approved or not disapproved annual Disadvantaged Business Enterprise (DBE) subcontracting participation goal.

The Offeror will certify that they have complied with the requirements of 49 CFR part 26: Participation by Disadvantaged Business Enterprises in DOT Programs, and that the offeror’s goals have not been disapproved by the Federal Transit Administration. (See DBE Certification Form - Page 34)

1.1.3.6 MODIFICATION OR WITHDRAWAL OF PROPOSALS
A modification of a proposal already received will be accepted by PDRTA only if the modification is received prior to the Proposal Due Date, or is specifically requested by PDRTA, or is made with a requested BAFO. All modifications shall be made in writing and executed and submitted in the same form and manner as the original proposal.

An Offeror may withdraw a proposal already received prior to the Proposal Due Date by submitting, in the same manner as the original proposal, to the PDRTA a written request for withdrawal executed by the Offeror’s authorized representative. After the proposal Due Date, a proposal may be withdrawn only if the PDRTA fails to award the Contract within the proposal validity period prescribed in “Due Date” (Section 1.1.3.1) or any agreed upon extension thereof. The withdrawal of a proposal does not prejudice the right of an Offeror to submit another proposal within the time set for receipt of proposals.

This provision for modification and withdrawal of proposals may not be utilized by an Offeror as a means to submit a late proposal and, as such, will not alter the PDRTA’s right to reject a proposal.

1.1.4 PROPOSAL EVALUATION, NEGOTIATION AND SELECTION
Proposals will be evaluated, negotiated, selected and any award will be made in accordance with the criteria and procedures described below. The approach and procedures are those that are applicable to a competitive negotiated procurement whereby proposals are evaluated to
determine which proposals are within a competitive range. Discussions and negotiations may then be carried out with Offerors within the competitive range, after which Best and Final Offers (BAFOs) may be requested. However, the PDRTA may select a proposal for award without any discussions or negotiations or request for any BAFO(s). Subject to PDRTA's right to reject any or all proposals, the Offeror will be selected whose proposal is found to be most advantageous to the PDRTA, based upon consideration of the criteria of "Qualification Requirements" (Section 1.1.4.3.1) and "Proposal Evaluation Criteria" (Section 1.1.4.3.2) below.

1.1.4.1 OPENING OF PROPOSALS
Proposals will be publicly opened. All proposals and evaluations will be kept strictly confidential throughout the evaluation, negotiation and selection process. Only the members of the Evaluation Committee and other PDRTA officials, employees and agents having a legitimate interest will be provided access to the proposals and evaluation results during this period.

1.1.4.2 EVALUATION COMMITTEE
An Evaluation Committee will be established. The Committee will make all decisions regarding the evaluations, determination of responsible Offerors and the competitive range, negotiations and the proposal of the Offeror, if any, that may be awarded the Contract. The Evaluation Committee may include officers, employees and agents of PDRTA. The Evaluation Committee will carry out the detailed evaluations.

1.1.4.3 PROPOSAL SELECTION PROCESS
The following describes the process by which proposals will be evaluated and a selection made for a potential award. Any such selection of a proposal by a responsible Offeror shall be made by consideration of only the criteria of "Qualification Requirements" (Section 1.1.4.3.1) and "Proposal Evaluation Criteria" (Section 1.1.4.3.2) below. Section 1.1.4.3.1 specifies the requirements for determining responsible Offerors, all of which must be met by an Offeror to be found qualified. Final determination of an Offerors’ qualification will be made based upon all information received during the evaluation process and as a condition for award. Section 1.1.4.3.2 contains all of the evaluation criteria, and their relative order of importance, by which a proposal from a qualified Offeror will be considered for selection. An award, if made, will be to a responsible Offeror for a proposal that is found to be in the PDRTA’s best interest, price and other evaluation criteria considered.

The procedures to be followed for these evaluations are provided in “Evaluation Procedures” (Section 1.1.4.4) below.

1.1.4.3.1 Qualification Requirements

The following are the requirements for qualifying responsible Offerors. All of these requirements must be met; therefore, they are not listed by any particular order of importance. The Offeror of any proposal that the Evaluation Committee finds not to meet these requirements, and cannot be made to meet these requirements, may be determined not to be responsible and its proposal rejected. The requirements are as follows:

I. Sufficient financial strength and resources and capability to finance the work to be performed and complete the Contract in a satisfactory manner as measured by:
A. Offeror’s financial statements prepared in accordance with United States Generally Accepted Accounting Principles (GAAP) and audited by an independent certified public accountant authorized to practice in the jurisdiction of either the PDRTA or the Offeror.

B. Ability to secure required bond(s) as evidenced by a letter of commitment from an underwriter confirming that the Offeror can be bonded for the required amount.

C. Willingness of any parent company to provide the required financial guaranty evidenced by a letter of commitment signed by an officer of the parent company having the authority to execute the parent company guaranty.

D. Ability to obtain required insurance with coverage values that meet minimum requirements evidenced by a letter from an underwriter confirming that the Offeror can be insured for the required amount.

II. Evidence that the human and physical resources are sufficient to perform the contract as specified and assure delivery of all equipment within the time specified in the Contract, to include:

A. Engineering, management and service organizations with sufficient personnel and requisite disciplines, licenses, skills, experience, and equipment to complete the Contract as required and satisfy any engineering or service problems that may arise during the warranty period.

B. Adequate manufacturing facilities sufficient to produce and factory-test equipment on schedule.

C. A spare parts procurement and distribution system sufficient to support equipment maintenance without delays and a service organization with skills, experience and equipment sufficient to perform all warranty and on-site work.

III. Evidence that Offeror is qualified in accordance with Part 3: Quality Assurance Provisions.

IV. Evidence of satisfactory performance and integrity on contracts in making deliveries on time, meeting specifications and warranty provisions, parts availability, and steps Offeror took to resolve any judgments, liens, fleet defects history, and warranty claims. Evidence shall be determined by client references.

1.1.4.3.2 Proposal Evaluation Criteria

The following are the complete criteria, listed by their relative degree of importance, by which proposals from responsible Offerors will be evaluated and ranked for the purposes of determining the competitive range and to make any selection of a proposal for a potential award. Any exceptions, conditions, reservations or understandings explicitly, fully and separately stated on the “Form for Proposal Deviation” (Section 1.1.6.12) which do not cause PDRTA to consider a proposal to be outside the competitive range, will be evaluated according to the respective evaluation criteria and/or sub-criteria which they affect.
The criteria are listed by their relative order of importance. Sub-criteria are listed by their relative order of importance within the specific criterion they comprise. Also, certain sub-criteria may have sub-criteria that are listed by their relative degree of importance within the specific sub-criterion they comprise.

The following criteria will be used in evaluating the proposal:

**Technical** – The Offeror’s compliance with the Technical Specification and the content of the Technical Proposal. (50 points maximum)

**Price** – The Price Proposal presented to PDRTA. – For scoring purposes within this criteria significant weight is placed on the “cost of bus” listed in Appendix H - row 1. (30 points maximum)

**Warranty** – The initial warranty offering presented to PDRTA. (10 points maximum)

**Delivery Schedule** – The tentative dates for vehicle delivery of the base contract. (5 points maximum)

**Offeror’s Past Performance** – The degree to which the Offeror has worked with procuring agencies with regard to bus manufacture, adherence to production and delivery schedules, resolution of warranty issues and fleet defects. The PDRTA will utilize the client reference (1.1.3.2.1), as well as past history. (5 points maximum)

**Unacceptable Exceptions, Conditions, Reservations and Understandings (pass or fail).**

Exceptions, conditions, reservations or understandings that are explicitly, fully and separately stated on the required form of section 1.1.6.12 "Form for Proposal Deviation" will be evaluated for their acceptability. Each of any exceptions and/or conditions made in a proposal will be evaluated and PDRTA will determine their individual acceptability. An unacceptable exception, condition, reservation, or understanding, if not withdrawn by the Offeror upon the request by PDRTA, would be cause for rejecting the proposal. For the purposes of determining the competitive range a proposal containing unacceptable exceptions, conditions, reservations or understandings, may be included on the basis that the proposal is capable of being made acceptable provided that the Offeror withdraw or modify the unacceptable exceptions, conditions, reservations or understandings. Any exceptions, conditions, reservations or understandings which do not cause PDRTA to consider a proposal to be outside the competitive range, will be evaluated according to the respective evaluation criteria and/or sub-criteria which they effect.

### 1.1.4.4 EVALUATION PROCEDURES

All aspects of the evaluations of the proposals and any discussions/negotiations, including documentation, correspondence and meetings, will be kept confidential during the evaluation and negotiation process.

Proposals will be analyzed for conformance with the instructions and requirements of the RFP and Contract documents. Proposals that do not comply with these instructions and do not include the required information may be rejected as insufficient. PDRTA reserves the right to request an Offeror to provide any missing information and to make corrections. Offerors are
advised that the detailed evaluation forms and procedures will follow the same proposal format and organization specified in “Instructions to Offerors” (Section 1.1.3). Therefore, Offerors shall pay close attention to and strictly follow all instructions. Submittal of a proposal will signify that the Offeror has accepted the whole of the Contract documents, except such conditions, exceptions, reservations or understandings explicitly, fully and separately stated on the forms and according to the instructions of “Form for Proposal Deviation” (Section 1.1.6.9). Any such conditions, exceptions, reservations or understandings that do not result in the rejection of the proposal are subject to evaluation under the criteria of “Proposal Evaluation Criteria” (Section 1.1.4.3.2).

Evaluations will be made in strict accordance with all of the evaluation criteria and procedures specified in “Proposal Selection Process” (Section 1.1.4.3) above. PDRTA will select for any award the highest ranked proposal from a responsible Offeror, qualified under “Qualification Requirements” (Section 1.1.4.3.1) which does not render this procurement financially infeasible and is judged to be most advantageous to PDRTA based on consideration of the evaluation “Proposal Evaluation Criteria” (Section 1.1.4.3.2).

1.1.4.4.1 Evaluation of Competitive Proposals

I. Qualification of Responsible Offerors. Proposals will be evaluated in accordance with requirements of “Qualification Requirements” (Section 1.1.4.3.1) to determine the responsibility of Offerors. Any proposals from Offerors whom PDRTA finds not to be responsible and finds cannot be made to be responsible may not be considered for the competitive range. Final determination of an Offeror’s responsibility will be made upon the basis of initial information submitted in the proposal, any information submitted upon request by PDRTA, information submitted in a BAFO and information resulting from PDRTA inquiry of Offeror’s references and its own knowledge of the Offeror.

II. Detailed Evaluation of Proposals and Determination of Competitive Range. Each proposal will be evaluated in accordance with the requirements and criteria specified in “Proposal Selection Process” (Section 1.1.4.3).

The following are the minimum requirements that must be met for a proposal to be considered for the competitive range. All of these requirements must be met; therefore, they are not listed by any particular order of importance. Any proposal that PDRTA determines not to meet these requirements, and may not be made to meet these requirements, may be determined by PDRTA not to be considered in the competitive range. The requirements are as follows:

A. Offeror is initially evaluated as responsible in accordance with the requirements of “Qualification Requirements” (Section 1.1.4.3.1), or that PDRTA finds it is reasonable that said proposal can be modified to meet said requirements. Final determination of responsibility will be made with final evaluations.

B. Offeror has followed the instructions of the RFP and included sufficient detailed information, such that the proposal can be evaluated. Any deficiencies in this regard must be determined by PDRTA to be either a defect that PDRTA will waive in accordance with “Acceptance/Rejection of Proposals” (Section 1.1.5.1) or that the proposal can be sufficiently modified to meet these requirements.

C. Proposal price would not render this procurement financially infeasible, or it is reasonable that such proposal price might be reduced to render the procurement financially feasible.
PDRTA will carry out and document its evaluations in accordance with the criteria and procedures of “Proposal Selection Process” (Section 1.1.4.3). Any extreme proposal deficiencies that may render a proposal unacceptable will be documented. PDRTA will make specific note of questions, issues, concerns and areas requiring clarification by Offerors and to be discussed in any meetings with Offerors that PDRTA finds to be within the competitive range.

Rankings and spreads of the proposals against the evaluation criteria will then be made by PDRTA as a means of judging the overall relative spread between proposals and of determining which proposals are within the competitive range, or may be reasonably made to be within the competitive range.

III. Proposals not within the Competitive Range. Offerors of any proposals that have been determined by the PDRTA as not in the competitive range, and cannot be reasonably made to be within the competitive range, will be notified in writing.

IV. Discussions with Offerors in the Competitive Range. The Offerors whose proposals are found to be within the competitive range, or may be reasonably made to be within the competitive range, will be notified and any questions and/or requests for clarifications provided to them in writing. Each such Offeror may be invited for a private interview(s) and discussions with PDRTA to discuss answers to written or verbal questions, clarifications and any facet of its proposal.

In the event that a proposal, which has been included in the competitive range, contains conditions, exceptions, reservations or understandings to any Contract requirements as provided in “Form for Proposal Deviation” (Section 1.1.6.9), said conditions, exceptions, reservations or understandings may be negotiated during these meetings. However, PDRTA shall have the right to reject any and all such conditions and/or exceptions, and instruct the Offeror to amend its proposal and remove said conditions and/or exceptions; and any Offeror failing to do so may cause PDRTA to find such proposal to be outside the competitive range.

No information, financial or otherwise, will be provided to any Offeror about any of the proposals from other Offerors. Offerors will not be given a specific price or specific financial requirements they must meet to gain further consideration, except that proposed prices may be considered to be too high with respect to the marketplace or unacceptable. Offerors will not be told of their rankings among the other Offerors.

V. Factory and Site Visits. PDRTA reserves the right to conduct factory visits to inspect the Offeror’s facilities and/or other transit systems which the Offeror has supplied the same or similar equipment.

VI. Best and Final Offers (BAFO). After all interviews have been completed, each of the Offerors in the competitive range will be afforded the opportunity to amend its proposal and make its BAFO. The request for BAFOs shall include:

A. Notice that discussions/negotiations are concluded;

B. Notice that this is the opportunity for submission of a BAFO;
C. A common date and time for submission of written BAFOs, allowing a reasonable opportunity for preparation of the written BAFOs.

D. Notice that if any modification to a BAFO is submitted, it must be received by the date and time specified for the receipt of BAFOs and is subject to the late submissions, modifications, and withdrawals of proposals provisions of the Request for Proposal.

E. Notice that if Offerors do not submit a BAFO or a notice of withdrawal and another BAFO, their immediate previous Offer will be construed as their BAFO.

Any modifications to the initial proposals made by an Offeror in its BAFO shall be identified in its BAFO. BAFOs will be evaluated by PDRTA according to the same requirements and criteria as the initial proposals “Proposal Selection Process” (Section 1.1.4.3). PDRTA will make appropriate adjustments to the initial scores for any sub-criteria and criteria that have been affected by any proposal modifications made by the BAFOs. These final scores and rankings within each criteria will again be arrayed by PDRTA and considered according to the relative degrees of importance of the criteria defined in “Proposal Evaluation Criteria” (Section 1.1.4.3.2).

PDRTA will then choose that proposal which it finds to be most advantageous to PDRTA based upon the evaluation criteria.

PDRTA reserves the right to make an award to an Offeror whose proposal it judges to be most advantageous to PDRTA based upon the evaluation criteria, without conducting any written or oral discussions with any Offerors or solicitation of any BAFOs.

1.1.4.5 CONFIDENTIALITY OF PROPOSALS

Except as otherwise required by the Freedom of Information Law, PDRTA will exempt from disclosure records submitted in the proposal which are trade secrets or are maintained for the regulation of commercial enterprise which if disclosed would cause substantial injury to the competitive position of the subject enterprise. Any such records that an Offeror believes should be exempted from disclosure shall be specifically identified and marked as such. Blanket-type identification by designating whole pages or sections as records exempt from disclosure will not assure confidentiality. The specific records must be clearly identified and an explanation submitted as to why they should be exempt.

Upon a request for records from a third party regarding any records submitted with this proposal for which an exemption was sought PDRTA will notify in writing the party involved. The party involved must respond within 10 (ten) business days with a written statement of the necessity for the continuation of such exemption.

1.1.5 RESPONSE TO PROPOSALS

1.1.5.1 ACCEPTANCE/REJECTION OF PROPOSALS

PDRTA reserves the right to reject any or all proposals for sound business reasons, to undertake discussions with one or more Offerors, and to accept that proposal or modified proposal which, in its judgment, will be most advantageous to the PDRTA, price and other evaluation criteria considered. PDRTA reserves the right to consider any specific proposal that is conditional or not prepared in accordance with the instructions and requirements of this RFP to be noncompetitive. PDRTA reserves the right to waive any defects, or minor informalities or
irregularities in any proposal that do not materially affect the proposal or prejudice other Offerors.

If there is any evidence indicating that two or more Offerors are in collusion to restrict competition or otherwise engaged in anti-competitive practices, the proposals of all such Offerors shall be rejected and such evidence may be a cause for disqualification of the participants in any future solicitations undertaken by PDRTA.

PDRTA may reject a proposal that includes unacceptable deviations as provided in “Conditions, Exceptions, Reservations or Understandings” (Section 1.1.2.4).

1.1.5.2 SINGLE PROPOSAL RESPONSE
If only one proposal is received in response to this RFP and it is found by PDRTA to be acceptable, a detailed price/cost proposal may be requested of the single Offeror. A price or cost analysis, or both, possibly including an audit, may be performed by or for PDRTA of the detailed price/cost proposal in order to determine if the price is fair and reasonable. The Offeror has agreed to such analysis by submitting a proposal in response to this RFP. A price analysis is an evaluation of a proposed price that does not involve an in-depth evaluation of all the separate cost elements and the profit factors that comprise an Offeror’s price proposal. It should be recognized that a price analysis through comparison to other similar procurements must be based on an established or competitive price of the elements used in the comparison. The comparison must be made to a purchase of similar quantity involving similar specifications and in a similar time frame. Where a difference exists, a detailed analysis must be made of this difference and costs attached thereto. Where it is impossible to obtain a valid price analysis, it may be necessary to conduct a cost analysis of the proposed price. A cost analysis is a more detailed evaluation of the cost elements in the Offeror’s Offer to perform. It is conducted to form an opinion as to the degree to which the proposed costs represent what the Offeror’s performance should cost. A cost analysis is generally conducted to determine whether the Offeror is applying sound management practices in proposing the application of resources to the contracted effort and whether costs are allowable, allocable and reasonable. Any such analyses and the results thereof shall not obligate PDRTA to accept such a single proposal; and PDRTA may reject such proposal at its sole discretion.

1.1.5.3 CANCELLATION OF PROCUREMENT
PDRTA reserves the right to cancel the procurement at any time before the Contract is fully executed and approved on behalf of PDRTA.

1.1.5.4 PROTESTS
Pre-Proposal Opening Protests. If an Offeror can demonstrate that the Contract Documents issued by PDRTA are unduly exclusionary and restrictive or that federal, state or local laws or regulations have been violated during the course of the procurement, then the Offeror may seek a review by the Chief Executive Officer or his appointed representative, at 313 S. Stadium Rd., Florence SC, 29506. Protests shall be clearly identified as Protests and submitted in writing as early as possible, but no later than five business days before proposal opening. Within ten business days after receipt of a pre-proposal protest, the appointed representative shall make one of the determinations listed in the paragraph entitled Rulings on Protests.

Post-Proposal Opening Protests. A protest to the acceptance or rejection of any or of all offers or bids to a contract, or to the award thereof, or to any such action proposed or intended by PDRTA must be received in writing by the Executive Director no later than five business days
after the protesting party first learned, or reasonably ought to have learned, of the action or the proposed or intended action to which he/she protests.

In the event the protester alleges that the Executive Director or the representative appointed by the Executive Director to serve as Decision-Maker for the particular protest, engaged in improper conduct during the subject procurement, the PDRTA ‘s Protest Committee shall serve as the Decision-Maker.

Rulings on Protests. Within ten business days, the Protest Committee shall render one of the following determinations:

(a) Protest is overruled.

(b) Protest is substantiated. Protest Committee shall issue instructions to remedy issues relating to the protest.

(c) Procurement activity is suspended until written notification by the Executive Director.

The determination shall be in writing and shall provide at a minimum a general response to each material issue raised in the protest. All documents submitted by the Protester and/or PDRTA staff and reviewed by the Protest Committee in the reaching of a determination shall form and be retained by PDRTA as the formal record of the dispute resolution process.

The issuance of the foregoing determination is PDRTA’s final decision of the dispute.

All interested parties shall be notified of any protests that are filed. PDRTA shall refrain from awarding a contract within five business days of the date of a decision rendered by the Protest Committee regarding a protest, unless PDRTA determines that:

(a) The items to be procured are urgently required.

(b) Delivery or performance will be unduly delayed by failure to make a prompt award.

(c) Failure to make a prompt award will otherwise cause undue harm to PDRTA or the federal government.

Protester’s Appeal to Federal or State Agencies. In the event that PDRTA fails to have written protest procedures or fails to abide by the protest procedures set forth above, and federal or state funds are participating in the procurement, then the protester may seek a review by the appropriate funding agency.

Protesters shall file such a protest not later than five (5) business days after a final decision is rendered under PDRTA’s protest procedure. In instances where the protester alleges that PDRTA failed to make a final determination on the protest, protesters shall file a protest with the appropriate agency not later than five (5) business days after the protester knew or should have known of PDRTA’s failure to render a final determination on the protest.

1.1.5.5 AVAILABILITY OF FUNDS

This procurement is subject to the availability of funding. Funding sources include local share, South Carolina State grants and grants from the Federal Transit Administration. This contract shall be subject to any terms and conditions contained in grants used to fund this contract. The PDRTA’s obligation hereunder is contingent upon the availability of appropriated funds from which payment for the contract purposed can be made. No legal liability on the part of PDRTA for any payment shall arise until funds are made available to the Contracting Officer for this Contract and until the Contractor received notice of such availability, to be confirmed in writing by the Contracting Officer. Any award of Contract hereunder will be conditioned upon said availability of funds for the Contract.
1.1.6 PRE AND POST-AWARD PURCHASER REQUIRED FORMS

1.1.6.1 REQUEST FOR CLARIFICATION
PDRTA RFP 1117-01-All Requests for Clarification due December 15, 2017 11:00 AM

This form must be used for requested clarifications and must be submitted as far in advance of
the Due Date as specified in “Offeror Communications and Requests” (Section 1.1.2.2).

<table>
<thead>
<tr>
<th>Request #:</th>
<th>Offeror: ______________________________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solicitation Ref: __________</td>
<td>Page: _______ Section: ____________________</td>
</tr>
</tbody>
</table>

Questions/Clarification:

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

PDRTA:
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
Request for Clarification, Exception or Approved Equal

ALL REQUESTS FOR APPROVED EQUALS MUST BE RECEIVED
BY December 15, 2017 11:00am

Bid Document Section:

Section Title:

Nature of Request:

If the vendor is seeking concurrence with an approved equal, please submit supporting documentation (such as product specifications) and/or samples to support your contention that the requested equal meets or exceeds the specification minimum requirement.

Signed:

PDRTA Response

Approved: _______  Denied: _______

Explanation:

Signed:  

______________________________________________
1.1.6.2 ACKNOWLEDGMENT OF ADDENDA

The following form shall be completed and included in the proposal.

Failure to acknowledge receipt of all addenda may cause the proposal to be considered non-responsive to the solicitation. Acknowledged receipt of each addendum must be clearly established and included with the Offer.

ACKNOWLEDGMENT OF ADDENDA - PDRTA RFP 1117-01

The undersigned acknowledges receipt of the following addenda to the documents:

Addendum No. ____________________, Dated____________________
Addendum No. ____________________, Dated____________________
Addendum No. ____________________, Dated____________________
Addendum No. ____________________, Dated____________________

Offeror:  ________________________________
Name

Street Address

City, State, Zip

Authorized Signature

Title

Phone
1.1.6.3 PRE-AWARD COMPLIANCE CERTIFICATIONS

1.1.6.3.1 Pre-award Buy America Compliance Certification

PRE-AWARD BUY AMERICA COMPLIANCE CERTIFICATION

As required by Title 49 of the CFR, Part 663 – Subpart B, Pee Dee Regional Transportation Authority (the recipient) is satisfied that the buses to be purchased, ________________________ (number and description of buses) from _____________________________ (the manufacturer), meet the requirements of Section 165(b)(3) of the Surface Transportation Assistance Act of 1982, as amended. The recipient ☐, or its appointed analyst ________________________ (the analyst – not the manufacturer or its agent), has reviewed documentation provided by the manufacturer, which lists (1) the proposed component and subcomponent parts of the buses identified by manufacturer, country of origin, and cost; and (2) the proposed location of the final assembly point for the buses, including a description of the activities that will take place at the final assembly point and the cost of final assembly.

Date: ______________ Signature: ___________________________________________________________________________ Title: Purchasing Agent

1.1.6.3.2 Pre-award Buy America Exemption Certification

PRE-AWARD BUY AMERICA EXEMPTION CERTIFICATION

As required by Title 49 of the CFR, Part 663 – Subpart B, Pee Dee Regional Transportation Authority (the recipient) certifies that there is a letter from FTA that grants a waiver to the buses purchased, ________________________ (number and description of buses), from the Buy America requirements under Section 165(b)(1, (b)(2), or (b)(4) of the Surface Transportation Assistance Act of 1982, as amended.

Date: ______________ Signature: ___________________________________________________________________________ Title: Purchasing Agent

1.1.6.3.3 Pre-award Purchaser’s Requirements Certification

PRE-AWARD PURCHASER’S REQUIREMENTS CERTIFICATION

As required by Title 49 of the CFR, Part 663 – Subpart B, Pee Dee Regional Transportation Authority (the recipient) certifies that the buses to be purchased, ________________________ (number and description of buses), from the Buy America requirements _____________________________ (the manufacturer), are the same product described in the recipient’s solicitation specification and that proposed manufacturer is a responsible manufacturer with the capability to produce a bus that meets the specifications.

Date: ______________ Signature: ___________________________________________________________________________ Title: Purchasing Agent
1.1.6.3.4 Pre-award FMVSS Compliance Certification

PRE-AWARD FMVSS COMPLIANCE CERTIFICATION

As required by Title 49 of the CFR, Part 663 – Subpart D, Pee Dee Regional Transportation Authority (the recipient) certifies that it received, at the pre-award stage, a copy of ________________________’s (the manufacturer) self-certification information stating that the buses, _________________________ (number and description of buses), will comply with the relevant Federal Motor Vehicle Safety Standards issued by the National Highway Traffic Safety Administration in Title 49 of the Code of Federal Regulations, Part 571.

Date: ______________ Signature: ______________________________ Title: Purchasing Agent

1.1.6.3.5 Pre-award FMVSS Exemption Certification

PRE-AWARD FMVSS EXEMPTION CERTIFICATION

As required by Title 49 of the CFR, Part 663 – Subpart D, Pee Dee Regional Transportation Authority (the recipient) certifies that it received, at the pre-award stage, a statement from ________________________’s (the manufacturer) indicating that the buses, _________________________ (number and description of buses), will not be subject to the Federal Motor Vehicle Safety Standards issued by the National Highway Traffic Safety Administration in Title 49 of the Code of Federal Regulations, Part 571.

Date: ______________ Signature: ______________________________ Title: Purchasing Agent
### 1.1.6.4 OFFEROR SERVICE AND PARTS SUPPORT DATA

<table>
<thead>
<tr>
<th>Location of nearest Technical Service Representative to PDRTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Address</td>
</tr>
<tr>
<td>Telephone</td>
</tr>
</tbody>
</table>

Offeror to describe technical services readily available from said representative.

<table>
<thead>
<tr>
<th>Location of nearest Parts Distribution Center to PDRTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Address</td>
</tr>
<tr>
<td>Telephone</td>
</tr>
</tbody>
</table>

Offeror shall describe the extent of parts available at said center.

**Policy for Delivery of Parts and Components to be Purchased for Service and Maintenance**

| Regular Method of Shipment | ________________________________ |
| Cost to PDRTA | ________________________________ |
1.1.6.5 BUY AMERICA CERTIFICATION

Certificate of Compliance

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

Date: ________________________________________________________

Signature: ______________________________________________________

Title: __________________________________________________________

Company Name: _______________________________________________

Certificate of Non-Compliance

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

Date: ________________________________________________________

Signature: ______________________________________________________

Title: __________________________________________________________

Company Name: _______________________________________________
1.1.6.6 DEBARMENT AND SUSPENSION CERTIFICATION (LOWER TIER COVERED TRANSACTION)

The prospective lower tier participant (Offeror) certifies, by submission of this Offer, that neither it nor its “principals” as defined at 49 C.F.R. § 29.105(p) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

If the prospective lower tier participant (Offeror) is unable to certify to the statement above, it shall attach an explanation, and indicate that it has done so, by placing an “X” in the following space


_______________________________ Signature of the Bidder or Offeror’s Authorized Official

_______________________________ Name and Title of the Bidder or Offeror’s Authorized Official

_______________________________ Date
1.1.6.7 LOBBYING CERTIFICATION

The Bidder or Offeror certifies, to the best of its knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of a Federal department or agency, a Member of the U.S. Congress, an officer or employee of the U.S. Congress, or an employee of a Member of the U.S. Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification thereof.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form--LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions (as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96).

3. The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.


_______________________________ Signature of the Bidder or Offeror’s Authorized Official

_______________________________ Name and Title of the Bidder or Offeror’s Authorized Official

_______________________________ Date
**DISCLOSURE OF LOBBYING ACTIVITIES**
Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352
(SEE REVERSE FOR PUBLIC BURDEN DISCLOSURE)

<table>
<thead>
<tr>
<th>1. Type of Federal Action:</th>
<th>2. Status of Federal Action:</th>
<th>3. Report Type:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. contract</td>
<td>a. bid/offer/application</td>
<td>a. initial filing</td>
</tr>
<tr>
<td>b. grant</td>
<td>b. initial award</td>
<td>b. material change</td>
</tr>
<tr>
<td>c. cooperative agreement</td>
<td>c. post-award</td>
<td>For Material Change Only:</td>
</tr>
<tr>
<td>d. loan</td>
<td></td>
<td>year: _____ quarter _____</td>
</tr>
<tr>
<td>e. loan guarantee</td>
<td></td>
<td>date of last report ______</td>
</tr>
<tr>
<td>f. loan insurance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Name and address of Reporting Entity:
   - Prime
   - Subawardee

5. If Reporting Entity in No. 4 is Subawardee,
   Enter Name and Address of Prime:

6 Federal Department/Agency:

7. Federal Program Name/Description:
   CFDA Number, if applicable: _______________

8. Federal Action Number, if known:

9. Award Amount, if known: $

10. a. Name and Address of Lobbying Entity
    (if individual, last name, first name, Mi:)

11. Amount of Payment (check all that apply):
    $ ___________  •  actual  •  planned

12. Form of Payment (Check all that apply):
    a. cash
    b. in-kind; specify: nature _____________ value _____________

13. Type of Payment (check all that apply):
    •  a. retainer
    •  b. one-time fee
    •  c. commission
    •  d. contingent fee
    •  e. deferred
    •  f. other; specify: __________________

14. Brief Description of Services Performed or to be Performed and Date(s) of Service, Including officer(s), employee(s), or Member(s) contacted, for Payment Indicated in Item 11:

15. Continuation Sheet(s) SF-LLL-A attached:  •  Yes  •  NO

16. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosures shall be subject to a civil penalty of not less than $10,000 for each such failure.

Signature: _____________________________

Print Name: ___________________________

Title: ________________________________

Telephone No.: _______________________
DIRECTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Use the SF-LLL-A Continuation Sheet for additional information if the space on the form is inadequate. Please complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.

2. Identify the status of the covered Federal action.

3. Identify the appropriate classification of this report. If this is a follow-up report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last information previously submitted report by this reporting entity for this covered Federal action.

4. Enter the full name, address, city, state and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting that designates if it is, or expects to be, a prime or subawardee recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.

5. If the organization filing the report in item 4 checks “Subawardee”, then enter the full name, address, city, state and zip code of the prime Federal recipient. Include Congressional District, if known.

6. Enter the name of the Federal agency making the award or loan commitment. Include at least on organizational level below PDRTA, if known. For example, Department of Transportation, United States Coast Guard.

7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.

8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., “RFP-DE-90-001.”

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.

10. (a) Enter the full name, address, city, state and zip code of the lobbying entity engaged by the reporting entity identified in item 4 to influence the covered Federal action.
    (b) Enter the full names of the individual(s) performing services, and include full address if different form 10 (a). Enter Last Name, First Name, and Middle Initial (MI).

11. Enter the amount of compensation paid or reasonably expected to be paid by the reporting entity (item 4) to the lobbying entity (item 10). Indicate whether the payment has been made (actual) or will be made (planned). Check all boxes that apply. If this is a material change report, enter the cumulative amount of payment made or planned to be made.

12. Check the appropriate box(es). Check all boxes that apply. If payment is made through
13. Check the appropriate box(es). Check all boxes that apply. If other, specify nature.

14. Provide a specific and detailed description of the services that the lobbyist has performed, or will be expected to perform, and the date(s) of any services rendered. Include all preparatory and related activity, not just time spent in actual contact with Federal officials. Identify the Federal official(s) or employee(s) contacted or the officer(s), employee(s), or Member(s) of Congress that were contacted.

15. Check whether or not a SF-LLL-A Continuation Sheet(s) is attached.

16. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the date needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, D.C. 20503.

DISCLOSURE OF LOBBYING ACTIVITIES

Reporting Entity: ___________________________ Page ___ of ___
1.1.6.8 DBE CERTIFICATION

I hereby certify that the Offeror has complied with the requirements of 49 CFR part 26, Participation by Disadvantaged Business Enterprises in DOT Programs, and that our goals have not been disapproved by the Federal Transit Administration.

_________________________________ Signature of the Offeror’s Authorized Official

_________________________________ Name and Title of the Offeror’s Authorized Official

_________________________________ Date
1.1.6.9 CERTIFICATE OF COMPLIANCE WITH BUS TESTING REQUIREMENT

The undersigned certifies that the vehicles offered in this procurement comply and will, when delivered, comply with 49 U.S.C. § 5323(c) and FTA’s implementing regulation at 49 CFR Part 665 according to the indicated one of the following three alternatives.

(mark one and only one of the three blank spaces with an “x”)

1. ___ The buses offered herewith have been tested in accordance with 49 CFR Part 665 on ________________________ (date). The vehicles being sold should have the identical configuration and major components as the vehicle in the test report, which must be submitted with this Offer. If the configuration or components are not identical, the manufacturer shall provide with its Offer a description of the change and the manufacturer’s basis for concluding that it is not a major change requiring additional testing.

2. ___ The manufacturer represents that the vehicle is "grandfathered" (has been used in mass transit service in the United States before October 1, 1988, and is currently being produced without a major change in configuration or components), and submits with this Offer the name and address of the recipient of such a vehicle and the details of that vehicle’s configuration and major components.

3. ___ The vehicle is a new model and will be tested and the results will be submitted to PDRTA prior to acceptance of the first bus.

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

Date: ________________________________

Signature: ________________________________

Company Name: ________________________________

Title: ________________________________
### 1.1.6.10 OPEN TRADE REPRESENTATION CERTIFICATE OF COMPLIANCE

**OPEN TRADE REPRESENTATION**
(S.C. Code Ann. §§ 11-35-5300)

*The following representation, which is required by Section 11-35-5300(A), is a material inducement for the State to award a contract to you.*

I, the official named below, certify I am duly authorized to execute this certification on behalf of the vendor identified below, and, as of the date of my signature, the vendor identified below is not currently engaged in the boycott of a person or an entity based in or doing business with a jurisdiction with whom South Carolina can enjoy open trade, as defined in SC Code Section 11-35-5300.

<table>
<thead>
<tr>
<th>Vendor Name (Printed)</th>
<th>State Vendor No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>By (Authorized Signature)</td>
<td>Date Executed</td>
</tr>
<tr>
<td>Printed Name and Title of Person Signing</td>
<td>[Not used]</td>
</tr>
</tbody>
</table>
IRAN DIVESTMENT ACT OF 2014

(S.C. Code Ann. §§ 11-57-10, et seq.)

The Iran Divestment Act List is a list published by the South Carolina Budget and Control Board pursuant to Section 11-57-310 that identifies persons engaged in investment activities in Iran.

Currently, the list is available at the following URL: http://procurement.sc.gov/PS/PS-iran-divestment.phtm (.) Section 11-57-310 requires the government to provide a person ninety days written notice before he is included on the list. The following representation, which is required by Section 11-57-330(A), is a material inducement for the State to award a contract to you.

I, _____________________________________ the official named below, certify I am duly authorized to execute this certification on behalf of _____________________________________ the vendor identified below, and, as of the date of my signature, the vendor identified below is not on the current Iran Divestment Act List. I further certify that I will notify the Procurement Officer immediately if, at any time before award of a contract, the vendor identified below is added to the Iran Divestment Act List.

______________________________________
Vendor Name (Printed)

______________________________________
Taxpayer Identification No.

______________________________________
By (Authorized Signature)

______________________________________
State Vendor No.

______________________________________
Printed Name and Title of Person Signing

______________________________________
State Executed
1.1.6.12 FORM FOR PROPOSAL DEVIATION

The following form shall be completed for each condition, exception, reservation or understanding (i.e., deviation) in the proposal according to “Conditions, Exceptions, Reservations and Understandings” (Section 1.1.2.4). One copy without any price/cost information is to be placed in the technical proposal as specified in “Technical Proposal Requirements” (Section 1.1.3.2) and a separate copy with any price/cost information placed in the price proposal as specified in “Price Proposal Requirements” (Section 1.1.3.3).

Deviation # ___________ Offeror: ____________________________

Solicitation Ref: Page: ___________ Section: _________________

Complete Description of Deviation

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

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____________________________________________________________________________

____________________________________________________________________________

Rationale (Pros & Cons):

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

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____________________________________________________________________________

____________________________________________________________________________
1.1.6.13 PRICING SCHEDULE (Refer to Pricing Matrix, Appendix H)

The buses and materials to be furnished under the proposed contract shall be priced as listed below in the Pricing Matrix (Appendix H). Refer to Appendix H – Deliverables and Contract Requirements - for a list of materials other than complete buses such as spare components, test and/or diagnostic equipment and OEM manuals to be furnished during the contact.

<table>
<thead>
<tr>
<th>18+ Passenger Low Floor Cutaway Bus</th>
<th>Pricing</th>
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<tbody>
<tr>
<td><strong>OPTIONS:</strong></td>
<td></td>
</tr>
<tr>
<td>Recommended Spare Parts Inventory</td>
<td></td>
</tr>
<tr>
<td>GFI Odyssey Electronic Farebox with Trim</td>
<td></td>
</tr>
<tr>
<td>Initial Bus Build Test &amp; Diagnostic Equipment – Appendix H</td>
<td></td>
</tr>
<tr>
<td>Air bag suspension system</td>
<td></td>
</tr>
<tr>
<td>Automatic Vehicle Monitoring (AVM) – 5.10.4.7.7</td>
<td></td>
</tr>
<tr>
<td>Wireless Data Transfer–Auto Announcement (per facility) – 5.10.4.7.10</td>
<td>Refer to Appendix H “Pricing Matrix”</td>
</tr>
<tr>
<td>Wireless Data Transfer-Video – 5.10.4.11.6</td>
<td></td>
</tr>
<tr>
<td>Additional Warranty – Appendix F</td>
<td></td>
</tr>
</tbody>
</table>
1.1.6.14 NON-COLLUSIVE PROPOSAL CERTIFICATION

Statement of Non-Collusion

By submission of this proposal, each Offeror and each person signing on behalf of any Offeror certifies, and in the case of a joint proposal each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his/her knowledge and belief:

(1) The prices in this proposal have been arrived at independently, without collusion, consultation, communication or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;

(2) Unless otherwise required by law, the prices which have been quoted in this proposal have not been knowingly disclosed by the Offeror and will not knowingly be disclosed by the Offeror prior to opening, directly or indirectly, to any other proponent or to any competitor; and

(3) No attempt has been made or will be made by the Offeror to induce any other person, partnership or corporation to submit or not to submit a proposal for the purpose of restricting competition.

A BID SHALL NOT BE CONSIDERED FOR AWARD NOR SHALL ANY AWARD BE MADE WHERE (1), (2), (3) ABOVE HAVE NOT BEEN COMPLIED WITH; PROVIDED HOWEVER, THAT IF IN ANY CASE THE BIDDER(S) CANNOT MAKE THE FOREGOING CERTIFICATION, THE BIDDER SHALL SO STATE AND SHALL FURNISH BELOW A SIGNED STATEMENT WHICH SETS FORTH IN DETAIL THE REASONS THEREFORE:

[AFFIX ADDENDUM TO THIS PAGE IF SPACE IS REQUIRED FOR STATEMENT.]

Subscribed to under penalty of perjury under the laws of the State of South Carolina, this _______ day of ______________________, 2016 as the act and deed of said corporation or partnership.

__________________________________
Signature

__________________________________
Printed Name and Title
**IF PROPOSER(S) IS A PARTNERSHIP, COMPLETE THE FOLLOWING:**

<table>
<thead>
<tr>
<th>NAMES OF PARTNERS OR PRINCIPALS</th>
<th>LEGAL RESIDENCE</th>
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</table>

**IF PROPOSER(S) (ARE) A CORPORATION, COMPLETE THE FOLLOWING:**

<table>
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<tr>
<th>NAME</th>
<th>LEGAL RESIDENCE</th>
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<tr>
<td>PRESIDENT:</td>
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<td>SECRETARY:</td>
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<tr>
<td>TREASURER:</td>
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<td>PRESIDENT:</td>
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<tr>
<td>TREASURER:</td>
<td></td>
</tr>
</tbody>
</table>
Identifying Data

Potential Contractor

Address

(street)

(city, state, zip)

Telephone

If applicable, Responsible Corporate Officer

Name ____________________________ Title ____________________________

Signature __________________________________________________________

Joint or combined proposals by companies or firms must be certified on behalf of each participant.

____________________________________

____________________________________

Legal name of person, firm or corporation

By ____________________________ By ____________________________

Name ____________________________ Name ____________________________

Title ____________________________ Title ____________________________

Address ____________________________ Address ____________________________
1.1.6.15 DISCLOSURE OF CONTACTS FORM

This form shall be completed and submitted with your proposal. Failure to complete and submit this form shall result in a determination of non-responsiveness and disqualification of the proposal. If at the time of submission of this form, the specific name of a person authorized to attempt to influence a decision on your behalf is unknown, you agree to provide the specific person's information when it is available. You also agree to update this information during the negotiation or evaluation process of this procurement, and throughout the term of any contract awarded to your company pursuant to this proposal.

Name of Contractor:____________________________________________________________

Address:__________________________________________________________

Name and Title of Person Submitting this Form: ___________________________

Is this an initial filing in accordance with Section II, paragraph 1 of EO 127 or an updated filing in accordance with Section II, paragraph 2 of EO 127? (Please circle):

Initial filing

Updated filing

The following person or organization was retained, employed or designated by or on behalf of the Contractor to attempt to influence the procurement process:

Name:_______________________________________________________________________

Address: __________________________________________________________________

Telephone Number:  __________________________________

Place of Principal Employment: ___________________________________________________

Occupation: __________________________________________________________________

Does the above named person or organization have a financial interest in the procurement*? (Please circle)

yes no

* Financial interest in the procurement means (a) owning or exercising direct or indirect control over, or owning a financial interest of more than one percent in, a contractor or other entity that stands to gain or benefit financially from the award of a procurement contract; (b) receiving, expecting or attempting to receive compensation, fees, remuneration or other financial gain or benefit from a contractor or other individual or entity that stands to benefit financially from procurement contract; (c) being compensated by, or being a member of, an entity or organization which is receiving, expecting or attempting to receive compensation, fees, remuneration or other financial gain from a contractor or other individual or entity that stands to benefit financially from a procurement contract; (d) receiving, expecting or attempting to receive any other financial gain or benefit as a result of the procurement contract; (e) being a relative of a person with a financial interest in the procurement.
1.1.6.16 DISCLOSURE OF PRIOR NON-RESPONSIBILITY DETERMINATIONS

Name of Contractor: ____________________________________________________________

Address: ________________________________________________________________

Name and Title of Person Submitting this Form: ________________________________

Has any covered agency or authority* made a finding of non-responsibility regarding the Contractor in the last five years? (Please circle):

No                  Yes

If yes, was the basis for the finding of the Contractor’s non-responsibility due to the intentional provision of false or incomplete information required by Executive Order Number 127? (Please circle):

No                  Yes

If yes, please provide details regarding the finding of non-responsibility below.

Covered Agency or Authority: ________________________________________________

Year of Finding of Non-responsibility: ______________________________________

Basis of Finding of Non-Responsibility:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

* Covered agency or authority means any State department, office or division, or any board, commission or bureau thereof, and any public benefit corporation, public authority or commission at least one of whose members is appointed by the Governor.
1.2 OFFER

By execution below Offeror hereby offers to furnish equipment and services as specified in the PDRTA’s Request for Proposals No. 1117-01 Including “General Provisions” (Section 2), “Quality Assurance Provisions” (Section 3), “Warranty Provisions” (Section 4) and “Technical Specifications” (Section 5) therein.

Offeror: ______________________________________

Name

________________________________________

Street Address

________________________________________

City, State, Zip

________________________________________

Signature of Authorized Signer

________________________________________

Title

________________________________________

Phone
1.3 AWARD
By execution below PDRTA accepts Offer as indicated above.

Chief Executive Officer: ______________________________
                          Signature

Date of Award: ______________________________
2.1 DEFINITIONS
The following are definitions of special terms used in this document.

**Authorized Signer/Signature.** The person who is executing this Contract on behalf of the Offeror/Contractor and who is authorized to bind the Offeror/Contractor.

**PDRTA.** The Pee Dee Regional Transportation Authority

**Contract.** The Offer and its acceptance by PDRTA as manifested by the contract documents specified in "Contract Documents" (Section 2.2.2).

**Contracting Officer.** The person who is responsible for this Solicitation on behalf of the PDRTA.

**Contractor.** The successful Offeror who is awarded a Contract for providing all buses and equipment described in the Contract Documents.

**Defect.** Patent or latent malfunction or failure in manufacture, installation, or design of any component or subsystem.

**Due Date.** The date and time by which Offers (proposals or bids) must be received by PDRTA as specified in "Instructions to Offerors" (Section 1.1.3 of PDRTA's solicitation).

**Offer.** A promise to deliver equipment and services according to the underlying solicitation of PDRTA documented using the prescribed form in the solicitation, including any bid or proposal or Best and Final Offer.

**Offeror.** A legal entity that makes an Offer.

**Non-Technical Deviation:** A deviation that refers to Sections 1 through 4. PDRTA will respond in writing to each non-technical deviation.

**Related Defect.** Damage inflicted on any component or subsystem as a direct result of a separate Defect.

**Solicitation.** PDRTA's Request for Proposals.

**Supplier or Subcontractor.** Any manufacturer, company, or agency providing units, components, or subassemblies for inclusion in the bus. Supplier items shall require qualification by type and acceptance tests in accordance with requirements defined in Part 3: Quality Assurance Provisions.

**Technical Deviation:** A deviation to Section 5 of the RFP. PDRTA will evaluate and score each technical deviation as part of the technical proposal.

**Work.** Any and all labor, supervision, services, materials, machinery, equipment, tools, supplies, and facilities called for by the Contract and necessary to the completion thereof.
2.2 CONTRACT AND MODIFICATIONS

2.2.1 CONTRACT AWARD AND EXECUTION

The acceptance of an Offer for award, if made, shall be evidenced by a notice of award of Contract in writing delivered in person or by mail to the Offeror whose Offer is accepted. No other act by PDRTA shall evidence acceptance of an Offer. Such notice shall obligate said Offeror to commence performance under the Contract as specified in "Production of Documents" (Section 2.7.3).

2.2.1.1 ORDERING OF BUSES

(a) Any bus to be furnished under this Contract shall be ordered by issuance of delivery (purchase) orders by the individuals designated in the specifications.

(b) All delivery (purchase) orders are subject to the terms and conditions of this Contract. In the event of conflict between a delivery (purchase) order and this Contract, the Contract shall control.

(c) A delivery (purchase) order is considered "issued" when PDRTA deposits the order in the mail or faxes a copy to the Contractor.

(d) Any order issued during the effective period of this Contract and not completed by the Contractor within that period shall be completed by the Contractor within the time specified in the order. The Contract shall govern the Contractor’s rights and obligations with respect to that order to the same extent as if the order were complete during the contract’s effective period.

2.2.1.2 DELIVERY DATES

Bus delivery dates for the initial bus build will be determined by using the “Bus Delivery Dates” submittal. The amount of time that elapses between the ordering of the initial bus build and delivery of the initial bus build will be used as a benchmark for future bus orders under this Contract.

2.2.1.3 PILOT BUS

The first bus of the initial build of each bus model ordered (e.g. bus of different length) shall be delivered to PDRTA four weeks before beginning the manufacture of the remaining buses of the build. This period will be used to further evaluate compliance with the specifications.

2.2.2 CONTRACT DOCUMENTS

The Contract consists of the following:

- Part 1 - Contractor's Offer or Best and Final Offer and PDRTA's Notice of Award
- Part 2 - General Contractual Provisions
- Part 3 - Quality Assurance Provisions
- Part 4 - Warranty Provisions
- Part 5 - Technical Specifications
- Appendix A – South Carolina State Clauses
- Appendix B – Federally Required and Other Contract Clauses
- Addenda - As issued.

In the event of any conflict among these documents the order of precedence shall be:

First – Addenda issued by PDRTA
Second – Part 5, Technical Specifications
2.2.3 MODIFICATIONS TO CONTRACT

2.2.3.1 CONTRACTOR CHANGES
Any proposed change in this Contract shall be submitted in writing to PDRTA for its prior approval.

2.2.3.2 WRITTEN CHANGE ORDERS
Verbal change orders are not permitted. No change in this Contract shall be made unless PDRTA gives prior written approval therefore. The Contractor shall be liable for all costs resulting from, and/or for satisfactorily correcting, any specification change not properly ordered by written modification to the Contract and signed by PDRTA.

2.2.3.3 CHANGE ORDER PROCEDURE
As soon as reasonably possible but no later than 30 (thirty) calendar days after receipt of the written change order to modify the Contract, the Contractor shall submit to the Contracting Officer a detailed price and schedule proposal for the work to be performed. This proposal shall be accepted or modified by negotiations between the Contractor and the Contracting Officer. At that time a detailed modification shall be executed in writing by both parties. Disagreements that cannot be resolved within negotiations shall be resolved in accordance with the Contract disputes clause. Regardless of any disputes, the Contractor shall proceed with the work ordered.

2.2.3.4 PRICE ADJUSTMENT FOR REGULATORY CHANGES
If price adjustment is indicated, either upward or downward, it shall be negotiated between PDRTA and the Contractor for changes that are mandatory as a result of legislation or regulations that are promulgated and become effective after the Due Date. Such price adjustment may be audited, where required.

2.2.4 PARTIES AND CHANGES IN PARTIES

2.2.4.1 PARTIES
The parties to the contract are PDRTA as defined in “Definitions”, Section 2.1 and the Offeror as set out in the accepted Offer.

2.2.4.2 SUCCESSION
The Contract will be binding on the parties, their successors, and assigns.

2.2.4.3 ASSIGNMENT AND SUBCONTRACTING
The Contractor will not assign or subcontract its rights or obligations under the Contract without prior written permission of PDRTA, and no such assignment or subcontract will be effective until approved in writing by PDRTA. The PDRTA will not assign or subcontract its rights or obligations under Contract without prior written permission of the Contractor, except that
PDRTA reserves the right to assign all or a portion of the specified deliverables along with its rights and/or obligations under the Contract to another transit agency (any FTA-funded entity).

2.2.5 SPECIFICATION AND OFFER OMISSIONS

Notwithstanding the provision of drawings, technical specifications, or other data by PDRTA, the Contractor shall have the responsibility of supplying all parts and details required to make the bus complete and ready for service even though such details may not be specifically mentioned in the drawings and specifications. Fare collection equipment, communication equipment, and other items that are installed by PDRTA shall not be the responsibility of the Contractor unless they are included in this Contract.

Any request, condition, exception, reservation, understanding or other deviation by Contractor not separately stated as required by "Instructions to Offerors" (Section 1.1.3 of PDRTA's solicitation) by completing the specified form(s) shall be invalid and shall not be binding on PDRTA.

2.2.6 TERMINATION OF CONTRACT

2.2.6.1 TERMINATION FOR CONVENIENCE

The performance of work under this Contract may be terminated by PDRTA in accordance with this clause in whole, or from time to time in part, whenever the Contracting Officer shall determine that such termination is in the best interest of PDRTA. Any such termination shall be effected by delivery to the Contractor of a notice of termination specifying the extent to which performance of work under the Contract is terminated, and the date upon which such termination becomes effective.

After receipt of a notice of termination, and except as otherwise directed by the Contracting Officer, the Contractor shall: stop work under the Contract on the date and to the extent specified in the notice of termination; place no further orders or subcontracts for materials, services, or facilities, except as may be necessary for completion of such portion of the work under the Contract as is not terminated; terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the notice of termination; assign to PDRTA in the manner, at the times, and to the extent directed by the Contracting Officer, all of the right, title, and interest of the Contractor under the orders and subcontracts so terminated, in which case PDRTA shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts; settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, with the approval or ratification of the Contracting Officer, to the extent she may require, which approval or ratification shall be final for all the purposes of this clause; transfer title to PDRTA and deliver in the manner, at the times, and to the extent, if any, directed by Contracting Officer the fabricated or un-fabricated parts, work in process, completed work, supplies, and other material produced as part of, or acquired in connection with the performance of, the work terminated, and the completed or partially completed plans, drawings, information and other property which, if the Contract had been completed, would have been required to be furnished to PDRTA; use its best efforts to sell, in the manner, at the times, to the extent, and at the price(s) directed or authorized by the Contracting Officer, any property of the types referred to above, provided, however, that the Contractor shall not be required to extend credit to any purchaser, and may acquire any such property under the conditions prescribed by and at a price(s) approved by the Contracting Officer, and provided further, that the proceeds of any such transfer or disposition shall be applied in reduction of any payments to be made by PDRTA to the Contractor under this
Contract or shall otherwise be credited to the price or cost of the work covered by this Contract or paid in such other manner as the Contracting Officer may direct; complete performance of such part of the work as shall not have been terminated by the notice of termination; and take such action as may be necessary, or as the Contracting Officer may direct, for the protection or preservation of the property related to this Contract which is in the possession of the Contractor and in which PDRTA has or may acquire an interest.

The Contractor shall be paid its costs, including contract close-out costs, and profit on work performed up to the time of termination. The Contractor shall promptly submit its termination claim to PDRTA to be paid the Contractor. Settlement of claims by the Contractor under this termination for convenience clause shall be in accordance with the provisions set forth in Part 49 of the Federal Acquisition Regulations (48 CFR 49) except that wherever the word "Government" appears it shall be deleted and the word "PDRTA" shall be substituted in lieu thereof.

2.2.6.2 TERMINATION FOR DEFAULT

PDRTA may, by written notice of default to the Contractor, terminate the whole or any part of this Contract if the Contractor fails to make delivery of the supplies or to perform the services within the time specified herein or any extension thereof; or if the Contractor fails to perform any of the other provisions of the Contract, or so fails to make progress as to endanger performance of this Contract in accordance with its terms, and in either of these two circumstances does not cure such failure within a period of 10 (ten) days (or such longer period as the Contracting Officer may authorize in writing) after receipt of notice from the Contracting Officer specifying such failure.

In the event that PDRTA elects to waive its remedies for any breach by Contractor of any covenant, term or condition of this Contract, such waiver by PDRTA shall not limit PDRTA's remedies for any succeeding breach of that or any other term, covenant, or condition of this Contract.

If the Contract is terminated in whole or in part for default, PDRTA may procure, upon such terms and in such manner as the Contracting Officer may deem appropriate, supplies or services similar to those so terminated. The Contractor shall be liable to PDRTA for any excess costs for such similar supplies or services, and shall continue the performance of this Contract to the extent not terminated under the provisions of this clause. Except with respect to defaults of subcontractors, the Contractor shall not be liable for any excess costs if the failure to perform the Contract arises out of causes beyond the control and without the fault or negligence of the Contractor. If the failure to perform is caused by the default of a subcontractor, and if such default arises out of causes beyond the control of both the Contractor and subcontractor, and without the fault or negligence of either of them, the Contractor shall not be liable for any excess costs for failure to perform, unless the supplies or services to be furnished by the subcontractor were obtainable from other sources in sufficient time to permit the Contractor to meet the required delivery schedule.

Payment for completed supplies delivered to and accepted by PDRTA shall be at the Contract price. PDRTA may withhold from amounts otherwise due the Contractor for such completed supplies such sum as the Contracting Officer determines to be necessary to protect PDRTA against loss because of outstanding liens or claims of former lien holders.

If, after notice of termination of this Contract under the provisions of this clause, it is determined for any reason that the Contractor was not in default under the provisions of this clause, or that
the default was excusable under the provisions of this clause, the rights and obligations of the parties shall be the same as if the notice of termination had been issued pursuant to termination for convenience of the Procurement Agency.

The rights and remedies of PDRTA provided in this clause shall not be exclusive and are in addition to any other rights and remedies provided by law or under this Contract.

2.2.7 DISPUTES

Any dispute arising under this Agreement that is not disposed of by agreement shall be decided by the Contracting Officer who shall reduce the decision to writing and mail or otherwise furnish a copy thereof to the Contractor. The decision of the Contracting Officer shall be final and conclusive unless within thirty days from the date of receipt of such decision, the Contractor mails or otherwise furnishes to the Contracting Officer a written appeal of the original finding addressed to PDRTA and requesting a hearing on the claim.

If the Contractor appeals the Contracting Officer’s decision, PDRTA shall appoint a Protest Committee and the Contractor shall be afforded an opportunity to be heard and to offer evidence in its appeal.

The decision of the Protest Committee shall be final and conclusive unless determined by a court of competent jurisdiction to have been fraudulent or capricious or arbitrary or so grossly erroneous as necessarily to imply bad faith or not supported by substantial evidence.

Pending final decision of the disputes hereunder, the Contractor shall proceed diligently with the performance of this Agreement and in accordance with the decision of the Contracting Officer.

2.2.8 COMMUNICATIONS

Communications in connection with this Contract shall be in writing and shall be delivered personally; by facsimile, email, or by regular, registered, or certified mail addressed to the officer(s) or employee(s) of PDRTA and of the Contractor designated to receive such communications. Telephone calls may be used to expedite communications but shall not be official communication unless confirmed in writing.

Communications shall be considered received at the time actually received by the addressee or designated agent.

2.3 DELIVERY AND TITLE

2.3.1 DELIVERIES

2.3.1.1 BUS DELIVERY PROCEDURE

Delivery of buses shall be determined by signed receipt of PDRTA’s designated representative, the Maintenance Manager, at 313 S. Stadium Rd. Florence SC 29506, and may be preceded by a cursory inspection of the bus.

2.3.1.2 DELIVERY SCHEDULE

Days and hours of delivery shall be 7:00 a.m. through 3:30 p.m. Monday through Friday, excluding holidays that are officially recognized PDRTA holidays.
2.3.1.3 PRE-DELIVERY TESTS AND INSPECTIONS
The pre-delivery tests and inspections shall be performed at or near the Contractor's plant; they shall be performed in accordance with the procedures defined in Part 3: Quality Assurance Provisions, and they may be witnessed by the resident inspector. When the bus passes these tests and inspections, the resident inspector shall authorize release of the bus.

2.3.1.4 ASSUMPTION OF RISK OF LOSS
PDRTA shall assume risk of loss of the bus on delivery, as defined in "Bus Delivery Procedure" (Section 2.3.1.1), if delivered by common carrier or driveway, or on release to PDRTA's drivers at the Contractor's plant. Prior to this delivery or release, the Contractor shall have risk of loss of the bus, including any damages sustained during the common carrier or drive-away operation regardless of the status of title or any payments related to the bus. Drivers shall keep a maintenance log en-route and it shall be delivered to PDRTA with the bus.

2.3.1.5 ACCEPTANCE OF BUS
Within 15 (fifteen) calendar days after arrival at the designated point of delivery, the bus shall undergo PDRTA tests defined in Part 3: Quality Assurance Provisions. If the bus passes these tests or if PDRTA does not notify Contractor of non-acceptance within 15 (fifteen) calendar days after delivery, acceptance of the bus by PDRTA occurs on the fifteenth day after delivery. Acceptance may occur earlier if PDRTA notifies the Contractor of early acceptance or places the bus in revenue service. If the bus fails these tests, it shall not be accepted until the repair procedures defined in "Repairs After Non-acceptance" (Section 2.3.2) have been carried out and the bus retested until it passes.

2.3.2 REPAIRS AFTER NONACCEPTANCE
The Contractor, or its designated representative shall perform the repairs after non-acceptance. If the Contractor fails or refuses to make the repairs within 5 (five) days, then the work may be done by PDRTA's personnel with reimbursement by the Contractor.

2.3.2.1 REPAIRS BY CONTRACTOR
After non-acceptance of the bus, the Contractor must begin work within 5 (five) working days after receiving notification from PDRTA of failure of acceptance tests. PDRTA shall make the bus available to complete repairs timely with the Contractor repair schedule.

The Contractor shall provide, at its own expense, all spare parts, tools, and space required to complete the repairs. At PDRTA's option, the Contractor may be required to remove the bus from PDRTA's property while repairs are being effected. If the bus is removed from PDRTA's property, repair procedures must be diligently pursued by the Contractor's representatives, and the Contractor shall assume risk of loss while the bus is under its control.

2.3.2.2 REPAIRS BY PDRTA
1. Parts Used. If PDRTA performs the repairs after non-acceptance of the bus, it shall correct or repair the defect and any related defects using Contractor-specified parts available from its own stock or those supplied by the Contractor specifically for this repair. Monthly, or at a period to be mutually agreed upon, reports of all repairs covered by this procedure shall be submitted by PDRTA to the Contractor for reimbursement or replacement of parts. The Contractor shall provide forms for these reports.
2. **Contractor Supplied Parts.** If the Contractor supplies parts for repairs being performed by PDRTA after non-acceptance of the bus, these parts shall be shipped prepaid to PDRTA from any source selected by the Contractor within 10 (ten) working days after receipt of the request for said parts.

3. **Return of Defective Components.** The Contractor may request that parts covered by this provision be returned to the manufacturing plant. The total cost for this action shall be paid by the Contractor.

4. **Reimbursement for Labor.** PDRTA shall be reimbursed by the Contractor for labor. The amount shall be determined by multiplying the number of man-hours actually required to correct the defect by a per hour, Mechanic 2, straight wage rate of $30.00 per hour, plus a 3 percent annual increase in wage rate, plus the cost of towing in the bus if such action was necessary. This wage-benefit rate shall not exceed the rate in effect in PDRTA's service garage at the time the defect correction is made.

5. **Reimbursement for Parts.** PDRTA shall be reimbursed by the Contractor for defective parts that must be replaced to correct the defect. The reimbursement shall include taxes where applicable and 20% percent handling costs.

### 2.3.3 UNAVOIDABLE DELAYS

#### 2.3.3.1 CONTRACTOR'S DELAY

If the Contractor is delayed at any time during the progress of the Work by the neglect or failure of PDRTA or by a cause described below, then the time for completion and/or affected delivery date(s) shall be extended by PDRTA subject to the following conditions:

1. The cause of the delay arises after the notice of award and neither was nor could have been anticipated by the Contractor by reasonable investigation before such award and is not due to any fault on the part of the Contractor;

2. The Contractor demonstrates that the completion of the Work and/or affected delivery(s) will be actually and necessarily delayed;

3. The effect of such cause cannot be avoided or mitigated by the exercise of all reasonable precautions, efforts and measures whether before or after the occurrence of the cause of delay; and

4. The Contractor makes written request and provides other information to PDRTA as described in "Notification of Contractor Delay" (Section 2.3.3.2 below).

A delay meeting all the conditions of this section shall be deemed an excusable delay. Any concurrent delay that does not constitute an excusable delay shall not be the sole basis for denying a request hereunder.

None of the above shall relieve the Contractor of any liability for the payment of any liquidated damages owing from a failure to complete the Work by the time for completion that the Contractor is required to pay pursuant to "Liquidated Damages" (Section 2.3.4) for delays occurring prior to, or subsequent to the occurrence of an excusable delay.
PDRTA reserves the right to rescind or shorten any extension previously granted, if subsequently PDRTA determines that any information provided by Contractor in support of a request for an extension of time was erroneous; provided however, that such information or facts, if known, would have resulted in a denial of the request for an excusable delay. Notwithstanding the above, PDRTA will not rescind or shorten any extension previously granted if the Contractor acted in reliance upon the granting of such extension and such extension was based on information which, although later found to have been erroneous, was submitted in good faith by the Contractor.

2.3.3.2 NOTIFICATION OF CONTRACTOR DELAY
Notwithstanding "Contractor's Delay" (Section 2.3.3.1), no extension or adjustment of time shall be granted unless (1) written notice of the delay is filed with PDRTA within 7 (seven) calendar days after the commencement of the delay and (2) a written application therefore, stating in reasonable detail the causes, the effect to date and the probable future effect on the performance of the Contractor under the Contract, and the portion or portions of the Work affected, is filed by the Contractor with PDRTA within 14 (fourteen) calendar days after the commencement of the delay. No such extension or adjustment shall be deemed a waiver of the rights of either party under this Contract. PDRTA shall make its determination within 30 (thirty) calendar days after receipt of the application.

2.3.4 LIQUIDATED DAMAGES
It is mutually understood and agreed by and between the parties to the Contract that time is of the essence with respect to the completion of the Work and that in case of any failure on the part of the Contractor to complete the Work within the time specified in "Delivery Schedule" (Section 2.3.1.2), except for any excusable delays as provided in "Unavoidable Delays" (Section 2.3.3), or any extension thereof, PDRTA will be damaged thereby. The amount of said damages, being difficult if not impossible of definite ascertainment and proof, it is hereby agreed that the amount of such damages due PDRTA shall be fixed at $172 per business day (i.e. excluding holidays, weekends or other times PDRTA is unable to accept vehicles) per bus not delivered in substantially as good condition as inspected by PDRTA at the time released for shipment.

The Contractor hereby agrees to pay the aforementioned amounts as fixed, agreed and liquidated damages, and not by way of penalty, to PDRTA and further authorizes PDRTA to deduct the amount of the damages from money due the Contractor under the Contract, computed as aforesaid. If the monies due the Contractor are insufficient or no monies are due the Contractor, the Contractor shall pay PDRTA the difference or the entire amount, whichever may be the case, within 30 (thirty) calendar days after receipt of a written demand by the Contracting Officer.

The payment of aforesaid fixed, agreed and liquidated damages shall be in lieu of any damages for any loss of profit, loss of revenue, loss of use, or for any other direct, indirect, special or consequential losses or damages of any kind whatsoever that may be suffered by PDRTA arising at any time from the failure of the Contractor to fulfill the obligations referenced in this clause in a timely manner.

PDRTA specifically reserves the right, without limitation of any other rights, to terminate the Contract in accordance with "Termination of Contract" (Section 2.2.6).

2.3.5 REGISTRATION DOCUMENTATION
Adequate documents for registering the bus in the State of South Carolina shall be provided to PDRTA at least ten (10) working days before each bus is released to the common carrier drive-away or to PDRTA’s drivers.

2.4 PAYMENT
PDRTA shall pay and the Contractor shall accept the amounts set forth in the price schedule as full compensation for all costs and expenses of completing the Work in accordance with the Contract, including but not limited to all labor and material required, overhead, expenses, storage and shipping, risks and obligations, taxes (as applicable), fees and profit, and any unforeseen costs.

All payments shall be made as provided herein, less any additional moneys withheld as provided below and less any amounts for liquidated damages in accordance with "Liquidated Damages" (Section 2.3.4).

PDRTA shall make payments for buses at the unit prices itemized in the Price Schedule within 30 (thirty) calendar days after the delivery and acceptance of each bus and receipt of a proper invoice. In the event that the bus does not meet all requirements for acceptance PDRTA may, at its exclusive option, "conditionally accept" the bus and place it into revenue service pending receipt of Contractor furnished materials and/or labor necessary to effectuate corrective action for acceptance. For any conditionally accepted bus the payment shall be reduced by an amount to be withheld, and paid upon corrective action by the Contractor, equal to twice the estimated cost for parts and labor for the corrective action.

PDRTA shall make payments for spare parts and/or equipment at the unit prices itemized in the price schedule within 30 (thirty) calendar days after the delivery and acceptance of said spare parts and/or equipment and receipt of a proper invoice.

PDRTA shall make a final payment for all withholding within 30 (thirty) calendar days of receipt of a final proper invoice and the following:

1. Delivery and acceptance of all Contract deliverables, including manuals and other documentation required by the Contract, excluding training.

2. Rectification of any deficiencies found during the acceptance of buses.

3. Contractor provision of any certifications as required by law and/or regulations.

4. Completion of post-delivery audits required under the Contract.

Payments shall be made in accordance with PDRTA’s Prompt Payment Rules and Regulations.

2.5 SERVICE AND PARTS

2.5.1 TRAINING
Within one month after delivery of the first bus, and twelve months after the delivery of the first bus Contractor shall provide a qualified instructor from the bus manufacturer and, when necessary, a qualified instructor from the engine, transmission, multiplex and fire suppression system manufacturers at PDRTA property for the purpose of training PDRTA maintenance and
operations instruction staff. The minimum amount of training shall be 40 hours of classroom time per each of the two training occasions (Total of 80 classroom hours of training). At least three mechanics shall receive training per bus build. The content of the training classes shall be agreed upon as per the Maintenance Staff Training Plan submittal. The classes shall be videotaped and edited based on course outlines by a professional video production team at the expense of the Contractor. Such tapes shall become the sole property of PDRTA. This requirement may be waived by PDRTA if the Contractor has videotapes already available that are acceptable to PDRTA. A computerized interactive training program shall be accepted in lieu of professional video training.

2.5.2 ENGINEER / SERVICE REPRESENTATIVES

The Contractor shall, at its own expense, have a competent engineering service representative(s) available on request to assist PDRTA's staff in the solution of engineering or design problems within the scope of the specifications that may arise during the warranty period. This does not relieve the Contractor of responsibilities under Part 4: Warranty Provisions.

2.5.3 DOCUMENTS

The Contractor shall provide the required documents and manuals as specified in Appendix E, Deliverable and Contract Requirements. All parts manuals are to be furnished in printed/paper and electronic PDF format. The Contractor shall keep maintenance manuals available for a period of three years after the date of acceptance of the buses procured under this Contract. The Contractor shall also exert its best efforts to keep maintenance manuals, operator manuals and parts books up-to-date for a period of 15 (fifteen) years. The supplied maintenance and operator's manuals shall incorporate all equipment ordered on the buses covered by this procurement.

2.5.4 PARTS AVAILABILITY GUARANTY

The Contractor hereby guarantees to provide, within reasonable periods of time, the spare parts, software and all equipment necessary to maintain and repair the buses supplied under this Contract for a period of at least 15 (fifteen) years after the date of acceptance and to supply an electronic version of the revised manual yearly by January 30th. Parts shall be interchangeable with the original equipment and be manufactured in accordance with the quality assurance provisions of this Contract. Prices shall not exceed the Contractor's then current published catalog prices.

Where the parts ordered by PDRTA are not received within two working days of the agreed upon time/date and a bus procured under this Contract is out-of-service due to the lack of said ordered parts, then the Contractor shall provide PDRTA, within eight hours of PDRTA's verbal or written request, the original suppliers' and/or manufacturers' parts numbers, company names, addresses, telephone numbers and contact persons' names for all of the specific parts not received by PDRTA.

If the Contractor fails to honor this parts guaranty or parts ordered by PDRTA are not received within 30 (thirty) days of the agreed upon delivery date, then the Contractor shall provide to PDRTA, within 7 (seven) days of PDRTA's verbal or written request, the design and manufacturing documentation for those parts manufactured by the Contractor and the original suppliers' and/or manufacturers' parts numbers, company names, addresses, telephone numbers and contact persons' names for all of the specific parts not received by PDRTA.
A suggested parts list required for normal maintenance of the fleet of vehicles to be purchased shall be furnished by the Contractor with the net price shown for each item. The Contractor shall furnish current price information. This parts list shall be delivered with the first production bus. The parts catalog shall enumerate and describe every item used on the buses, along with special equipment with its related parts, with each listing including the accepted generic modified noun name description, the original supplier, its part number and name, the Contractor's part number if used, and all commercial equivalents.

An appendix giving the original supplier's complete address and telephone numbers for their offices responsible for parts ordering shall be included. Each component that can be disassembled must be broken down in illustrations to its indexed parts. Prior to publication, PDRTA's representative shall be afforded the opportunity to identify parts with PDRTA's class and lot number for inclusion in this parts catalog by the Contractor. PDRTA shall have the right to make direct purchase from the sources listed by the Contractor, and as defined by the other applicable parts of this specification.

Contractor's design and manufacturing documentation provided to PDRTA shall be for its sole use in regard to the buses procured under this Contract and for no other purpose.

2.5.5 INTERCHANGEABILITY
Unless otherwise agreed, all units and components procured under this Contract, whether provided by suppliers or manufactured by the Contractor, shall be duplicates in design, manufacture, and installation to assure interchangeability among buses in this procurement. This interchangeability shall extend to the individual components as well as to their locations in the buses.

It is understood that bus manufacturers can't control regulatory changes or changes made by sub-component suppliers over the course of the contract. Any changes that need to be made for these reasons must be noted during preproduction for the upcoming bus build. Part numbers and descriptions shall be required.

2.5.6 SURVIVABILITY
Contractor's obligations under this section 2.5 shall survive the nominal expiration or discharge of other Contract obligations and PDRTA may obtain any remedy under law, Contract or equity to enforce the obligations of Contractor that survive the manufacturing, warranty, and final payment periods.

2.6 AUDIT AND INSPECTION OF RECORDS
In accordance with 49 C.F.R. § 18.36(i), 49 C.F.R. § 19.48(d), and 49 U.S.C. § 5325(a), the Contractor agrees to provide PDRTA, FTA, the Comptroller General of the United States, the Secretary of the U.S. Department of Transportation, the South Carolina State Department of Transportation or any of their duly authorized representatives access to any books documents, papers, and records of the Contractor which are directly pertinent to or relate to this Contract (1) for the purpose of making audits, examinations, excerpts, and transcriptions and (2) when conducting an audit and inspection.

A. In the event of a sole source Contract, or single Offer, single responsive Offer, or competitive negotiated procurement the Contractor shall maintain and the Contracting Officer, the U.S. Department of Transportation and the South Carolina State Department of Transportation or the representatives thereof, shall have the right to examine all books,
records, documents, and other cost and pricing data related to the Contract price, unless such pricing is based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the public, or prices set by law or regulation, or combinations thereof. Data related to the negotiation or performance of the contract shall be made available for the purpose of evaluating the accuracy, completeness, and currency of the cost or pricing data. The right of examination shall extend to all documents necessary for adequate evaluation of the cost or pricing data, along with the computations and projections used therein, including review of accounting principles and practices that reflect properly all direct and indirect costs anticipated for the performance of the Contract.

B. For Contract modifications or change orders the Contracting Officer, the U.S. Department of Transportation and the South Carolina State Department of Transportation, or their representatives shall have the right to examine all books, records, documents, and other cost and pricing data related to a Contract modification, unless such pricing is based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the public, or prices set by law or regulation, or combinations thereof. Data related to the negotiation or performance of the Contract modification or change order shall be made available for the purpose of evaluating the accuracy, completeness, and currency of the cost or pricing data. The right of examination shall extend to all documents necessary for adequate evaluation of the cost or pricing data, along with the computations and projections used therein, either before or after execution of the Contract modification or change order for the purpose of conducting a cost analysis. If an examination made after execution of the contract modification or change order reveals inaccurate, incomplete, or out-of-date data, the Contracting Officer may renegotiate the contract modification or change order price adjustment and PDRTA shall be entitled to any reductions in the price that would result from the application of accurate, complete or up-to-date data.

C. For any cost reimbursable work the Contractor shall maintain and the Contracting Officer, the U.S. Department of Transportation and the South Carolina State Department of Transportation, or their representatives shall have the right to examine books, records, documents, and other evidence, including review of accounting principles and practices that reflect properly all direct and indirect costs incurred as related to said cost reimbursable work.

1. The materials described in Paragraphs A, B and C above shall be available at the Contractor's office at all reasonable times for inspection, audit, and making excerpts and transcriptions until three years from the date of final payment under the Contract except that the materials described in Paragraph A above shall also be available prior to any award and materials relating to "Service and Parts" (Section 2.5). For records relating to appeals under "Disputes" (Section 2.2.7), "Audit and Inspection of Records" (this Section 2.6), litigation, or the settlement of claims arising out of the negotiation or the performance of contract modifications, records shall be kept available until such appeals, litigation, or claims have been disposed of.

2. The Contracting Officer and her representative and any other parties authorized under this clause shall employ sound business practices to protect the confidence of the data specified under this clause, for which the Contractor provides access, against disclosure of such information and material to third parties except as permitted by the Contract. The
Contractor shall be responsible for ensuring that any confidential data bears appropriate notices relating to its confidential character.

3. The requirements of this section are in addition to other audit, inspection, and record-keeping provisions specified elsewhere in the Contract documents.

2.7 RISK

2.7.1 INSURANCE

The Contractor agrees to procure and maintain at its expense during the term of the Agreement insurance of the kinds and in the amounts hereafter required, with insurance companies authorized to do business in the State of South Carolina, covering all operations under this Agreement, whether performed by the Contractor or its subcontractors. The policies shall provide for a thirty-day notice to PDRTA prior to termination, cancellation or change.

Prior to the execution of the Agreement, the Contractor shall supply PDRTA, by delivering to the Purchasing Agent, 313 S. Stadium Rd., Florence SC, a certificate(s) of insurance providing evidence of insurance coverage for the Contractor for the following coverage:

(A) Commercial General Liability insurance in a comprehensive form including coverage for property damage, bodily injury, personal injury, products, contractual and completed operations with a single limit of at least $5,000,000.00 per occurrence and aggregate. The certificate shall name PDRTA as an additional insured.

PDRTA and the Contractor agree to waive all rights against each other for damages to the extent covered by the insurance, except for such rights they may have to the proceeds of such insurance held by PDRTA as trustee. The Contractor shall require similar reciprocal waivers by all subcontractors and sub-subcontractors. This policy shall recognize such waivers of recovery by an appropriate Waiver of Subrogation Clause Endorsement, excluding any subrogation of rights granted under South Carolina law to the contrary notwithstanding.

2.7.2 PERFORMANCE BOND

PDRTA reserves the right to request a Performance Bond on an annual basis for each bus build of the contract.

2.7.3 PRODUCTION OF DOCUMENTS

Upon award of the Contract to an Offeror, such Offeror shall commence performance under the Contract by executing all Contract Guaranty Agreements provided with the Offer and by furnishing any required bonds pursuant to the Contract documents within 10 calendar days after the date of receipt of the notice of award or within such further time as PDRTA may allow. Failure to fulfill these requirements within the specified time is cause for termination of the Contract under "Termination for Default" (Section 2.2.5.2).

2.7.4 INDEMNIFICATION

The Contractor shall, to the extent permitted by law (1) protect, indemnify and save PDRTA and its members, officers, employees and agents, including consultants, harmless from and against any and all liabilities, damages, claims, demands, liens, encumbrances, judgments, awards, losses, costs, expenses, and suits or actions or proceedings, including reasonable expenses, costs and attorneys’ fees incurred by PDRTA and its officers, employees and agents, including consultants, in the defense, settlement or satisfaction thereof, for any injury, death, loss or damage to persons or property of any kind whatsoever, arising out of, or resulting from, the
negligent acts, errors or omissions of the Contractor, including negligent acts, errors or
omissions of its officers, employees, servants, agents, subcontractors and suppliers; and (2)
upon receipt of notice and if given authority, shall settle at its own expense or undertake at its
own expense the defense of any such suit, action or proceeding, including appeals, against
PDRTA and its members, officers, employees and agents, including consultants, relating to
such injury, death, loss or damage. Each party shall promptly notify the other in writing of the
notice or assertion of any claim, demand, lien, encumbrance, judgment, award, suit, action or
other proceeding hereunder. The Contractor shall have sole charge and direction of the
defense of such suit, action or proceeding. PDRTA shall not make any admission that might be
materially prejudicial to the Contractor unless the Contractor has failed to take over the conduct
of any negotiations or defense within a reasonable time after receipt of the notice and authority
above provided. PDRTA shall at the request of the Contractor furnish to the Contractor all
reasonable assistance that may be necessary for the purpose of defending such suit, action or
proceeding, and shall be repaid all reasonable costs incurred in doing so. PDRTA shall have
the right to be represented therein by advisory counsel of its own selection at its own expense.

The obligations of the Contractor under the above paragraph shall not extend to circumstances
where the injury, or death, or damages is caused solely by the negligent acts, errors or
omissions of PDRTA, its officers, employees, agents or consultants. The obligations of the
Contractor shall not extend to circumstances where the injury, or death, or damages is caused,
by the negligence of any third party operator, not including an assignee or subcontractor of the
Contractor, subject to the right of contribution as provided in the next sentence below. In case
of joint or concurrent negligence of the parties hereto giving rise to a claim or loss against either
one or both, each shall have full rights of contribution from the other.

2.7.5 MATERIALS/ACCESSORIES RESPONSIBILITY
The Contractor shall be responsible for all materials and workmanship in the construction of the
bus and all accessories used, whether the same are manufactured by the Contractor or
purchased from supplier. This provision excludes tires, fare boxes, radios, and any equipment
leased or supplied by PDRTA, except insofar as such equipment is damaged by the failure of a
part or component for which the Contractor is responsible, or except insofar as the damage to
such equipment is caused by the Contractor during the manufacture of the buses. Risk of
damage to or loss of the buses is the subject of "Assumption of Risk of Loss" (Section 2.3.1.4).

2.8. 2016 SOUTH CAROLINA OPEN TRADE CLAUSE
A state agency or entity shall require a person that attempts to contract with the State, including
a contract renewal or assumption, to certify, at the time the bid is submitted or the contract is
entered into, renewed, or assigned, that the person or the assignee is not identified on a list
created pursuant to Section 11-57-310. A state agency shall include certification information in
the procurement record.

2.9 POLICIES FOR PRIME CONTRACT

2.9.1 PRE-AWARD AND POST-DELIVERY AUDIT REQUIREMENTS

2.9.1.1 CERTIFICATIONS REQUIRED
The Contractor agrees to comply with 49 U.S.C. § 5323(l) and FTA's implementing regulation at
49 C.F.R. Part 663 and to submit the required certifications:
2.9.1.2 BUY AMERICA REQUIREMENTS
The Contractor agrees to comply with 49 U.S.C. 5323(j) and 49 C.F.R. Part 661, which provide that Federal funds may not be obligated unless steel, iron and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 C.F.R. 661.7, and include final assembly in the United States for 15 passenger vans and 15 passenger wagons produced by Chrysler Corporation, and microcomputer equipment and software. Separate requirements for rolling stock are set out at 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11. Rolling stock must be assembled in the United States and have a 60 percent domestic component.

2.9.1.3 FEDERAL MOTOR VEHICLE SAFETY STANDARDS (FMVSS)
The Contractor shall submit 1) manufacturer's FMVSS self-certification sticker information that the vehicle complies with relevant FMVSS or 2) manufacturer's certified statement that the contracted buses will not be subject to FMVSS regulations.

3.1 CONTRACTOR'S IN-PLANT QUALITY ASSURANCE REQUIREMENTS

3.1.1 QUALITY ASSURANCE REQUIREMENTS
3.1 QUALITY ASSURANCE REQUIREMENTS
The Contractor, the Contractor's manufacturing plant and organization shall be certified to the appropriate QS-9000/ISO 9000 series of standards or utilize a similar quality assurance program.

3.1.2 QUALITY ASSURANCE ORGANIZATION

3.1.2.1 ORGANIZATION ESTABLISHMENT
The Contractor shall establish and maintain an effective in-plant quality assurance organization. It shall be a specifically defined organization and should be directly responsible to the Contractor's top management.

3.1.2.2 CONTROL
The quality assurance organization shall exercise quality control over all phases of production from initiation of design through manufacture and preparation for delivery. The organization shall also control the quality of supplied articles.

3.1.2.3 AUTHORITY AND RESPONSIBILITY
The quality assurance organization 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 transit buses.

3.1.3 QUALITY ASSURANCE ORGANIZATION FUNCTIONS

3.1.3.1 MINIMUM FUNCTIONS
The quality assurance organization shall include the following minimum functions.
3.1.3.2 WORK INSTRUCTIONS
The quality assurance organization shall verify inspection operation instructions to ascertain that the manufactured product meets all prescribed requirements.

3.1.3.3 RECORDS MAINTENANCE
The quality assurance organization shall maintain and use records and data essential to the effective operation of its program. 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 1 year after inspections and tests are completed.

3.1.3.4 CORRECTIVE ACTION
The quality assurance organization shall detect and promptly ensure correction of any conditions that may result in the production of defective transit buses. These conditions may occur in designs, purchases, manufacture, tests, or operations that culminate in defective supplies, services, facilities, technical data, or standards.

3.1.4 STANDARDS AND FACILITIES

3.1.4.1 BASIC STANDARDS AND FACILITIES
The following standards and facilities shall be basic in the quality assurance process.

3.1.4.2 CONFIGURATION CONTROL
The Contractor shall maintain drawings, assembly procedures, and other documentation that completely describe a qualified bus that meets all of the options and special requirements of this procurement. The quality assurance organization shall verify that each transit bus is manufactured in accordance with these controlled drawings, procedures, and documentation.

3.1.4.3 MEASURING AND TESTING FACILITIES
The Contractor shall provide and maintain the necessary gauges and other measuring and testing devices for use by the quality assurance organization to verify that the buses 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.

3.1.4.4 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, replaced, or repaired as required to maintain quality.

3.1.4.5 EQUIPMENT USE BY RESIDENT INSPECTORS
The Contractor's gauges and other measuring and testing devices shall be made available for use by the resident inspectors to verify that the buses conform to all specification requirements. If necessary, the Contractor's personnel shall be made available to operate the devices and to verify their condition and accuracy.

3.1.5 CONTROL OF PURCHASES

3.1.5.1 MAINTENANCE OF CONTROL
The Contractor shall maintain quality control of purchases.
3.1.5.2 SUPPLIER CONTROL
The Contractor shall require that each supplier maintain a quality control program for the services and supplies that it provides. The Contractor's quality assurance organization 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 processes. Controls shall be established to prevent inadvertent use of nonconforming materials.

3.1.5.3 PURCHASING DATA
The Contractor shall verify that all applicable specification requirements are properly included or referenced in purchase orders of articles to be used on transit buses.

3.1.6 MANUFACTURING CONTROL

3.1.6.1 CONTROLLED CONDITIONS
The Contractor 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.

3.1.6.2 COMPLETED ITEMS
A system for final inspection and test of completed transit buses shall be provided by the quality assurance organization. It shall measure the overall quality of each completed bus.

3.1.6.3 NONCONFORMING MATERIALS
The quality assurance organization shall monitor the Contractor's system for controlling nonconforming materials. The system shall include procedures for identification, segregation, and disposition.

3.1.6.4 STATISTICAL TECHNIQUES
Statistical analysis, tests, and other quality control procedures may be used when appropriate in the quality assurance processes.

3.1.6.5 INSPECTION STATUS
A system shall be maintained by the quality assurance organization for identifying the inspection status of components and completed transit buses. Identification may include cards, tags, or other normal quality control devices.

3.1.7 INSPECTION SYSTEM

3.1.7.1 INSPECTION SYSTEM SCOPE
The quality assurance organization shall establish, maintain, and periodically audit a fully-documented inspection system. The system shall prescribe inspection and test of materials, work in process, and completed articles. As a minimum, it shall include the following controls.

3.1.7.2 INSPECTION PERSONNEL
Sufficient trained inspectors shall be used to ensure that all materials, components, and assemblies are inspected for conformance with the qualified bus design.
3.1.7.3 INSPECTION RECORDS
Acceptance, rework, or rejection identification shall be attached to inspected articles. Articles that have been accepted as a result of approved materials review actions shall be identified. 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 bus. 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 Contractor or resident inspectors during assembly shall be entered by the inspection personnel on a record that accompanies the major component, subassembly, assembly, or bus from start of assembly through final inspection. Actions shall be taken to correct discrepancies or deficiencies in the manufacturing processes, 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, PDRTA shall approve the modification, repair, or method of correction to the extent that the contract specifications are affected.

3.1.7.4 QUALITY ASSURANCE AUDITS
The quality assurance organization shall establish and maintain a quality control audit program. Records of this program shall be subject to review by PDRTA.

3.2 INSPECTIONS

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

Stations shall also be at the best locations to inspect or test characteristics before they are concealed by subsequent fabrication or assembly operations. These locations shall minimally include underbody structure completion, body framing completion, body prior to paint preparation, water test before interior trim and insulation installation, engine installation completion, underbody dress-up and completion, bus prior to final paint touchup, bus prior to road test, and bus final road test completion.

3.2.2 RESIDENT INSPECTOR

3.2.2.1 RESIDENT INSPECTOR ROLE
PDRTA may be represented at the Contractor's plant by resident inspectors. They shall monitor, in the Contractor's plant, the manufacture of transit buses built under the procurement. The presence of these resident inspectors in the plant shall not relieve the Contractor of its responsibility to meet all of the requirements of this procurement. The PDRTA shall designate a primary resident inspector, whose duties and responsibilities are delineated in "Pre-Production Meetings" (Section 3.2.2.2); "Authority" (Section 3.2.2.3); and "Pre-Delivery Tests" (Section 3.3.2). Contractor and resident inspector relations shall be governed by the guidelines included as Attachment A to this Part 4 "Quality Assurance" Provisions.
3.2.2.2 PRE-PRODUCTION MEETINGS
The primary resident inspector shall participate in design review and pre-production meetings with PDRTA. At these meetings the configuration of the buses and the manufacturing processes shall be finalized, and all contract documentation provided to the inspector.

No less than 30 (thirty) days prior to the beginning of bus manufacture, the primary resident inspector shall meet with the Contractor's quality assurance manager and shall conduct a pre-production audit meeting. They shall review the inspection procedures and finalize inspection checklists. The resident inspectors may begin monitoring bus construction activities two weeks prior to the start of bus fabrication.

3.2.2.3 AUTHORITY
Records and data maintained by the quality assurance organization shall be available for review by the resident inspectors. Inspection and test records for this procurement shall be available for a minimum of one year after inspections and tests are completed.

The Contractor’s gauges and other measuring and testing devices shall be made available for use by the resident inspectors to verify that the buses conform to all specification requirements. If necessary, the Contractor's personnel shall be made available to operate the devices and to verify their condition and accuracy. Discrepancies noted by the resident inspector during assembly shall be entered by the Contractor's inspection personnel on a record that accompanies the major component, subassembly, assembly, or bus from start of assembly through final inspection. Actions shall be taken to correct discrepancies or deficiencies in the manufacturing processes, 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, PDRTA shall approve the modification, repair, or method of correction to the extent that the contract specifications are affected.

The primary resident inspector shall remain in the Contractor's plant for the duration of bus assembly work under this contract. Only the primary resident inspector or designee shall be authorized to release the buses for delivery. The resident inspectors shall be authorized to approve the pre-delivery acceptance tests. Upon request to the quality assurance supervisors, the resident inspectors shall have access to the Contractor's quality assurance files related to this procurement. These files shall include drawings, assembly procedures, material standards, parts lists, inspection processing and reports, and records of defects.

3.2.2.4 SUPPORT PROVISIONS
The Contractor shall provide office space for the resident inspectors in close proximity to the final assembly area. This office space shall be equipped with desks, outside and interplant telephones, file cabinet, chairs, and clothing lockers sufficient to accommodate the resident staff.

3.3 ACCEPTANCE TESTS

3.3.1 RESPONSIBILITY
Fully-documented tests shall be conducted on each production bus following manufacture to determine its acceptance to PDRTA. These acceptance tests shall include pre-delivery inspections and testing by the Contractor, and inspections and testing by PDRTA after the buses have been delivered.
3.3.2 PRE-DELIVERY TESTS
The Contractor shall conduct acceptance tests at its plant on each bus following completion of manufacture and before delivery to PDRTA. These pre-delivery tests shall include visual and measured inspections, as well as testing the total bus operation. The tests shall be conducted and documented in accordance with written test plans, approved by PDRTA.

Additional tests may be conducted at the Contractor's discretion to ensure that the completed buses have attained the desired quality and have met the requirements in "Technical Specifications" (Part 5). PDRTA may, prior to commencement of production, demand that the Contractor demonstrate compliance with any requirement in "Technical Specifications" (Part 5), if there is evidence that prior tests have been invalidated by Contractor's change of supplier or change in manufacturing process. Such demonstration shall be by actual test, or by supplying a report of a previously performed test on similar or like components and configuration. Any additional testing shall be recorded on appropriate test forms provided by the Contractor and shall be conducted before acceptance of the bus.

The pre-delivery tests shall be scheduled and conducted with a 30 (thirty) day notice so that they may be witnessed by the resident inspectors, 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 bus. The under-floor equipment shall be available for inspection by the resident inspectors, using a pit or bus hoist provided by the Contractor. A hoist, scaffold, or elevated platform shall be provided by the Contractor to easily and safely inspect bus roofs. Delivery of each bus shall require written authorization of the primary resident inspector. Authorization forms for the release of each bus for delivery shall be provided by the Contractor. An executed copy of the authorization shall accompany the delivery of each bus.

3.3.2.1 INSPECTION - VISUAL AND MEASURED
Visual and measured inspections shall be conducted with the bus 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 bus in a static condition do function as designed.

3.3.2.2 TOTAL BUS OPERATION
Total bus operation shall be evaluated during road tests. The purpose of the road tests is to observe and verify the operation of the bus as a system and to verify the functional operation of the subsystems that can be operated only while the bus is in motion.

Each bus shall be driven for a minimum of 15 (fifteen) miles during the road tests. Observed Defects shall be recorded on the test forms. The bus 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 bus operation tests.

3.3.3 POST-DELIVERY TESTS
PDRTA may conduct acceptance tests on each delivered bus. These tests shall be completed within 15 (fifteen) days after bus 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 bus release and delivery to PDRTA. The post-delivery tests shall include visual inspection and bus operations. No post-delivery test shall apply criteria that are different from the criteria applied in an analogous pre-delivery test (if any).
Buses that fail to pass the post-delivery tests are subject to non-acceptance. PDRTA shall record details of all Defects on the appropriate test forms and shall notify the Contractor of acceptance, conditional acceptance, or non-acceptance of each bus within five days according to "Acceptance of Bus" (Section 2.3.1.5) after completion of the tests. The Defects detected during these tests shall be repaired according to procedures defined in "Contractual Provisions" (Part 2, "Repairs After Non-acceptance" (Section 2.3.2).

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

3.3.3.2 BUS OPERATION
Road tests will be used for total bus operation similar to those conducted at the Contractor's plant. In addition, PDRTA may elect to perform chassis dynamometer tests. Operational deficiencies of each bus shall be identified and recorded.
3.4 GUIDE FOR INSPECTION

**Pre-Building Phase**

<table>
<thead>
<tr>
<th>Bus Manufacturers Expectations</th>
<th>Transit System Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Contract/Transit system inspectors must be given all contract documentation before beginning inspection process.</td>
<td>1. Manufacturers should have a formal, approved Quality Assurance (QA) Program, and must adhere to the program! Program must identify senior QA person. QA program must be an integral part of the company’s ISO 9000 certification to be effective January 1, 1999. Any changes in approved program must be resubmitted to transit system for approval.</td>
</tr>
</tbody>
</table>
| 2. Bus manufacturers inspection process should be reviewed at preproduction audit meeting. Inspectors should be present and understand the difference between various manufacturers processes. At least one key customer and manufacturer representative should be present that will follow the entire procurement from start to finish. | 2. Preproduction audit meeting with transit system.  
- Representatives from contracts, engineering, quality, and production should be represented  
- Manufacturers should improve communication between own departments regarding contract requirements  
- Must have formal sales release to review at the meeting and provide final sales release prior to production  
- Manufacturers should not use meeting to sell parts  
- Manufacturers should supply test information and other documents required to meet expectations. |
| 3. When change orders are required, they need to be made as early in the process as possible. Six months before building starts, whenever possible. If change orders have an impact on delivery schedule, consideration should be given to a delivery schedule revision. | 3. Manufacturers should have application and installation approvals from suppliers whenever possible.  
- On installations of new major components, sub-supplier must be present at initial production. |
| 4. Transit system inspection forms should be provided to manufacturers prior to the build so that the manufacturer will know the items the customer believes are critical. The inspection forums should be provided to the manufacturer after completion so that the defects to be corrected can be identified. | 4. Manufacturers should read and understand the specification prior to bid! Specification clarification should be made during the approved equals process. Ask questions at prebid meetings. |
| 5. If transit system requires sole source components, transit system should obtain assistance for first installation of new components. | 5. Manufacturers service representative should be involved with preproduction audit meeting and initial production and/or at final acceptance. |
| 6. Transit system should have a decision maker at the preproduction audit meeting. | 6. Prior to build—bus manufacturer should be able to provide to the transit system a complete Bill of Material for the bus to be built. |
| 7. Transit system should make every effort to inform manufacturers of what they want. Hidden agenda items buried in contract do not promote the cooperative environment desired. | |
| 8. Agree on what constitutes a line shut down before build begins. | |
### Process During Building Phase

<table>
<thead>
<tr>
<th>Bus Manufacturers Expectations</th>
<th>Transit System Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Need one person as primary inspector from start to finish of process. The primary inspector should be included in the design review process and preproduction meetings. Consistency is very important. First or second bus should stay at manufacturer’s location as a quality standard and be delivered last.</td>
<td>1. Resident inspector should have access to a complete set of engineering drawings and documents for the bus being built. Engineering or manufacturing changes must be formally documented and included in documents provided to transit systems.</td>
</tr>
<tr>
<td></td>
<td>2. Manufacturers should maintain build schedule if possible. Changes in build schedule and requests for overtime and weekend work must be communicated as early as possible.</td>
</tr>
<tr>
<td></td>
<td>3. Buses should not be presented for final buy-off (inspection) that are not ready or complete.</td>
</tr>
<tr>
<td></td>
<td>4. Manufacturers should have formal internal/external communications process and feedback of inspection problems and resolutions. Manufacturers should provide early resolution of problems identified by inspectors. QA procedures must be revised to reflect problem correction.</td>
</tr>
<tr>
<td></td>
<td>5. Attitude of manufacturers and QA personnel is important. Remember who the customer is. However, there must be mutual respect.</td>
</tr>
<tr>
<td></td>
<td>6. Transit system is not responsible for redesigning the bus, correcting problems or manufacturer quality. They audit only. Should not need a learning period for manufacturers to determine acceptable quality standards.</td>
</tr>
<tr>
<td></td>
<td>7. Buses should be identical and interchangeable within an order unless approved by transit system.</td>
</tr>
<tr>
<td></td>
<td>8. Inspection work should be spread evenly during the workday to the extent possible.</td>
</tr>
</tbody>
</table>

### Post Building Phase

<table>
<thead>
<tr>
<th>Bus Manufacturers Expectations</th>
<th>Transit System Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Increase the rate of the final acceptance process at the transit system after delivery to improve payment process.</td>
<td>1. Defects noted at property final inspection should be repaired in a timely and acceptable manner.</td>
</tr>
<tr>
<td>2. On property final acceptance inspection should be primarily for shipping damage and defects that occur during shipment. Complete vehicle inspection with criteria different from that used at the plant should not be done.</td>
<td></td>
</tr>
</tbody>
</table>
4.1 BASIC PROVISIONS

4.1.1 WARRANTY REQUIREMENTS

4.1.1.1 CONTRACTOR WARRANTY
Warranties in this document are in addition to any statutory remedies or warranties imposed on the Contractor. Consistent with this requirement, the Contractor warrants and guarantees to the original PDRTA each complete bus, and specific subsystems and components as follows.

4.1.1.2 COMPLETE BUS
The complete bus, propulsion system, components, major subsystems, and body and chassis structure, are warranted to be free from Defects and Related Defects for one year or 50,000 miles, whichever comes first, beginning on the in service date as recorded in PDRTA’s maintenance and materials management software, or conditional acceptance of each bus under "Acceptance of Bus" (2.3.1.5). The warranty is based on regular operation of the bus under the operating conditions prevailing in PDRTA’s locale.

4.1.1.3 SUBSYSTEMS AND COMPONENTS
Subsystems and components shall be warranted as submitted in Appendix F, as determined by the negotiated procurement process or purchased additional warranty.

4.1.1.4 EXTENSION OF WARRANTY
If, during the warranty period, repairs or modifications on any bus, made necessary by defective design, materials or workmanship are not completed due to lack of material or inability to provide the proper repair for 30 (thirty) calendar days, the applicable warranty period shall be extended by the number of days equal to the delay period.

4.1.2 VOIDING OF WARRANTY
The warranties shall not apply to the failure of any part or component of the bus that directly results from misuse, negligence, accident, or repairs not conducted in accordance with the Contractor provided maintenance manuals and with workmanship performed by adequately trained personnel in accordance with recognized standards of the industry. The warranty shall also be void if PDRTA fails to conduct normal inspections and scheduled preventive maintenance procedures as recommended in the Contractor’s maintenance manuals and that omission caused the part or component failure. PDRTA shall maintain documentation, auditable by the Contractor, verifying service activities in conformance with the Contractor’s maintenance manuals.

4.1.3 EXCEPTIONS AND ADDITIONS TO WARRANTY
The warranties shall not apply to the following items: scheduled maintenance items, normal wear-out items, and items furnished by PDRTA, except insofar as such equipment may be damaged by the failure of a part or component for which the Contractor is responsible.

The warranties shall not apply to components and major subsystems specified by PDRTA, and required by PDRTA to be installed on the bus by the Contractor, if the following conditions apply: the component or major subsystem supplier declines to participate in this warranty; and the Contractor notifies PDRTA in writing with, or before submitting, Contractor’s original Offer. The Contractor shall pass on to PDRTA any warranty, offered by a component supplier, which is superior to that required herein.
4.1.4 DETECTION OF DEFECTS
If PDRTA detects a Defect within the warranty periods defined in "Warranty Requirements" (Section 4.1.1), it shall within 20 (twenty) working days, notify the Contractor's representative. Within five working days after receipt of notification, the Contractor's representative shall either agree that the Defect is in fact covered by warranty, or reserve judgment until the subsystem or component is inspected by the Contractor's representative or is removed and examined at PDRTA's property or at the Contractor's plant. At that time, the status of warranty coverage on the subsystem or component shall be mutually resolved between PDRTA and the Contractor. Work shall commence to correct the Defect within 10 (ten) working days after receipt of notification and shall be conducted in accordance with "Repairs by Contractor" (Section 4.2.2).

4.1.5 SCOPE OF WARRANTY REPAIRS
When warranty repairs are required, PDRTA and the Contractor's representative shall agree within five working days after notification on the most appropriate course for the repairs and the exact scope of the repairs to be performed under the warranty. If no agreement is obtained within the five-day period, PDRTA reserves the right to commence the repairs in accordance with "Repairs by PDRTA" (Section 4.2.3).

4.1.6 FLEET DEFECTS

4.1.6.1 OCCURRENCE AND REMEDY
A fleet defect is defined as cumulative failures of any kind in the same components in the same or similar application where such items covered by the warranty and such failures occur in the warranty period in the specified proportion of the buses delivered under this contract. For deliveries of over 50 buses, the proportion shall be 15 (fifteen) percent. For deliveries of 4 (four) to 49 (forty-nine) buses the proportion shall be 20 (twenty) percent.

The Contractor shall correct a fleet defect under the warranty provisions defined in "Repair Procedures" (Section 4.2). After correcting the Defect, PDRTA and the Contractor shall mutually agree to and the Contractor shall promptly undertake and complete a work program reasonably designed to prevent the occurrence of the same Defect in all other buses and spare parts purchased under this contract. Where the specific Defect can be solely attributed to particular identifiable part(s), the work program shall include redesign and/or replacement of only the defectively designed and/or manufactured part(s). In all other cases, the work program shall include inspection and/or correction of all of the buses in the fleet via a mutually agreed to arrangement.

4.1.6.2 EXCEPTIONS TO FLEET DEFECT PROVISIONS
The fleet defect warranty provisions shall not apply to PDRTA-supplied items such as fareboxes, radio and fare collection equipment, communication systems, and tires.

Fleet defect warranty provisions shall not apply to components and major subsystems specified by PDRTA and required by PDRTA to be installed on the bus by the Contractor, if the following conditions apply: the component or major subsystem supplier declines to participate in this warranty; and the Contractor notifies the PDRTA in writing with, or before submitting, Contractor’s original Offer. The Contractor shall pass on to PDRTA any warranty, offered by a component supplier, that is superior to that required herein.
4.2 REPAIR PROCEDURES

4.2.1 REPAIR PERFORMANCE
The Contractor is responsible for all warranty-covered repair work. To the extent practicable, PDRTA will allow the Contractor or its designated representative to perform such work. At its discretion, the PDRTA may perform such work if it determines it needs to do so based on transit service or other requirements. Such work shall be reimbursed by the Contractor.

4.2.2 REPAIRS BY CONTRACTOR
The Contractor or its designated representative shall begin work on warranty-covered repairs, within five calendar days after receiving notification of a Defect from PDRTA. PDRTA shall make the bus available to complete repairs timely with the Contractor repair schedule.

The Contractor shall provide at its own expense all spare parts, tools, and space required to complete repairs. At PDRTA's option, the Contractor may be required to remove the bus from PDRTA's property while repairs are being affected. If the bus is removed from PDRTA's property, repair procedures must be diligently pursued by the Contractor's representative.

4.2.3 REPAIRS BY PDRTA

4.2.3.1 PARTS USED
If PDRTA performs the warranty-covered repairs, it shall correct or repair the Defect and any Related Defects utilizing parts supplied by the Contractor specifically for this repair. At its discretion, PDRTA may use Contractor-specified parts available from its own stock if deemed in its best interest. Monthly, or at a period to be mutually agreed upon, reports of all repairs covered by this warranty shall be submitted by PDRTA to the Contractor for reimbursement or replacement of parts. The Contractor shall provide forms for these reports.

4.2.3.2 CONTRACTOR SUPPLIED PARTS
PDRTA may require that the Contractor supply new parts for warranty-covered repairs being performed by PDRTA. These parts shall be shipped prepaid to PDRTA from any source selected by the Contractor within 10 (ten) working days of receipt of the request for said parts. Parts supplied by the Contractor shall be Original Equipment Supplier (OEM) equivalent or superior to that used in the bus original manufacture.

4.2.3.3 DEFECTIVE COMPONENTS RETURN
The Contractor may request that parts covered by the warranty be returned to the manufacturing plant. The total cost for this action shall be paid by the Contractor. Materials should be returned in accordance with Contractor's instructions.

4.2.3.4 FAILURE ANALYSIS
The Contractor shall, upon specific request of PDRTA, provide a failure analysis of fleet defect- or safety-related parts, or major components, removed from buses under the terms of the warranty, that could affect fleet operation. Such reports shall be delivered within 60 (sixty) days of the receipt of failed parts.

4.2.3.5 REIMBURSEMENT FOR LABOR
PDRTA shall be reimbursed by the Contractor for labor. The amount shall be determined by multiplying the number of man-hours actually required to correct the Defect by a per hour,
Mechanic 2, straight wage-benefit rate, of $30.00 per hour, plus the cost of towing in the bus if such action was necessary and if the bus was in the normal service area. The wage rate shall not exceed the rate in effect in PDRTA’s service garage at the time the Defect correction is made.

4.2.3.6 REIMBURSEMENT FOR PARTS
PDRTA shall be reimbursed by the Contractor for defective parts and for parts that must be replaced to correct the Defect. The reimbursement shall be at the current price at the time of repair and shall include taxes where applicable and 15 (fifteen) percent handling costs.

4.2.3.7 REIMBURSEMENT REQUIREMENTS
The Contractor shall reimburse PDRTA for warranty labor and/or parts within 60 (sixty) days of receipt of warranty claim.

4.2.4 WARRANTY AFTER REPLACEMENT/REPAIRS
If any component, unit, or subsystem is repaired, rebuilt or replaced by the Contractor, or by PDRTA with the concurrence of the Contractor, the component, unit, or subsystem shall have the un-expired warranty period of the original. Repairs shall not be warranted if Contractor-provided or authorized parts are not used for the repair; unless the Contractor has failed to respond within five days, in accordance with "Scope of Warranty Repairs" (Section 4.1.5).

The warranty on items determined to be fleet defects as defined in Section 4.1.6.1 shall be extended for the time and/or miles of the original warranty. This extended warranty shall begin on the repair/replacement date for corrected items on each bus.
PDRTA RFP 0816-02

30-35 FOOT
URBAN HEAVY-DUTY
LOW FLOOR
DIESEL POWERED
TRANSIT BUSES

TECHNICAL SPECIFICATIONS
5.1 GENERAL

5.1.1 SCOPE

5.1.1.1 GENERAL REQUIREMENTS
This specification defines the requirements for a small urban, heavy-duty, low floor transit bus that will be operated in the geographic, climatological and environmental conditions of the PDRTA’s operating area in Northeastern South Carolina. The bus will be used for general service on urban and arterial streets and suburban express service. The bus shall have a minimum expected life of 12 years or 500,000 miles whichever comes first and is intended for the widest possible spectrum of passengers, including children, adults, the elderly, and persons with disabilities.

5.1.1.2 BUSES OF SHORTER LENGTH
This specification lists the criteria for a bus with a length of 35 feet.

5.1.2 DEFINITIONS

The following are definitions of special terms used in this specification.

(1) dBA. Decibels with reference to 0.0002 microbar as measured on the "A" scale.

(2) Audible Discrete Frequency. An audible discrete frequency is determined to exist if the sound power level in any 1/3-octave band exceeds the average of the sound power levels of the two adjacent 1/3-octave bands by 4 decibels (dB) or more.

(3) Standee Line. A line marked across the bus aisle to designate the forward area that passengers may not occupy when the bus is moving.

(4) Useable Floor Space. Floor area available to standees, excluding the area under seats, area occupied by feet of seated passengers, the vestibule area forward of the standee line, and any floor space indicated by manufacturer as non-standee areas such as, the floor space “swept” by passenger doors during operation. Floor area of 1.5 square feet shall be allocated for the feet of each seated passenger that protrudes into the standee area.

(5) Curb Weight. Weight of bus, including maximum fuel, oil and coolant; and all equipment required for operation and required by this specification, but without passengers or operator.

(6) Seated Load. One hundred fifty pounds for every designed passenger seating position and for the operator.
(7) **Gross Load.** One hundred fifty pounds for every designed passenger seating position, for the operator, and for each 1.5 square feet of free floor space.

(8) **SLW (Seated Load Weight).** Curb weight plus seated load.

(9) **GVW (Gross Vehicle Weight).** Curb weight plus gross load.

(10) **GVWR (Gross Vehicle Weight Rated).** The maximum total weight as determined by the bus manufacturer, at which the bus can be safely and reliably operated for its intended purpose.

(11) **GAWR (Gross Axle Weight Rated).** The maximum total weight as determined by the axle manufacturer, at which the axle can be safely and reliably operated for its intended purpose.

(12) **Heavy Heavy-Duty Diesel Engine (HHDD).** Heavy heavy-duty diesel engines have sleeved cylinder liners, are designed for multiple rebuilds, and a rated horsepower that generally exceeds 250.

(13) **Operator's Eye Range.** The 95th-percentile ellipse defined in SAE Recommended Practice J941, except that the height of the ellipse shall be determined from the seat at its reference height.

(14) **Fireproof.** Materials that will not burn or melt at temperatures less than 2,000° F.

(15) **Fire Resistant.** Materials that have a flame spread index less than 150 as measured in a radiant panel flame test per ASTM-E 162-90.

(16) **Human Dimensions.** The human dimensions used in specification are defined in Humanscale 1/2/3, N. Diffrient, A. R. Tilley, J. C. Bardagiy, MIT Press.

(17) **HIC (Head Injury Criteria).** The following equation presents the definition of head injury criteria:

\[
\left[ \frac{1}{t_1 - t_2} \int_{t_1}^{t_2} (a) dt \right]^{2.5} (t_2 - t_1)
\]

where:
\[ a = \text{the resultant acceleration at the center of gravity of the head form expressed as a multiple of } g, \text{ the acceleration of gravity.} \]

\[ t_1 \text{ and } t_2 = \text{any two points in time during the impact.} \]

(18) Design Operating Profile. The operating profile for design purposes shall consist of simulated transit type service. The duty cycle is described in the figure “Transit Bus Duty Cycle.” The duty cycle consists of three phases to be repeated in sequence: a central business district (CBD) phase of 2 miles with 7 stops per mile and a top speed of 20 mph, an arterial route phase of 2 miles with 2 stops per mile and a top speed of 40 mph, and a commuter phase of 4 miles with 1 stop and a maximum speed of 55 mph and a 5 minute idle phase.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Stops/ Mile</th>
<th>Top Speed (mph)</th>
<th>Miles</th>
<th>Accel. Dist. (ft.)</th>
<th>Accel. Time (s)</th>
<th>Cruise Dist. (ft.)</th>
<th>Cruise Time (s)</th>
<th>Decel. Rate (fpsps)</th>
<th>Decel. Dist. (ft.)</th>
<th>Decel. Time (s)</th>
<th>Dwell Time (s)</th>
<th>Cycle Time (min-s)</th>
<th>Total Stops</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBD</td>
<td>7</td>
<td>20</td>
<td>2</td>
<td>155</td>
<td>10</td>
<td>540</td>
<td>18.5</td>
<td>6.78</td>
<td>60</td>
<td>4.5</td>
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<tr>
<td>Idle</td>
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<tr>
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<td>2</td>
<td>40</td>
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<td>1035</td>
<td>29</td>
<td>1350</td>
<td>22.5</td>
<td>6.78</td>
<td>255</td>
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<td>4-30</td>
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<tr>
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<td>2</td>
<td>155</td>
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<td>510</td>
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<td>4.5</td>
<td>7</td>
<td>9-20</td>
<td>14</td>
</tr>
<tr>
<td>Commuter</td>
<td>1 stop for phase Max. or 55</td>
<td>4</td>
<td>5500</td>
<td>90</td>
<td>2 miles + 4580 ft.</td>
<td>188</td>
<td>6.78</td>
<td>480</td>
<td>12</td>
<td>20</td>
<td>5-10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
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<td>17.8 mph</td>
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</table>
The bus shall be loaded to SLW and shall average approximately 18 mph while operating on this duty cycle. Operation shall continue regardless of the ambient temperature or weather conditions. The passenger doors shall be opened and closed at each stop, and the bus shall be knelt at each stop during the CBD phase. The braking profile shall be:

- 16 percent of the stops at 3 ft/sec/sec
- 50 percent of the stops at 6 ft/sec/sec
- 26 percent of the stops at 9 ft/sec/sec
- 8 percent of the stops at 12 ft/sec/sec

These percentages of stops shall be evenly distributed over the three phases of the duty cycle. For scheduling purposes, the average deceleration rate is assumed.
Average speed is defined as the miles traveled divided by the hours of engine operation. The majority of this idle time is while the bus is in gear and stopped in traffic, or at bus stops as well as frequent brake applications per mile due to traffic congestion and traffic signals.

(20) **Class of Failures.** Classes of failures are described below.

a. **Class 1: Physical Safety.** A failure that could lead directly to passenger or operator injury or represents a severe crash situation.

b. **Class 2: Road Call.** A failure resulting in an en route interruption of revenue service. Service is discontinued until the bus is replaced or repaired at the point of failure.

c. **Class 3: Bus Change.** A failure that requires removal of the bus from service during its assignments. The bus is operable to a rendezvous point with a replacement bus.

d. **Class 4: Bad Order.** A failure that does not require removal of the bus from service during its assignments but does degrade bus operation. The failure shall be reported by operating personnel.

(21) **Maintenance Personnel Skill Levels:**

a. 5M: Mechanic 2
b. 4M: Mechanic 1
c. 3M: Utility Worker

**Note:** Whenever a specific time is indicated to access components or complete a task, it is assumed the bus is in the location where the work is to be performed. All necessary equipment is in its correct position (tools, jacks, vehicle lifts, lighting, fluid recovery systems, etc.) and ready for use.

(22) **Standards.** Standards referenced in this specification shall be the latest revisions unless otherwise stated.

(23) **Wheelchair.** A mobility aid belonging to any class of three or four-wheeled devices, usable indoors, designed for and used by individuals with mobility impairments, whether operated manually or powered.
(24) **Structure.** The structure shall be defined as the basic body, including floor deck material and installation, load bearing external panels, structural components, axle mounting provisions and suspension beams and attachment points. It also includes the floor deck material and installation, when required for structural integrity.

(25) **Low Floor Bus.** A bus which, between at least the front (entrance) and rear (exit) doors, has a floor sufficiently low and level so as to remove the need for steps in the aisle between the doors and in the vicinity of these doors.

(26) **Discrete Signals.** A signal which can take only pre-defined values, usually of a binary 0 or 1 nature where 0 is battery ground potential and 1 is a defined battery positive potential.

(27) **Analog Signals.** A continuously variable signal that is solely dependent upon magnitude to express information content. Note: Analog signals are used to represent the state of variable devices such as rheostats, potentiometers, temperature probes, etc.

(28) **Serial Data Signals.** Serial data signals are a current loop based representation of ASCII or Alphanumeric data used for transferring information between devices by transmitting a sequence of individual bits in a pre-arranged order of significance. Note: An example is the communication that takes place between two or more electronic components with the ability to process and store information.

(29) **Physical Layer.** The first layer of the seven-layer International Standards Organization (ISO) Open Systems Interconnect (OSI) reference model. This provides the mechanical, electrical, functional and procedural characteristics required to gain access to the transmission medium (e.g., cable) and is responsible for transporting binary information between computerized systems.

### 5.1.3 ABBREVIATIONS

The following is a list of abbreviations used in Part 5: Technical Specifications.

(1) **ADA**  Americans with Disabilities Act

(2) **ANSI**  American National Standards Institute

(3) **ASHRAE**  American Society of Heating, Refrigerating and Air Conditioning Engineers

(4) **ASTM**  American Society for Testing and Materials
5.1.4 REFERENCED PUBLICATIONS

The documents or portions thereof referenced within this specification shall be considered part of the requirements of the specification. The edition indicated for each referenced document is the current edition, as of the date of the issuance of this specification. The bus shall comply with the most current revision of the referenced documents at the date of bus manufacture.

5.1.5 LEGAL REQUIREMENTS

5.1.5.1 COMPLIANCE WITH FMVSS AND FMCSR
The bus shall comply with all applicable FMVSS and shall accommodate all applicable FMCSR in effect at the date of manufacture.

5.1.5.2 COMPLIANCE WITH ADA
The bus shall meet the requirements of ADA regulations 49 CFR, part 38, subpart B: Accessibility Specifications for Transportation; Vehicles, Buses, Vans and Systems.

5.1.5.3 COMPLIANCE WITH OTHER REGULATIONS
The bus shall comply with all additional applicable Federal and all applicable South Carolina State regulations. These shall include, but not be limited to, Federal and South Carolina State safety accessibility, and security requirements.

5.1.5.4 CONFLICT WITH REQUIREMENTS
In the event of any conflict between the requirements of this Specification and any applicable legal requirement, the legal requirement shall prevail. Technical requirements that exceed the legal requirements are not considered to conflict.

5.1.6 OVERALL REQUIREMENTS

5.1.6.1 COMPLIANCE WITH SPECIFICATIONS
The bus model(s) proposed must comply with these specifications and the proposed and delivered buses shall be of first-class quality and the workmanship shall be the best obtainable in various trades. The design of the bus that the manufacturer proposes to furnish shall be such as to produce a bus of substantial and durable construction in all respects.

5.1.6.2 VERIFICATION OF COMPLIANCE
The bus provided shall be fully tested to assure compliance with the performance and safety requirements of the specifications. At the option of PDRTA, the bus manufacturer may be required to provide test results and/or certifications insuring compliance with the requirements of the specifications. 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 the appropriate section of the technical specification and shall be provided by the bus manufacturer for approval by PDRTA.

5.1.6.3 COMPOSITION OF MATERIALS
All materials used in construction of the bus and all its parts shall be of known composition and conform in all respects to American Society of Testing Materials, Society of Automotive Engineers, or similar association standards. Materials used shall be duplicated in manufacture, design and construction on each bus model provided to PDRTA under this Contract.

5.1.6.4 PARTS OR COMPONENTS NOT LISTED IN SPECIFICATIONS
All parts or components not listed in these specifications, but that are necessary to furnish a complete bus, shall be the bus manufacturer's standard parts or components.
5.1.6.5 SUBMITTED DEVIATION
When a specific part or component is accompanied by the phrase “submitted deviation”, such a part or component shall be used to describe the properties and characteristics a proposed alternative part or component must possess. Deviations will be evaluated and scored for compliance with the technical specification.

5.1.6.6 RESPONSIBILITY OF APPLICATION AND INSTALLATION
The bus manufacturer shall assume all responsibility that the application and installation of each system, component and part is compliant, proper and intended with the original manufacturer’s requirements and recommendations. Components used in the bus shall be of heavy-duty design and proven in transit service. Parts that are manufactured by others and modified by the bus manufacturer shall be identified in the parts manual.

5.1.6.7 IDENTICAL BUSES
It is intended for this contract, if necessary, to encompass building groups of buses at different times during the contract period. Each part and component that comprises a new bus shall be new and identical to the same part or component in each bus manufactured during the contract period.

5.1.6.8 PERMITTED CHANGES

5.1.6.8.1 Product Improvement
Changes that are of a “product improvement” nature may occur between builds of buses provided that such changes result in an equal or greater value with no increase in cost. The PDRTA shall approve such changes.

5.1.6.8.2 Electronic and Data Communication System Updates
As updates or new technology become available for electronic and data communication systems, PDRTA may request that such updates be made available. If a proposed update will result in an increased cost, the bus manufacturer shall determine the new cost and PDRTA will determine if the new cost is fair and reasonable.

5.1.6.8.3 Software Upgrades
As new versions of software become available for the various subsystems listed in this specification, the new software, and new hardware if required shall be furnished for the duration of the contract. If a software or hardware change is necessary and will result in an increased cost to PDRTA, the bus manufacture shall advise PDRTA of the new cost and allow PDRTA to determine if it is fair and reasonable.

5.1.6.8.4 Obsolete Equipment
Changes necessary because a part or component becomes obsolete, may occur between groups of buses. PDRTA shall approve such changes. If a necessary change will result in an increased cost, the bus manufacturer shall determine the new cost and PDRTA will determine if the new cost is fair and reasonable.

5.1.6.9 DELIVERY OF COMPLETE BUSES
Each bus shall be delivered complete and ready for service and no advantages shall be taken by the bus manufacturer in the omission of any parts or details that make a bus
complete and ready for service, even if such parts are not mentioned in these specifications.

5.1.6.10 BUS SERVICE LIFE

5.1.6.10.1 Length of Bus Service Life
The bus shall be designed to operate in urban transit service for at least 12 years or 500,000 miles. It shall be capable of operating a minimum of 40,000 miles per year including the twelfth year.

5.1.6.10.2 Altoona Testing
The proposed bus shall have undergone appropriate structural testing and/or analysis, including STRUAA FTA required Altoona testing, to ensure adequacy of design for heavy duty urban transit service. Any items that required repeated repairs or replacement must undergo the corrective action with supporting test and analysis. A report clearly describing and explaining the failures and corrective actions taken to ensure any and all such failures will not re-occur shall be submitted to PDRTA. Submit a list of all models or variations of the proposed bus that have been Altoona tested (i.e. different bus lengths, different power plants, different fuel types etc.) and the date of the Altoona test. In addition to the bus model/test date list, submit only the fuel economy discussion or summary of each test in which the bus burned diesel fuel.

5.1.6.11 DESIGN OPERATING PROFILE
The bus shall be designed and proven to operate per the “Transit Bus Duty Cycle” of the “Design Operating Profile”. The “High Density Urban (HDU) Operating Profile” shall be applied to the design of the Electrical, Pneumatic, Brakes and Cooling Subsystems.

5.1.6.12 OPERATING CONDITIONS

5.1.6.12.1 Atmospheric Parameters
The bus shall achieve normal operation in ambient temperature ranges of \(-10^\circ\) F to \(115^\circ\) F, at relative humidity between 5 percent and 100 percent, and at altitudes up to 3,000 feet above sea level. Degradation of performance due to atmospheric conditions shall be minimized at temperatures below \(-10^\circ\) F, above \(115^\circ\) F, or at altitudes above 3,000 feet.

5.1.6.12.2 Cold Weather Starting Requirements
Special equipment or procedures may be employed to start the engine when exposed to temperatures less than 30° F for a minimum of four hours without the engine in operation. All cold weather starting aids, engine heating devices and procedures shall be of the type recommended by the engine manufacturer and approved by PDRTA.

5.1.6.13 ROUTE / INFRASTRUCTURE COMPATIBILITY

5.1.6.13.1 Ease of Bus Operation
Buses shall incorporate features essential for safe, fast, efficient and comfortable operation by the operator, features that ensure excellent road and traffic visibility under all driving conditions and adequate means for safe passenger movement. The bus shall be made capable of easy maneuvering in normal and heavy traffic.
5.1.6.13.2 Physical Size
With the exceptions of exterior mirrors, marker and signal lights, bumpers, fender skirts, washers, wipers, ad frames and rub rail, the bus shall have the following overall dimensions as shown in the figure “Transit Bus Exterior Dimensions” at static conditions and design height.

A. Body Length: 30 and 35 feet (± 3 inches)
B. Body Width: 96 to 102 inches (± 1 inch)
C. Maximum Overall Height: 130 inches, includes all rigid roof mounted items such as A/C, exhaust, etc.

5.1.6.13.3 Underbody Clearance
The bus shall maintain the minimum clearance dimensions as shown in the figure “Transit Bus Minimum Road Clearance” as defined in SAE Standard J689, regardless of load up to the gross vehicle weight rating.
A. **Ramp Clearances.** Approach angle shall be no less than 8.5 degrees. Breakover angle shall be no less than 8 degrees. Departure angle shall be no less than 9 degrees.

B. **Ground Clearance.** Ground clearance shall be no less than 10 inches, except within the axle zone and wheel area.

C. **Axle Clearance.** Axle zone clearance, which is the projected area between tires and wheels on the same axial centerline, should be no less than 6.3 inches.

D. **Wheel Area Clearance.** Wheel area clearance, shall be no less than 8 inches for parts fixed to the bus body and 6 inches for parts that move vertically with the axles.

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**TRANSIT BUS MINIMUM ROAD CLEARANCE**

5.1.6.13.4 **Turning Radius**
Outside body corner-turning radius for a standard configuration 30-35 foot long bus shall not exceed 44 feet.

5.1.6.13.5 **Maximum Curb Weight**
Curb weight of the bus, as defined in section 5.1.2, shall be minimized to the extent practical without compromising integrity and durability and shall not exceed 28,500 pounds.

5.1.6.13.6 **Maximum Gross Vehicle Weight**
The bus shall be designed to carry the Gross Vehicle Weight as defined in Section 5.1.2, which shall not exceed the bus GVWR.
5.1.6.13.7 Maximum Axle Load
The bus shall be designed not to exceed the GAWR of an axle as defined in Section 5.1.2 of this specification.

5.1.6.13.8 Balanced Axle Load
The bus curb weight shall be balanced from side to side on each axle to maintain proper alignment and handling. The curb weight of any wheel/tire shall not exceed +/- 15% of the other wheel/tire on the same axle.

5.1.6.13.9 Seating/Standing Capacity
The passenger seating capacity shall be no less than 27 for a 30-foot bus, 30 for a 35-foot bus with the specified seating arrangement. The passenger standing capacity shall be determined by the amount of useable floor space. Each standing passenger space shall utilize 1.5 square feet of useable floor space.

5.1.6.13.10 Floor Height
Height of the floor above the street shall be no more than 15 3/4 inches measured at the centerline of the front and rear doorway. The floor may be inclined along the longitudinal axis of the bus, and the incline shall be less than 3 1/2° off the horizontal except locally at the doors where 2° slope toward the door is allowed. All floor measurements shall be with the bus at the design running height and on a level surface and with the standard, 305/70R 12R22.5 or equal, tires.

5.1.6.13.11 Interior Headroom
Headroom above the aisle and at the centerline of the aisle seats shall be no less than 78 inches in the forward half of the bus tapering to no less than 74 inches forward of the rear settee. At the centerline of the window seats, headroom shall be no lower than 65 inches. Headroom at the back of the rear bench seat may be reduced to a minimum of 56 inches, but it shall increase to the ceiling height at the front of the seat cushion.

5.1.6.13.12 Door Height Above Pavement
It shall be possible to open and close either passenger door when the bus loaded to GVWR is not knelt and parked with the tires touching an 8-inch-high curb on a street sloping toward the curb so that the street side wheels are 5 inches higher than the right side wheels.

5.1.6.13.13 Door Opening Dimensions
The front door clear width shall be no less than 31 inches with the doors fully opened. The rear door opening clear width shall be no less than 24 inches with the doors fully opened. When open, the doors shall leave an opening no less than 76 inches in height.
Curbside Operator Visibility

5.1.6.13.14 Curbside Operator Visibility
The maximum distance between the front door opening and the forward edge of the glass of the first window on the curbside of the bus shall be no more than 13 inches.

5.1.6.13.15 Performance

5.1.6.13.15.1 General Requirements
Speed, gradeability, and acceleration performance requirements shall be met at, or corrected to, 77° F, 29.31 inches Hg, dry air per SAE J1995.

5.1.6.13.15.2 Top Speed
The bus shall be capable of achieving a top speed as determined by the engine, transmission, rear axle and bus manufacturers and shall be governed at a top speed of 65 m.p.h. on a straight, level road at GVWR with all accessories operating.

5.1.6.13.15.3 Gradeability
Gradeability requirements shall be met on grades with a dry commercial asphalt or concrete pavement at GVWR with all accessories operating. The propulsion system and...
drive train shall enable the bus to achieve and maintain a speed of 40 mph on a 2-1/2 percent ascending grade and 7 mph on a 16 percent ascending grade.

5.1.6.13.15.4 Acceleration
The bus shall meet or exceed the listed requirements with the bus at GVWR on a level surface. Measurements shall commence when the accelerator is depressed with the engine at idle speed.

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<thead>
<tr>
<th>SPEED (MPH)</th>
<th>TIME (SEC)</th>
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<tbody>
<tr>
<td>10</td>
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<td>10.8</td>
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<tr>
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<td>20.0</td>
</tr>
<tr>
<td>40</td>
<td>31.0</td>
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5.1.6.13.16 Maximum Operating Distance
The operating range of the bus when run on the transit bus duty cycle shall be at least 350 miles.

5.1.6.13.17 Fuel Economy
The engine shall be tuned when delivered to provide optimized performance as specified above, including fuel economy. All related components and configuration that affect fuel economy, such as, fan control/operation, transmission, axle ratio, etc., shall be selected accordingly. The bus shall achieve a minimum average fuel economy of 4.00 miles per gallon when run on the Transit Bus Duty Cycle loaded to SLW. Reference SAE J1376, Fuel Economy Measurement Test (Engineering Type) for Trucks and Buses.

5.1.6.13.18 Jerk Limitation
Jerk, the rate of change of acceleration measured at the centerline, floor level of the bus shall be minimized throughout the shifting of each transmission range and retarder application and shall be no greater than 0.3 g/sec. for a duration of a quarter-second or more.

5.1.6.13.19 Noise

5.1.6.13.19.1 Interior Noise

5.1.6.13.19.1.1 Maximum Internal Noise Levels
Maximum internal noise shall not exceed eighty (80) DBA in areas "1", "2", and "3", and no more than eighty-three (83) DBA in area "4" as described below. Sound levels within the bus shall be measured with all doors and windows closed and all bus equipment operating. If some equipment operates on a cyclic basis, the sound level shall be measured with all equipment functioning simultaneously to determine the worst-case noise level.
5.1.6.13.19.1.2 Internal Noise Test Procedure

Measurements shall be made with the bus empty, except for test personnel and equipment. Not more than three (3) persons shall occupy the bus during the measurements.

Measurements shall be made at a height of four feet (4') above the floor and directly above the center line of the seats at the following locations:

1. The operator’s seat;
2. The foremost passenger seat at the centerline of the bus;
3. The seat nearest the center of the bus, and at the bus centerline; and
4. The rear-most seat at the centerline of the bus.

Accelerate the bus at full throttle from standstill to automatic transmission shift speed. Gear or range must be selected so that terminating test speed is sixty-five (65) miles per hour. Observe and record maximum sound level during this operating mode. The sound level recorded shall be the average of at least four (4) readings.

Measurements shall be taken where there is no reflecting or absorbing surfaces to change the sounds emitting from the bus.

5.1.6.13.19.2 Exterior Noise

Airborne noise generated by the bus and measured from either side shall not exceed 83 dBA under full power acceleration when operated at or below 35 mph at curb weight and just prior to transmission upshift. The maximum noise level generated by the bus pulling away from a stop at full power shall not exceed 83 dBA. The bus-generated noise at curb idle shall not exceed 65 dBA. If the noise contains an audible discrete frequency as defined in Section 5.1.2, a penalty of 5 dBA shall be added to the sound level measured. All noise readings shall be taken 50 feet from and perpendicular to, the centerline of the bus with all accessories operating. Instrumentation, test sites, and other general requirements shall be in accordance with SAE Standard J366. The pull away test shall begin with the front bumper even with the microphone. The curb idle test shall be conducted with the rear bumper even with the microphone.

5.1.6.13.19.3 Resonance and Vibration

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.

5.1.6.13.19.4 Outside Air Infiltration

The bus body shall be sealed so that no noticeable air movement is caused inside the bus due to air movement outside the bus during normal operations with the windows, ventilators and passenger doors closed.

5.1.6.14 MAINTENANCE AND INSPECTION

5.1.6.14.1 Skill Level
Scheduled maintenance or inspection tasks as specified by the bus manufacturer shall require a skill level of 3M or less.

5.1.6.14.2 Inspection Interval
Scheduled maintenance tasks shall be related and shall be grouped in maximum mileage intervals. Based upon the Design Operating Profile defined in section 5.1.2, routine scheduled maintenance actions, such as filter replacement and adjustments, shall not be required at intervals of less than 6,000 miles, or as indicated from a regular oil analysis program and routine daily service performed during the fueling operations. Higher levels of scheduled maintenance tasks shall occur at even multiples of mileage for lower level tasks.

5.1.6.14.3 Special Tools Requirement
Any special tools required to maintain the bus shall be provided in quantities as specified. Cost of tools shall be submitted separately as optional costs.

5.1.6.14.4 Component or Part Accessibility
All systems, components or parts subject to periodic maintenance or that are subject to a failure of any class as defined in section 5.1.2 (19), shall be readily accessible for service and inspection. To the extent practicable, removal or physical movement of components unrelated to the specific maintenance and/or repair tasks involved shall not be permitted. As a goal, relative accessibility of components, measured in time required to gain access, shall be inversely proportional to frequency of maintenance and repair of the components.

5.1.6.14.5 Component or Part Interchangeability
Components with identical functions shall be interchangeable to the extent practicable. These components shall include, but not limited to, passenger window hardware, interior trim, lamps, lamp lenses, and seat assemblies. Components with non-identical functions shall not be, or appear to be, interchangeable. A component shall not be used in an application for which it was neither designed nor intended. Any one component or part used in the construction of these buses shall be an exact duplicate in design, manufacture, and assembly for each bus in each order group in this Contract.

5.1.6.15 FIRE SAFETY

5.1.6.15.1 Passenger Fire Safety

5.1.6.15.1.1 General Requirements
The bus shall be designed and manufactured in accordance with all applicable fire safety and smoke emission regulations. These provisions shall include the use of fire-retardant/low-smoke materials, fire detection systems, fire resistant separations, and facilitation of passenger evacuation.

5.1.6.15.1.2 Materials Requirements
All materials used in the construction of the Passenger Compartment of the bus shall be in accordance with the Recommended Fire Safety Practices defined in FTA Docket 90, dated October 20, 1993. Materials entirely enclosed from the passenger compartment,
such as insulation within the sidewalls, need not comply. In addition, smaller components and items, such as seat grab rails, switch knobs and small light lenses, shall be exempt from this requirement.

5.1.6.15.2 Engine Compartment and Wheel Well Fire Resistance and Separation
The requirements for fire resistance of the engine compartment and wheelwells are defined in Section 5.2.1.11

5.1.6.15.3 Engine Compartment Fire Suppression
The requirements for the fire suppression system in the engine compartment are defined in Section 5.10.4.12

5.1.6.16 ENVIRONMENTAL REQUIREMENTS

5.1.6.16.1 General Requirements
In the design and manufacture of the bus, the bus manufacturer shall make every effort to reduce the amount of potentially hazardous waste generated by PDRTA when maintaining the bus in accordance with the procedures contained in the manufacturer’s maintenance manuals. In accordance with Section 6002 of the Resource Conservation and Recovery Act the Bus manufacturer shall use, whenever possible and allowed by the specifications, recycled materials in the manufacture of the bus.

5.1.6.16.2 Exhaust Emissions
The engine shall meet all applicable emission requirements.

5.2 Structure

5.2.1 DESIGN

5.2.1.1 GENERAL REQUIREMENTS
The bus shall have a clean, smooth, simple design, primarily derived from bus performance requirements and passenger service criteria established by this specification. The exterior and body features, including grilles and louvers, shall be shaped to facilitate manual cleaning. Water and dirt shall not be retained in or on any body feature. The body and windows shall be sealed to prevent leaking of air, dust, or water under normal operating conditions and during cleaning with pressure washers for the service life of the bus. Exterior panels shall be sufficiently stiff to minimize vibration; drumming or flexing while the bus is in service. When panels are lapped, the upper and forward panels shall act as a watershed. However if entry of moisture into interior of bus is prevented by other means, then rear cap panels may be lapped otherwise. The windows, hatches, and doors shall be able to be sealed. Accumulation on any window of the bus of spray and splash generated by the bus’s wheels on a wet road shall be minimized.

5.2.1.2 STRUCTURE LIFE
The structure of the bus as defined in section 5.1.2 (24), shall be designed to withstand the transit service conditions typical of an urban duty cycle throughout its service life. The Design Operating Profile defined in section 5.1.2 shall be considered for this purpose. The bus structural frame shall be designed to operate with no maintenance or repairs throughout a minimum 12-years under the Design Operating Profile. The bus shall be
constructed using only inherently corrosion-resistant materials and fasteners to minimize deterioration. No structural failure or cracks shall occur during the 12-year bus life. A carbon steel structure with a 12 year/500,000 mile warranty will be considered through submittal of a deviation.

5.2.1.3 DISTORTION
The bus, loaded to GVWR and under static conditions, shall not exhibit deflection or deformation that impairs the operation of the steering mechanism, doors, windows, passenger escape mechanisms and service doors. Static conditions shall include the bus at rest with any one wheel or dual set of wheels on a 6-inch curb or in a 6-inch deep hole.

5.2.1.4 CRASHWORTHINESS
The bus body and roof structure shall withstand a static load equal to 150 percent of the curb weight evenly distributed on the roof with no more than a 6-inch reduction in any interior dimension. Windows shall remain in place and shall not open under such a load. These requirements must be met without components such as roof-mounted air conditioning installed. The bus shall withstand a 25-mph impact by a 4,000-pound automobile at any point, excluding doorways, along either side of the bus with no more than 3 inches of permanent structural deformation at seated passenger hip height. This impact shall not result in sharp edges or protrusions in the bus interior. Exterior panels below 35 inches from ground level shall withstand a static load of 2,000 pounds applied perpendicular to the bus by a pad no larger than 5 inches square. This load shall not result in deformation that prevents installation of new exterior panels to restore the original appearance of the bus. To protect passengers seated in low floor area, the basic low floor bus structure shall incorporate a substantial side impact barrier. The barrier shall include a stainless steel plate, continuous between the front wheel arches and the rear suspension (except in the width of the exit door opening). The impact barrier shall be an integral welded part of the undercarriage portion of the bus structure.

Results of such testing shall meet the standards set forth in Federal Register Volume 47, No. 195, Section 2.1.2.10.

5.2.1.5 FRAME MATERIALS
The frame shall consist of structural stainless steel and/or aluminum for maximum durability, reduced maintenance, weight and improved corrosion resistance.

5.2.1.6 BODY MATERIALS
Body materials shall be selected and the body fabricated to reduce maintenance, extend durability, and provide consistency of appearance throughout the service life of the bus. Detailing shall be kept simple; add-on devices and trim, where necessary, shall be minimized and integrated into the basic design. Reinforced fiberglass and plastic materials shall not be used as a stress-carrying body construction member.

5.2.1.7 FASTENERS
The underframe shall be welded and Huck bolted throughout. Bolt fasteners shall be grade 8 traceable hardware, and shall be used only where necessary to allow for
routine disassembly (e.g., the closing cross member shall be bolted to allow for engine removal at overhaul). No movement at bolted joints shall be permitted.

5.2.1.8 CORROSION RESISTANCE

The bus frame, body, structure and suspension components shall resist corrosion or deterioration from atmospheric conditions and road salts, including but not limited to sodium chloride, calcium chloride and magnesium chloride, for a period of 12 years or 500,000 miles whichever comes first. It shall maintain structural integrity and nearly maintain original appearance throughout its service life, provided that it is maintained in accordance with the procedures specified in the manufacturer’s service manual by PDRTA. With the exception of periodically inspecting the visible coatings applied to prevent corrosion and reapplying these coatings in limited spots, the Bus manufacturer shall not require the complete reapplication of corrosion compounds over the life of the bus. The bus shall be constructed using only inherently corrosion-resistant materials and fasteners to minimize deterioration. All materials that are not inherently corrosion resistant shall be protected with corrosion-resistant coatings. All joints and connections of dissimilar metals shall be corrosion-resistant and shall be protected from galvanic corrosion. Representative samples of all materials and connections shall withstand a 2-week (336-hour) salt spray test in accordance with ASTM Procedure B-117 with no structural detrimental effects to normally visible surfaces, and no weight loss of over 1 percent. All exterior body seams, joints and overlapping panels shall be sealed against entry of water or dust. Where dissimilar metals meet, proper care shall be taken to prevent electrolytic corrosion.

5.2.1.9 UNDERCOATING

Except as noted below, the entire body lower frame assembly, cab, underbody, understructure/frame, chassis, fenders, wheel housings, and lower skirt panels shall be completely undercoated. Undercoating shall be PPG Corashield 7972 (www.ppg.com) material or submitted deviation. Undercoating shall be applied to a uniform thickness throughout with no bare spots. Items and components that shall not be undercoated include non-metallic fender and engine, transmission, drive shaft(s), differential/axle housing, brakes, lube fittings, exhaust system, and power steering. The inner surfaces of structural tubing other than stainless steel shall be protected with a corrosion inhibitor or undercoating.

5.2.1.10 THERMAL INSULATION

5.2.1.10.1 Passenger Compartment/Operator’s Area Requirements

All insulation materials shall be sealed or self-sealing to minimize entry and/or retention of moisture. Insulation properties shall be unimpaired during the service life of the bus. All insulation materials shall comply with the Recommended Fire Safety Practices defined in FTA Docket 90, dated October 20, 1993. The combination of interior and exterior materials of the sides, roof, wheelwells and bus ends, and the insulation between these materials shall provide thermal insulation sufficient to meet the interior temperature requirements of this specification.

5.2.1.10.2 Engine Compartment Insulation
The insulation material(s) used inside the engine compartment shall not absorb or retain oils or water and shall be designed to prevent casual damage that may occur during maintenance operations. The engine compartment shall be sealed so as to prevent smoke and fumes from entering the passenger area and shall be insulated to assure there will be a minimum eighty degree (80°) temperature differential between engine compartment and passenger area.

5.2.1.11 FIRE RESISTANCE AND SEPARATION

5.2.1.11.1 Engine Compartment/Passenger Compartment Fire Resistance and Separation
The passenger and engine compartments shall be separated by a bulkhead(s) constructed of fire resistant materials. The engine compartment shall include areas where the engine and exhaust systems are housed including the muffler, if mounted above the horizontal shelf. Such materials shall preclude or retard propagation of an engine compartment fire into the passenger compartment for a period of 10 minutes and shall be in accordance with the Recommended Fire Safety Practices defined in FTA Docket 90, dated October 20, 1993. Only necessary openings shall be allowed in the bulkhead, and these shall be fireproofed. Any passageways for the climate control system air shall be separated from the engine compartment by fireproof material. Piping through the bulkhead shall have copper, brass, or fireproof fittings sealed at the bulkhead with copper or steel piping on the forward side. Wiring may pass through the bulkhead only if connectors or other means are provided to prevent or retard fire propagation through the bulkhead. Engine access panels in the bulkhead shall be fabricated of fireproof material and secured with fireproof fasteners. These panels, their fasteners, and the bulkhead shall be constructed and reinforced to minimize warping of the panels during a fire that will compromise the integrity of the bulkhead.

5.2.1.11.2 Wheelwell/Passenger Compartment Fire Resistance and Separation
The passenger compartment and each wheel well shall be separated by fire resistant materials. Such materials shall preclude or retard propagation of a tire or other fire into the passenger compartment for a period of 10 minutes and shall be in accordance with the Recommended Fire Safety Practices defined in FTA Docket 90, dated October 20, 1993.

5.2.1.12 EXPOSED COMPONENTS AND PARTS
Components and Parts mounted under the bus shall be mounted or shielded in such a way to prevent water and dirt from accumulating around or on top of such components. Whenever possible, components normally mounted under the bus shall be shielded from water and dirt or mounted in a secure location in the passenger compartment. Such shielding shall be designed to shed water and dirt.

5.2.1.13 TOWING
The understructure at the front and rear overhang immediately behind each bumper shall permit simultaneous lifting and towing without special rigging. The design shall be verified by submission of the corresponding parts of the STRUAA (Altoona Test), which address towing/recovery. A means of attaching a suitable towing bracket and a cable for winching shall be provided on each end of the bus. Each means of towing bracket and
cable attachment shall withstand, without permanent deformation, tension loads up to 1.2 times the curb weight of the bus within 20 degrees of the longitudinal axis of the bus. The means of towing bracket and cable attachment shall not provide a toehold for unauthorized riders. The bus shall sustain no damage or permanent deformation when the means of towing bracket and cable attachment are used as specified. Each cable attachment shall accommodate a hook with a 1-inch throat. The means of tow bracket attachment shall consist of two vertical 1-1/2 inch holes centered between 23" - 28-1/2" apart equidistant from the centerline of the bus. The lateral centerline of the holes shall be 18" from the front surface of the bumper. The tow bracket shall simultaneously lift and tow the bus, utilize two vertical 1-1/2" tapered pins to engage the specified holes on the bus frame and be compatible with PDRTA's contracted tow service vehicles. Each pin shall be accessible after insertion for the installation of a pin or key to prevent the pin from disengaging when the bus is towed. Each axle shall be tethered with a chain to the bus structure to prevent an axle from “hanging” from various suspension components when the bus is towed. The method of attaching the towing bracket and cable shall require the specific approval of PDRTA.

5.2.1.14 JACKING
It shall be possible to safely jack up the bus, at curb weight, with a common 10-ton floor jack with or without special adapter, when a tire or dual set is completely flat and the bus is on a level, hard surface, without crawling under any portion of the bus. Jacking from a single point shall permit raising the bus sufficiently high to remove and reinstall a wheel and tire assembly. Jacking pads located on the axle or suspension near the wheels shall permit easy and safe jacking with the flat tire or dual set on a 6-inch-high run-up block not wider than a single tire. The bus shall withstand such jacking at any one or any combination of wheel locations without permanent deformation or damage.

5.2.1.15 HOISTING
The bus axles or jacking plates shall accommodate the lifting pads of a 2-post hoist system. Jacking plates, if used as hoisting pads, shall be designed to prevent the bus from falling off the hoist. Other pads or the bus structure shall support the bus on jack stands independent of the hoist.

5.2.2 FLOOR STRUCTURE

5.2.2.1 GENERAL REQUIREMENTS
The floor shall be essentially a continuous flat plane, except at the wheel housing and platforms. The floor height shall be designed to eliminate steps and facilitate boarding and alighting of passengers. The floor shall consist of two levels (bi-level construction). Aft of the rear door extending to the rear settee riser, the floor height may be raised to a height approximately 18 inches above the lower level. An increase slope shall be allowed on the upper level not to exceed 3½° off the horizontal. The bus floor in the area of the entrance and exit doors shall have a lateral slope not exceeding 2° to allow for drainage.

5.2.2.2 STRENGTH
The floor deck shall be reinforced as needed to support passenger loads. At GVWR, the floor shall have an elastic deflection of no more than 0.60 inches from the normal plane. The floor shall withstand the application of 2.5 times gross load weight without permanent detrimental deformation. Floor, with coverings applied, shall withstand a static load of at least 150 pounds applied through the flat end of a ½ inch-diameter rod, with 1/32-inch radius, without permanent visible deformation.

5.2.2.3 MATERIAL REQUIREMENTS

The floor, as assembled, including the sealer, attachments and covering shall be waterproof, non-hygroscopic, and resistant to mold growth. The sub-floor shall be resistant to the effects of moisture, including decay (dry or wet rot). It shall be impervious to wood destroying insects such as termites.

5.2.2.3.1 Plywood Requirements

If plywood is used, it shall be certified at the time of manufacturing by an industry approved third-party inspection agency such as APA- The Engineered Wood Association. Plywood shall be of a thickness adequate to support the design loads, manufactured with exterior glue, satisfy the requirements of a Group I Western panel as defined in PS 1-95 (Voluntary Product Standard PS 1-95, Construction and Industrial Plywood) and be of a grade that is manufactured with a solid face and back. Plywood shall be installed with the highest-grade veneer up. Plywood shall be pressure-treated with a preservative chemical that prevents decay and damage by insects. Preservative treatments shall utilize no EPA listed hazardous chemicals. The concentration of preservative chemical shall be equal to or greater than required for an above ground level application. Treated plywood will be certified for preservative penetration and retention by a third party inspection agency. Pressure-preservative treated plywood shall have a moisture content at or below fifteen percent. A barrier shall be applied to prevent contact by road salt with the plywood panels.

5.2.2.3.2 Other Floor Structure Materials

Other floor structure materials, such as composites, may be provided with the approval of PDRTA.

5.2.2.4 INSTALLATION

The floor deck may be integral with the basic structure or mounted on the structure securely to prevent chafing or horizontal movement and designed to last the life of the bus. Sheet metal screws shall not be used to retain the floor and all floor fasteners shall be serviceable from one side only. An adhesive and/or sealant to secure the floor to the structure shall be used in combination with the use of bolt or screw fasteners and its effectiveness shall last throughout life of the bus. Each joint between the floor deck and a structure member shall be sealed after the floor deck is installed. Tapping plates, if 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 bus. The underside of each piece of floor deck shall be primed with PPG Corashield 7972 (www.ppg.com) or submitted deviation before installation. The edges of each piece of floor deck shall be sealed with liquid neoprene, liquid urethane, Tuffcote (www.hexham.ndirect.co.uk), or submitted deviation before installation. Floor shall be
laid in such a manner as to be free from squeaks. All edges shall be over underframe members. The entire wooden floor shall be thoroughly sanded in preparation for application of floor covering material.

5.2.2.5 FLOOR / WALL TRANSITION
Where the floor meets the walls of the bus, as well as other vertical surfaces, such as, platform risers, the surface edges shall be blended with a circular section of radius not less than 1 inch. Similarly, a molding or cove shall prevent debris accumulation between the floor and wheel housings.

5.2.3.1 PLATFORM, WHEEL HOUSING AND STEPWELL STRUCTURE

5.2.3.1 RAISED PLATFORMS
Raised platforms for passenger seats shall not be permitted without PDRTA's approval.

5.2.3.2 OPERATOR PLATFORM
The preferred operator's platform maximum height is 12 inches. A farebox platform shall be provided if the preferred operator's platform is exceeded. The operator's platform shall be of a height that, in a seated position, the operator can see an object located at an elevation of 42 inches above the road surface, 24 inches from the leading edge of the bumper. Notwithstanding this requirement, the platform height shall not position the operator such that the operator's vertical upward view is less than 15 degrees. The following schematic diagram illustrates a means by which the platform height can be determined, using the Critical Line of Sight.
5.2.3.3 FAREBOX PLATFORM
The farebox platform shall provide sufficient space for a GFI Odyssey farebox and a step for access to the operator’s platform. Location of the fare collection device shall not restrict traffic in the vestibule, including wheelchairs, and shall allow the operator to easily reach the farebox controls and to view the fare register. The fare box shall not restrict access to the operator area, operation of operator controls. The farebox shall not, either by itself or in combination with stanchions, transfer mounting, cutting, and punching equipment, restrict operator's field of view per SAE Recommended Practice J1050. Location and mounting of the fare collection device shall permit unrestricted passenger access. The fare box location shall permit accessibility for easy vault removal. The floor under the fare box shall be reinforced, as necessary, to provide a sturdy mounting platform and to prevent shaking of the fare box.

5.2.3.4 WHEEL HOUSING

5.2.3.4.1 General Requirements
Wheel housings shall be constructed of corrosion-resistant, non-combustible material.

5.2.3.4.2 Strength Requirements
Wheel housings, as installed and trimmed, shall withstand impacts of a 2-inch steel ball with at least 200 foot-pounds of energy without penetration.

5.2.3.4.3 Clearance Requirements
Sufficient clearance and air circulation shall be provided around the tires, wheels, and brakes to preclude overheating when the bus is operating on the design operating profile. Interference between the tires and any portion of the bus shall not be possible in operation up to the limit of tire adhesion with weights from curb weight to GVWR.

5.2.3.4.4 Support of Other Equipment
Wheel housings shall be adequately reinforced where seat pedestals are installed. Design and construction of front wheel housings shall allow for the installation of radio/electronic equipment storage compartment on interior top surface.

5.2.3.4.5 Interior Finish Requirements
The finish of the passenger compartment side of the front wheel housings shall be scratch-resistant and complement interior finishes of the bus to minimize the visual impact of the wheel housing. If non-metallic wheel housing covers are provided, then they shall be color-impregnated to match interior finishes. The lower portion of the interior trim on the front wheel housings extending to approximately 12 inches above floor shall be stainless steel.

5.2.3.5 STEPWELL

5.2.3.5.1 General Requirements
A maximum of one step and two risers shall be permitted to provide passenger access to the raised seating area in the rear of the bus. Each riser shall be the same height. The step tread shall be a minimum of 15 inches deep. The step tread shall support a minimum load of 500 lbs. placed on the center portion of the step tread.
5.2.3.5.2 Stepwell Structure
The stepwell shall be corrosion resistant to last the life of the bus and be replaceable as a unit if constructed out of non-metallic material.

5.3 CHASSIS

5.3.1 AXLES

5.3.1.1 FRONT AXLE

5.3.1.1.1 General Requirements
The front axle shall be a solid beam non-driving axle, MAN Standard (www.man-mec.com) or submitted deviation, with a load rating sufficient for the bus loaded to GVWR. All friction points on the front axle shall be equipped with replaceable bushings or inserts and lubrication fittings easily accessible from a pit or lift. Front axle shall be designed with proper wheel and axle geometry so that imperfect front axle operation will not be encountered in service.

5.3.1.1.2 Weight Rating
Front axle shall have a minimum rating of 14,600 lbs.

5.3.1.1.3 Bearing Lubrication
Wheel bearings shall utilize “wet” or grease lubrication.

5.3.1.1.4 Steering

5.3.1.1.4.1 General Requirements
Steering gear shall be an integral type. Steering effort and number of turns "lock-to-lock" shall be designed and coordinated to minimize operator fatigue. Steering forces and characteristics in the event of failure of the power boost shall enable the bus to be safely driven in this condition. Mounting of gear assembly shall be engineered to reduce road shock and vibration. Steering mechanism shall be mounted so that all adjustments can be made without dismounting. The steering unit shall have hex head filler and drain plugs. The drag link assembly shall have a horizontal socket for attachment at the Pitman arm, and a vertical stud for attachment at the steering knuckle arm. Both ends shall have internal springs and lubrication fittings. The assembly shall have plus or minus .50-inch length adjustment. Front axle tie rod ends shall be threaded into the tube for adjustment without removal. Lubrication fittings shall be provided on the non-serviceable end assemblies.

5.3.1.1.4.2 Steering Durability
Fatigue life of all steering components shall exceed 1,000,000 miles. No element of the steering system shall sustain a Class I failure when one of the tires hits a curb or strikes a severe road hazard. Inadvertent alteration of the steering system as a result of striking road hazards shall be considered a steering failure.

5.3.1.1.4.3 Steering Box
The power steering box shall be manufactured by Ross/TRW (www.trw.com), or submitted deviation.

5.3.1.1.4.4 Steering Column
The steering column shall be manufactured by Ross/TRW, or submitted deviation.

5.3.1.2 REAR AXLE

5.3.1.2.1 General Requirements
The rear axle shall be a heavy-duty, full floating type, MAN Standard or submitted deviation, incorporating a single reduction, spiral bevel drive. End tubes shall be removable and shall be threaded to allow for adjustment of wheel bearing nuts. The differential carrier shall incorporate the differential assembly, drive pinion and pinion cage. Carrier shall be removable as a complete unit from the axle housing. The pinion differential gears shall be carried in a two-piece case mounted on tapered roller bearings. Torque nuts and bolts are used to mount the dowel gear drive to the flanged half of the differential case. Axle shafts shall be the floating type with all wheel-bearing loads carried on the axle housing end sleeves. The drive flanges at the outer end shall be attached to hub-piloted wheels. Transfer of gear noise to the bus interior shall be minimized. The drive axle shall be designed to operate for not less than 300,000 miles on the design operating profile without replacement or major repairs. The lubricant drain plug shall be magnetic type, external hex head. A rear axle that uses a planetary gear design shall not be permitted.

5.3.1.2.2 Weight Rating
Rear axle shall have minimum rating of 26,000 lbs.

5.3.1.2.3 Bearing Lubrication
Wheel bearings shall utilize "wet" or grease lubrication.

5.3.1.3 RADIUS ARM ASSEMBLIES
Each axle shall have four (4) adjustable, rubber bushed (lubrication free) radius arm assemblies.

5.3.1.4 WHEELS AND TIRES

5.3.1.4.1 Wheels
Alcoa 8.25 x 22.5 machine finished hub piloted wheels, or submitted deviation shall be provided. All wheels shall be interchangeable and shall be removable without a puller. Wheels shall be compatible with tires in size and load-carrying capacity.

5.3.1.4.2 Tires
Tires shall be suitable for the conditions of transit service and sustained operation at the maximum speed capability of the bus, 305/70R, 12R22.5 or submitted deviation. The load on any tire at GVWR shall not exceed the tire rating.
5.3.2 SUSPENSION

5.3.2.1 GENERAL REQUIREMENTS
Both the front and rear suspensions shall be pneumatic type. The basic suspension system shall last the service life of the bus without major overhaul or replacement. Adjustment points shall be minimized and shall not be subject to a loss of adjustment in service. Necessary adjustments shall be easily accomplished without removing or disconnecting the components.

5.3.2.2 SPRINGS AND SHOCK ABSORBERS

5.3.2.2.1 Air Springs
Bus shall be equipped with an air-suspension system. Air suspension system shall consist of four (4) rear and four (4) front Rolling Lobe Firestone (www.Firestoneindustrial.com) air bellows or two (2) front air bellows if using ZF axles or submitted deviation. Air bellows shall act as a flexible connection between body and axle to absorb and cushion road shocks.

5.3.2.2.2 Leveling Valves
A leveling valve, manufactured by Barksdale (www.Barksdale.com) or submitted deviation, shall be provided at each wheel by which the air pressure is automatically regulated in proportion to the bus loading. Leveling valves shall be installed in such a manner that will prevent leveling valve rollover. The leveling valves shall also act to keep the bus body in relatively level position and contain a dampening or compensating feature to prevent excessive consumption of air resulting from high-frequency axle movements over rough streets.

5.3.2.2.3 Shock Absorbers
Vertical damping of the suspension system shall be accomplished by hydraulic shock absorbers, Koni (www.Koni-na.com) shock absorbers or submitted deviation, and mounted to the suspension arms or axles and attached to an appropriate location on the chassis. Damping shall be sufficient to control bus motion to 3 cycles or less after hitting road perturbations. Shock absorbers shall maintain their effectiveness for at least 50,000 miles of the service life of the bus. The shock absorber bushing shall be made of elastomeric material that will last the life of the shock absorber.

5.3.2.2.4 Axle Stops
Axle stops shall be provided between the axle and frame on each side of the axles to prevent axle and/or frame damage in severe bounce condition and to allow operation of the bus if one or more air bellows are deflated.

5.3.2.2.5 Horizontal Travel
The suspension system shall permit a minimum wheel travel of 3 inches jounce-upward travel of a wheel when the bus hits a bump (higher than street surface), and 3 inches rebound-downward travel when the bus comes off a bump and the wheels fall relative to the body. Elastomeric bumpers shall be provided at the limit of jounce travel. Rebound travel may be limited by elastomeric bumpers or hydraulically within the shock absorbers.
5.3.2.3 KNEELING

5.3.2.3.1 General Requirements
A kneeling system shall lower and raise the front of the bus a minimum of 3 inches, both above and below the level of the bus maintained by the leveling valves, at any load up to and including GVWR, measured at the longitudinal centerline of the entrance door.

5.3.2.3.2 Kneeling Valve
The kneeling valve shall be manufactured by Bendix or submitted deviation.

5.3.2.3.3 Kneeling Rate
The bus shall kneel at a maximum rate of 1.25 inches per second at essentially a constant rate. After kneeling, the bus shall rise within 2 seconds to a height permitting the bus to resume service and shall rise to the correct operating height within 7 seconds regardless of load up to GVWR. During the lowering and raising operation, the maximum acceleration shall not exceed 0.2g and the jerk shall not exceed 0.3g/sec.

5.3.2.4 CHASSIS/SUSPENSION LUBRICATION
All elements of steering, suspension, and drive systems requiring scheduled lubrication shall be provided with grease fittings conforming to SAE Standard J534. These fittings shall be located for ease of inspection, and shall be accessible with a standard grease gun without flexible hose end from a pit or with the bus on a hoist. Each element requiring lubrication shall have its own grease fitting with a relief path. The specified lubricant shall be suitable for all elements on the bus serviced by standard fittings.

5.3.3 BRAKES

5.3.3.1 SERVICE BRAKE

5.3.3.1.1 General Requirements
Service air brakes shall be furnished on all wheels of each bus. Disc brakes shall be supplied. The brake system shall conform to the requirements of all Federal and State regulations, designed so that conformance can be maintained throughout the normal adjustment cycle. A supplemental brake (transmission retarder) shall also be provided and not be used in meeting regulatory criteria. The braking system shall include service brakes, a parking and emergency brake. The brake system shall be approved by PDRTA.

5.3.3.1.2 Other Brake Types (Option)
Other brake configurations, such as drum brakes may be provided as an option.

5.3.3.1.3 Actuation

5.3.3.1.3.1 General Requirements
Service brakes shall be controlled and actuated by a compressed air system. The operator's brake pedal shall control the service brake and the supplemental brake in a coordinated manner to give a total braking effort depending on the position of the pedal up to the maximum capability of the braking system. The control shall make maximum practical use of the supplemental
brake to minimize brake fade and to achieve maximum brake lining lifetimes. Braking forces shall be proportioned among the axles to assure balanced braking and equalize lining life between axles. Braking shall be initiated at the second axle.

5.3.3.1.3.2 Automatic Brake System/Automatic Traction Control (ABS/ATC)
A microprocessor controlled Automatic Braking System (ABS) and Automatic Traction Control (ATC) shall be provided. The microprocessor shall be protected yet in an accessible location to allow for ease of service. Actuation of ABS or ATC shall override the operation of the brake retarder.

5.3.3.1.4 Brake Drums – IF ACCEPTED AS AN OPTION

5.3.3.1.4.1 Front Drum Size
Front brake drums shall be a minimum of 14.5 by 6 inches (368 by 152 mm). Drums shall be labeled with the maximum safe diameter for drum refinishing.

5.3.3.1.4.2 Rear Drum Size
Rear brake drums shall be a minimum of 14.5 by 10 inches (368 by 254 mm). Drums shall be labeled with the maximum safe diameter for drum refinishing.

5.3.3.1.5 Braking Equipment

Friction Material
The entire service brake system, including friction material, shall have a minimum overhaul or replacement life of 30,000 miles with a brake retarder on the design operating profile. The brake linings shall be made of non-asbestos material. In order to aid maintenance personnel in determining extent of wear, a provision such as a scribe line or chamfer indicating the thickness at which replacement becomes necessary, shall be provided on each brake lining and easily visible from a pit or hoist without removal of any components. Brake shoes shall be of two-shoe type, heavy duty, fabricated steel, heavily ribbed to insure uniform pressure.

Camshaft Bushings
Brake camshaft bushings shall be bronze bushings. Zerk fittings shall be installed and be easily accessible from either a pit or a hoist without removal of any components.

5.3.3.1.6 Slack Adjusters
Automatic slack adjusters, Haldex (www.haldex.com) or submitted deviation, shall be provided. All slack adjusters shall be removable without disassembly or removal of other components. Brakes shall be self-adjusting throughout the life of the friction material. Visible stroke indicators shall be provided to easily identify when the brakes are not in correct adjustment. Slack adjuster travel and geometry shall be designed not to exceed 90 degrees in relation to the pushrod, when properly adjusted, throughout the lining life. Adjusting bolt and lock shall be positioned so adjustment can be made easily.

5.3.3.1.7 Brake Chambers

5.3.3.1.7.1 Front brake chambers
The front brake chambers shall be Anchorlok (www.haldex.com) or MGM (www.mgmbrakes.com), minimum size type 24 with protective boot over the push rod, or submitted deviation.

5.3.3.1.7.2 Rear brake chambers
The rear brake chambers shall be Anchorlok or MGM, minimum size type 36 with protective boot over the push rod, or submitted deviation.

5.3.3.1.8 Brake Chamber Hoses
Brake hoses shall be installed in locations where the possibility of damage is minimized. Hoses shall be clamped and supported by the bus structure to minimize long unsupported hose lengths and to eliminate rubbing and/or chafing. Flexible brake lines shall be Parker 293 (www.parker.com) or submitted deviation, with nut and sleeve type fittings. They shall be of adequate length to prevent any strain, regardless of relative motion between brake valve and brake chamber, without allowing chafing or rubbing.

5.3.3.2 PARKING /EMERGENCY BRAKE

5.3.3.2.1 General Requirements
A parking brake shall be provided and be controlled by a Bendix PP-1 valve set (www.bendix.com) or submitted deviation to automatically apply the parking brake at 40 PSI. An emergency brake release shall be provided to release the brakes in the event of automatic emergency brake application. The operator shall be able to manually depress and hold down the emergency brake release valve to release the brakes and maneuver the bus to safety. Once the operator releases the emergency brake release valve, the brakes shall engage to hold the bus in place.

5.3.3.2.2 Spring Brake Chambers
The bus shall be equipped with spring brakes, Anchorlok #3030 or MGM #E3030T or submitted deviation, with quick release yoke or manual "wind-off", or submitted deviation.

5.3.3.3 DOOR BRAKE
The rear axle service brake shall apply when the door control is activated. The braking effort shall be adjustable, with hand tools only, from zero to maximum brake effort of the rear axle. Interlock controls shall be manufactured by Vapor (www.vapordoors.com) or submitted deviation, and mounted above the floor and readily accessible for servicing. The rear brakes shall be released by means of a quick-release air valve when doors are closed. A minimum service brake application of 10 psi shall be necessary to release the door brake.

5.4 PROPULSION SYSTEM

5.4.1 SYSTEM TYPE

5.4.1.1 CONVENTIONAL HHDD SYSTEM
Propulsion system and drive train shall provide power to enable the bus to meet the defined acceleration, top speed, and gradeability requirements, and operate all propulsion-
driven accessories. Power requirements are based on heavy, heavy-duty diesel (HDD) engines certified for use in 49 states (except California) using actual road test results or computerized vehicle performance data.

5.4.1.2 HYBRID ELECTRIC SYSTEM (OPTION)
A hybrid electric propulsion system consisting of one or more electric motor(s), control device and energy storage device, shall be provided as an option. The proposed system shall be approved by the bus manufacturer and Altoona tested for use in the bus being bid. If a bus manufacturer offers more than one hybrid electric system, each system shall be listed as an option. A diesel engine shall be the primary energy source for each hybrid system. The diesel engine, rear axle ratio, vehicle performance and brake function may change and the conventional transmission as specified shall be omitted by the selection of this option. The electrical energy storage and control devices shall be mounted on the roof of the bus. Bid submittals shall include the option cost, hybrid system, diesel engine and rear axle model and manufacturer.

5.4.1.3 SYSTEM CONFIGURATION
A “T-Drive” is the preferred propulsion system/drive train configuration.

5.4.2 POWER PLANT

5.4.2.1 ENGINE

5.4.2.1.1 General Requirements (Option)
A six-cylinder 8.9-liter HDD engine, a Cummins ISL or ISB (www.cummins.com) or submitted deviation should be provided. Such HDD engines shall be designed for use in an urban heavy-duty low floor transit bus and to operate for not less than 300,000 miles without major failure or significant deterioration. Components of the fuel injector and/or control system shall be designed to operate for not less than 150,000 miles without replacement or major service. Mileage intervals are based on the design operating profile defined in Section 5.1.2. During the engine warranty period, initial performance settings shall be changed only with the authorization from the engine, transmission and bus manufacturers.

5.4.2.1.2 Fuel Requirements
The engine shall meet all requirements of this specification when operating on low or ultra-low sulfur, # 1 or # 2 - diesel fuel, as certified by the engine manufacturer and specified by PDRTA. Durability of the engine and its components shall not be seriously reduced by operation on either of the commercially available diesel fuels.

5.4.2.1.3 Engine Control System
The engine shall be equipped with an electronically controlled management system, compatible with either 12 or 24-volt power distribution. The engine control system shall be capable of transmitting and receiving electronic inputs and data from other drivetrain components, and broadcasting that data to other vehicle systems. The engine’s electronic management system shall monitor operating conditions and provide instantaneous adjustments to optimize both engine and bus performance. The system shall be programmable to allow optimization of engine performance.
5.4.2.1.4 Engine Diagnostics
The engine control system shall have onboard diagnostic capabilities able to monitor vital engine functions; store and time stamp out of parameter conditions in memory, and communicate faults and vital conditions to service personnel. Diagnostic reader device connector ports, suitably protected against dirt and moisture, shall be provided in operator’s area and near or inside engine compartment. The onboard diagnostic system shall inform the operator via visual and/or audible alarms when out-of-parameter conditions exist for vital engine functions.

5.4.2.1.5 Engine Shutdown
5.4.2.1.5.1 Engine Shutdown - Damage Prevention
The engine control system shall protect the engine against progressive damage. The system shall monitor conditions critical for safe operation and automatically derate power and/or speed and initiate engine shutdown as needed. Automatic shutdown shall only occur when established parameters for the functions below are exceeded:

- Coolant Level
- Coolant Temperature
- Oil Pressure
- Oil Temperature
- Catalyst or Particulate Trap Over-Temperature

5.4.2.1.5.2 Automatic Engine Shutdown - EPA Compliant
The engine shall automatically turn off when the engine is in idle and the transmission is in neutral for 5 minutes. This shutdown feature shall be reset by cycling the Master – Run switch to the off position.

5.4.2.2 STARTER
The engine starter shall operate from normal coach voltage and be sized to provide sufficient torque to turn the engine reliably under all hot or cold engine or ambient temperature conditions. The starter shall be a heavy duty "Delco Products Division" Model 42MT or approved equal as recommended by the engine manufacturer.

The starter solenoid switch shall be interlocked so that:

- Engine can be started in neutral gear only with the transmission selector in neutral only.
- Starter will not operate when engine is running. The interlock shall be activated by fuel pressure or by other approved means.
- Other major electrical loads shall be disconnected while cranking.

5.4.2.3 TRANSMISSION
5.4.2.3.1 General Requirements
The transmission shall be multiple speed, automatic shifts with a torque converter. It shall be electronically controlled with an integral retarder. The transmission shall be the
ZF Ecolife 6AP1400 or ZF592 (www.zf.com) or approved equal. Contractor shall take into consideration the low floor design with lack of clearance around the transmission, to design sufficient transmission cooling system and high heat resistant transmission seals.

Transmission fluid level shall be checkable with the engine running. The transmission dipstick shall have two sets of fluid level marks’ one set for use with transmission at ambient (cold) temperature and one set for use with transmission at normal operating temperature. In addition, an electronic transmission fluid level monitoring and protection system shall be provided. This system shall permit a Utility Worker or Bus Operator to accurately determine transmission fluid levels during routine daily service.

Gross input power, gross input torque and rated input speed shall be compatible with the engine. The transmission shall be designed to operate for not less than 300,000 miles on the design operating profile without replacement or major service.

5.4.2.3.2 Transmission Control
The electronic controls shall be capable of transmitting and receiving electronic inputs and data from other Drivetrain components and broadcasting that data to other vehicle systems. Electronic controls shall be compatible with either 12 or 24 volt power distribution, provide consistent shift quality, and compensate for changing conditions such as variations in vehicle weight and engine power.

5.4.2.3.3 Transmission Diagnostics
The electronically controlled transmission shall have on-board diagnostic capabilities, be able to monitor functions, store and time stamp out-of-parameter conditions in memory, and communicate faults and vital conditions to service personnel. The transmission shall contain built-in protection software to guard against damage.

5.4.2.3.4 Retarder

5.4.2.3.4.1 General Requirements
The transmission shall be equipped with an integral hydraulic retarder designed to extend brake lining service life.

5.4.2.3.4.2 Retarder Activation
The retarder shall be activated when the brake pedal is depressed utilizing a minimum of 3-stages (e.g. 2, 4 and 7 psi of service brake pressure) or as required by the transmission manufacturer.

5.4.2.4 DRIVE SHAFT

5.4.2.4.1 General Requirements
Propeller shaft shall be MAN series (www.man-mec.com), or submitted deviation. It shall have a minimum diameter of four inches (4 inches) and shall be constructed of steel. The universal joints shall be heavy duty.

5.4.2.4.2 Lubrication Requirements
Lubrication fittings shall be provided for the universal bearings and slip joint splines.

5.4.2.4.3 Guard
The drive shaft shall be guarded to prevent it striking the floor of the bus or the ground in the event of a tube or universal joint failure.

5.4.2.5 AIR INTAKE
The location of the air intake system shall be designed to minimize the entry of dust and debris and maximize the life of the air filter. The engine air duct shall be designed to minimize the entry of water into the air intake system. Drainage provisions shall be included to allow any water/moisture to drain prior to entry into air filter.

5.4.2.6 EXHAUST SYSTEM

5.4.2.6.1 General Requirements
Exhaust gases and waste heat shall be discharged from the roadside rear corner of the roof. The exhaust pipe shall be of sufficient height to prevent exhaust gases and waste heat from discoloring or causing heat deformation to the bus roof. The use of the vertical exhaust outlet shall not increase the overall length of the bus, nor shall it be located in such a way as to present a burn hazard to the pedestrian traffic. The entire exhaust system shall be adequately shielded to prevent heat damage to any bus component. The exhaust outlet shall be designed to minimize rain, snow or water generated from high-pressure washing systems from entering into the exhaust pipe and causing damage to the exhaust treatment device. Exhaust manifolds, muffler and single tail pipe assemblies shall be tight and allow no emission of fumes or smoke other than from open end of tail pipe.

5.4.2.6.2 Material
The exhaust muffler shall be a stainless steel heavy plate type muffler designed with proper acoustical qualities and tailored to the engine requirements and installation. Exhaust pipes shall be constructed of stainless steel metal tubing direct from the muffler to a location in the upper left rear of the bus.

5.4.2.7 COOLING SYSTEMS

5.4.2.7.1 General Requirements
The cooling systems shall be of sufficient size to maintain all engine, transmission and hydraulic fluids and engine intake air at safe, continuous operating temperatures in accordance with engine and transmission manufacturers’ cooling system requirements when the bus is operated per the design operating profile and operating conditions.

5.4.2.7.2 Cooling Fan Operation (Option)
The cooling fan shall be temperature controlled, allowing the engine to reach operating temperature quickly. The temperature-controlled fan shall not be driven when the coolant temperature falls below the minimum level recommended by the engine manufacturer. The fan control system shall be designed with a fail-safe mode of “fan on.” The fan shall be hydraulically driven. The cooling fan shall be activated when the retarder is engaged and the coolant temperature exceeds the maximum limit.
established by the engine and transmission manufacturers. Engine thermostats shall be easily accessible for replacement. A roof mounted cooling system that incorporates electric fans will also be considered. The EMP mini-hybrid cooling system shall be provided as an option, employing eight (8) small, electrically-operated, variable-speed fans.

5.4.2.7.3 Engine Cooling

5.4.2.7.3.1 General Requirements
The engine shall be cooled by a water-based, pressure type, cooling system that does not permit boiling or coolant loss during bus operations.

5.4.2.7.3.2 Engine Coolant Type
The coolant type shall utilize ethylene glycol type approved by the engine manufacturer and compatible with all materials used in the cooling system that come in contact with the coolant.

5.4.2.7.3.3 Radiator Requirements
The radiator, and charge air cooler if integrated, manufactured by Modine with “E” coat (www.ModineRadiator.com) or submitted deviation, shall be of durable corrosion-resistant construction with bolted-on, removable stainless steel tanks or crimped on plastic tank or approved equal. The radiator may be roof mounted with the radiator fins positioned vertically.

5.4.2.7.3.3.1 Radiator Core
The radiator core shall utilize a copper dimple or aluminum, clog resistant design. Radiators with a fin density greater than 10 fins per inch, and louvered/slit designs shall not be used. Radiators with a thickness of greater than 5 inches shall not be used.

5.4.2.7.3.3.2 Radiator Air Stream
No heat producing components or climate control system components shall be mounted between the engine cooling air intake aperture and the radiator except for the hydraulic system radiator. This mounted location is not a requirement for hybrid vehicles.

5.4.2.7.3.3.3 Radiator Durability
The radiator and charge air cooler shall be designed to withstand thermal fatigue and vibration associated with the installed configuration.

5.4.2.7.3.4 Drains and Vents
All low points in the water-based cooling system shall be equipped with drain cocks. Air vent valves shall be fitted at high points in the cooling system unless it can be demonstrated that the system is self-purging.

5.4.2.7.3.5 Surge Tank
A surge tank, constructed of stainless steel, with 2 sight glasses to determine satisfactory engine coolant level shall be provided and shall be accessible by opening one of the engine compartment's access doors. The surge tank shall be mounted above
the radiator. A spring-loaded, momentary push button type valve to safely release pressure or vacuum in the cooling system shall be provided.

5.4.2.7.3.6 Booster Pump
A coolant booster pump shall be provided and be a magnetically coupled, brushless design. The booster pump shall be located and sized to ensure proper circulation throughout the coolant system.

5.4.2.7.4 Charge Air Cooling
The charge air-cooling system, also referred to as after-coolers or inter-coolers, shall provide maximum air intake temperature reduction with minimal pressure loss. The charge air radiator shall be sized and positioned to meet engine manufacturer’s requirements. The charge air radiator shall not be stacked ahead or behind the engine radiator and shall be positioned as close to the engine as possible unless integrated with the radiator. Air ducting and fittings shall be protected against heat sources, and shall be configured to minimize restrictions and maintain sealing integrity.

5.4.2.7.5 Transmission Cooling
The transmission shall be cooled by a separate heat exchanger sized to maintain operating fluid within the transmission manufacturer’s recommended parameters of flow, pressure and temperature. The transmission cooling system shall be matched to retarder and engine cooling systems to ensure that all operating fluids remain within recommended temperature limits established by each component manufacturer.

5.4.2.7.6 Hydraulic Cooling
The hydraulic system shall be cooled by a radiator and may be mounted in the radiator/charge air cooler air stream. Such a radiator shall be sized sufficiently to dissipate the generated heat load. Such a configuration shall utilize a hinged hydraulic radiator to facilitate cleaning of the radiator and/or charge air cooler. PDRTA will allow for a deviation to be submitted for a top-mounted configuration.

5.4.2.8 PNEUMATIC SYSTEM

5.4.2.8.1 General Requirements
The bus air system shall operate the air-powered accessories and the braking system with reserve capacity. New buses shall not leak down more than 5psi as indicated on the instrument panel mounted air gauges, within 15 minutes from the point of governor cut-off. The location of all compressed air devices shall be determined by limiting exposure of the component to corrosion and to minimize the length and quantity of air tubing.

5.4.2.8.2 Air Compressor
The air compressor shall be manufactured by WABCO (www.wabco-auto.com) or submitted deviation, with a minimum capacity of 18.7 cfm. The compressor shall be gear driven by the engine. The air compressor discharge line shall be a minimum ¾” Teflon w/stainless steel braid, or submitted deviation. No 90-degree fittings shall be installed on the lines from the air compressor to the “wet” tank. The air compressor shall be sized to charge the air system from 40psi to the governor cutoff pressure in less than 3 minutes while not exceeding the fast idle speed setting of the engine.
5.4.2.8.3 Governor
The air compressor governor shall be Bendix-Westinghouse "D-2" type (www.bendix.com), or submitted deviation.

5.4.2.8.4 Air System Drier
An air dryer shall prevent accumulation of moisture and oil in the air system. It shall be designed to handle 18.7 scfm continuous duty. The air dryer system shall be a Graham White, QBA15 drier (www.grahamwhite.com) or submitted deviation. It shall include a replaceable desiccant(s), electrically heated drain, and activation device. The air drier location shall be approved by PDRTA.

5.4.2.8.5 Air Reservoirs
All air reservoirs shall meet the requirements SAE J10.

5.4.2.8.6 Air Reservoir Drains
Each reservoir shall be equipped with a clean-out plug and a manual drain valve. Underfloor reservoirs shall utilize structural members to protect the drain valves. Reservoirs shall be sloped toward the drain valve. The drain valves shall discharge below floor level with lines routed to eliminate the possibility of water traps and/or freezing in the drain line.

5.4.2.8.7 Pressure Switches
A pressure switch shall be installed on each air reservoir.

5.4.2.9 HYDRAULIC SYSTEM

5.4.2.9.1 General Requirements
The hydraulic system is intended to provide energy for the operation of the cooling fan and power steering. The hydraulic system shall demonstrate a mean time between repairs in excess of 50,000 miles. Hydraulic system service tasks shall be minimized and scheduled no more frequently than those of other major bus systems. All elements of the hydraulic system shall be easily accessible for service or unit replacement.

5.4.2.9.2 Reservoir
A stainless steel reservoir of suitable capacity shall be provided. Such a reservoir shall contain a fill port/vent, dipstick, filter and a fluid level sensor.

5.4.2.9.3 Test Ports
Test ports shall be provided to check pressure and flow for each device powered by the hydraulic system.

5.4.2.9.4 Sensors
Sensors in the hydraulic system shall indicate low hydraulic fluid level and pressure.

5.4.2.10 FUEL SYSTEM

5.4.2.10.1 General Requirements
The fuel system shall be designed so as to not permit any fuel to leak or spill, with the filler cap properly closed, when the floor of the bus is at any angle from horizontal through 22 degrees from horizontal in any direction for any period of time. This shall be accomplished with the fuel tank filled to the designed and rated capacity and whistle cut off point.

The baffles and fuel pickup location shall assure continuous full power operation on a 6 percent upgrade for 15 minutes starting with no more than 25 gallons of fuel over the unusable amount in the tank(s). The bus shall operate at idle on a 6 percent downgrade for 30 minutes starting with no more than 10 gallons of fuel over the unusable amount in the tank(s).

5.4.2.10.2 Fuel Tank

5.4.2.10.2.1 General Requirements
A single fuel tank configured with bottom draw and fuel tank sending unit shall be provided to be accessible and replaceable from below the bus. The fuel tank shall be equipped with an external, hex head, brass drain plug. It shall be at least a 3/8-inch size and shall be located at the lowest point of the tank. The fuel tank shall have an inspection plate or easily removable filler neck to permit cleaning and inspection of the tank without removal from the bus. The tank shall be baffled internally to prevent excessive fuel movement regardless of fill level. The required re-fueling rate shall not damage the fuel tank or baffles. No penetrations or openings shall exist in the sides or bottom of the tank other than the openings necessary to provide a drain as specified or to provide fuel for the engine or auxiliary heater.

5.4.2.10.2.2 Fuel Capacity
The fuel tank shall have a total minimum capacity of 120 gallons

5.4.2.10.2.3 Material
The fuel tank shall be made of corrosion resistant stainless steel or of high-density cross-linked polyethylene plastic material.

5.4.2.10.2.4 Installation
The fuel tank shall be securely mounted to the bus to prevent movement during bus operation. The fuel tank shall not be supported by more than 10 percent of the external surface area of the tank. The fuel tank shall not contact any porous materials such as wood.

5.4.2.10.2.5 Labeling
The capacity, date of manufacture, manufacturer name, location of manufacture, and certification of compliance to Federal Motor Carrier Safety Regulation shall be permanently marked on the fuel tank. The markings shall be readily visible and shall not be covered with an undercoating material.

5.4.2.10.3 Fuel Filler

5.4.2.10.3.1 General Requirements
The fuel tank shall be equipped with an audible signal to indicate when tank is almost full and shall be provided with hinged spring loaded cap and hinged access door. Fill rate shall be a minimum of 40 gallons per minute. Filler neck shall be located on the curbside of the bus. All components of the dry break system shall be capable of being replaced without removing the fuel tank.

5.4.2.10.3.2 Fuel Filler Location
The fuel filler shall be located 7 to 33 feet behind the centerline of the front door on the curbside of the bus. The filler cap shall be retained to prevent loss and shall be recessed into the body so that spilled fuel will not run onto the outside surface of the bus.

5.4.2.11 HOSES, FLEXIBLE LINES, RIGID LINES AND PIPING

5.4.2.11.1 Routing
The routing of all hoses, lines and piping shall be engineered and be exactly duplicated from bus to bus. The bend radius of hoses, lines and piping shall be no less than recommended by the manufacturer or common practice. Whenever possible, angled fittings shall be used to minimize bends. There shall be no discretion of routing issues left to assembly personnel at the time of bus assembly. To the extent practicable, hoses, lines and piping shall not be located in exposed locations under the bus. Hoses, lines and piping necessarily located under the bus shall be protected from water, heat, corrosion, and mechanical damage.

5.4.2.11.2 Fastening and Support
The fastening and support method used to secure all hoses, lines and piping shall be engineered and be exactly duplicated from bus to bus. There shall be no discretion of fastening/support issues left to assembly personnel at the time of bus assembly. The fastening and/or support method shall have the same or greater corrosion resistance as the fastened and/or supported component. Rigid components shall be supported at a maximum interval of 24 inches. Flexible components shall be supported at a maximum interval of 12 inches. Each tube or group of tubes shall be supported fastened directly to the frame. Each hose, line, pipe or group of hoses, line or piping shall be supported and fastened directly to the frame. No tubing, hose, line, piping or wiring shall support any other tubing, hoses, lines, piping or wiring.

5.4.2.11.3 Compatibility
In addition to the requirements listed below, compatibility with the fluid being carried, internal and external temperatures, pressure and exposure to corrosion shall be considered when selecting a hose, line or piping type.

5.4.2.11.4 Length of Hoses and Flexible Lines
Hoses and flexible lines shall be kept at a minimum and shall be as short as practicable and have a maximum length of six (6) feet unless demonstrated impracticable for a given application.

5.4.2.11.5 Accessibility of Hoses and Flexible lines
All hoses and flexible lines must be accessible for replacement.
5.4.2.11.6 Accessibility of Connections
All hose, line and piping connections may be concealed by parts or components that are intended to be removed during maintenance or repairs to the bus. Accessibility must be provided if a connection is concealed by a component that is not intended to be removed during maintenance or repairs to the bus.

5.4.2.11.7 Hoses and Flexible Lines That Contain a Combustible Liquid
Hoses and flexible lines that contain a combustible fluid shall be configured so that a failure or leak will not result in a fire. Such hoses and flexible lines shall have a separate external sleeve.

5.4.2.11.8 Flexible Line Type
Flexible lines shall be Teflon hose with a braided stainless steel jacket with standard SAE or JIC brass or steel, swivel, end fittings.

5.4.2.11.9 Flexible Line Type - > 1 inches in Diameter
Flexible lines over 1 inch in diameter may not be Teflon with braided stainless steel jacket but shall be in conformance with SAE Standard J100R5.

5.4.2.11.10 Coolant Hoses and Piping

5.4.2.11.10.1 Coolant Piping Type
Coolant piping shall be of stainless steel or brass and, wherever practicable, hoses shall be eliminated.

5.4.2.11.10.2 Coolant Hose Type
Necessary hoses shall conform to SAE J20R1 and shall be premium, silicone rubber type, Thermopol or submitted deviation. All hoses shall be as short as practicable.

5.4.2.11.10.3 Coolant Rigid Line Type
Coolant rigid lines shall be of copper with a suitable bead rolled on each end to engage the coolant hose and clamp.

5.4.2.11.10.4 Coolant Hose Clamps
All hose connections shall be secured with premium, stainless steel clamps, Breeze constant tension or submitted deviation that provides a complete 360 degree seal. The clamps shall maintain a constant tension at all times, expanding and contracting with the hose in response to temperature changes and aging of the hose material.

5.4.2.11.10.5 Coolant Valves
Quarter turn coolant shutoff valves shall be provided for the heating and defroster units, coolant filter and coolant booster pumps.

5.4.2.11.11 Air Lines and Fittings

5.4.2.11.11.1 General Requirements
All air lines shall be Synflex nylon tubing (www.eaton.com), or submitted deviation, per SAE Standard J844 for nylon tubing if not subject to temperatures over 200 degrees F. Fittings shall be standard SAE or JIC brass or steel, flanged, swivel type fittings.

Nylon tubing shall be installed in accordance with the following color-code:

- **Green.** Indicates primary brakes and supply
- **Red.** Indicates secondary brakes
- **Brown.** Indicates parking brake
- **Yellow.** Indicates compressor governor signal
- **Black.** Indicates accessories

**5.4.2.11.11.2 Routing**
All air lines shall be sloped toward a reservoir and routed to prevent water traps.

**5.4.2.11.12 Oil & Hydraulic Lines**
Oil and hydraulic rigid lines shall be of stainless steel. Painted steel may be used for interior rigid lines.

**5.4.2.11.13 Fuel Lines**
Fuel lines shall conform to the engine manufacturer’s requirements. When the engine manufacturer does not specify a line type, flexible lines shall be of Teflon with a stainless steel braid and rigid lines shall be of stainless steel.

**5.4.2.11.14 Charge Air Hoses and Piping**

**5.4.2.11.14.1 General Requirements**
Charge air piping shall conform to the engine manufacturer’s requirements. Charge air piping and fittings shall be designed to minimize air restrictions and leaks. Piping shall be as short as possible and the number of bends shall be minimized. Bend radii shall be maximized to meet the pressure drop and temperature rise requirements of the engine manufacturer. The cross section of all charge air piping shall not be less than the cross section of the intake manifold inlet. Any change in pipe diameter shall be gradual to ensure a smooth passage of air and to minimize restrictions. Piping shall be routed away from exhaust manifolds and other heat sources, and shielded as required to meet the temperature rise requirements of the engine manufacturer.

**5.4.2.11.14.2 Charge Air Hose Type**
The charge air hose type shall be Thermopol (www.contitech.de/) or submitted deviation.

**5.4.2.11.14.3 Charge Air Piping Type**
Charge air piping shall be constructed of stainless steel, aluminized steel or anodized aluminum, except between the air filter and turbocharger inlet where piping may be constructed of fiberglass.

**5.4.2.11.14.4 Charge Air Hose Clamps**
The charge air hose clamps shall be R. G. Ray (www.normaamericasds.com) or submitted deviation.
5.4.2.12 ELECTRICAL SYSTEM

5.4.2.12.1 General Requirements
The electrical system shall be designed and installed in accordance with SAE J1292, “Automobile, Truck, Truck-Tractor, Trailer, and Motor Coach Wiring”, cause no fire hazard and provide adequate electrical power for required loads.

5.4.2.12.2 Circuit Protection
All circuits shall have overcurrent protection. The protection device shall be sized to the requirements of the load. The rating of the protection device shall not exceed 80% of the ampacity of the circuit conductor size and shall be sized to a minimum of 15 percent larger than the total circuit load current. Fuses shall be used only when a circuit breaker is not practicable. Manually re-settable circuit breakers shall have an open circuit indicator. Circuit protection devices shall be identified with a permanent marking not mounted on the device and be easily accessible in and mounted in a secure location.

5.4.2.12.3 Component Durability
All electrical components, including switches, relays, flashers, and circuit breakers, shall be heavy-duty designs with either a successful history of application to heavy-duty vehicles, or design specifications for an equivalent environment. The full load current of a circuit shall not exceed 80% of the component current rating. The electrical system and its electronic components shall be capable of operating in the area of the bus in which they will be installed as recommended in SAE J1455, except as modified by the temperature requirements provided in the table “Temperature Extreme Summary Heavy – Duty Transit Bus” and figure “Heavy – Duty Transit Bus”. Electrical and electronic equipment shall not be located in an environment that will reduce the performance or shorten the life of the component or electrical system. No bus component shall generate, or be affected by, electromagnetic interference or radio frequency interference (EMI/RFI) that can disturb the performance of electrical/electronic equipment as defined in SAE J1113.

5.4.2.12.4 Modular Design
Design of the electrical shall be modular so that each major component, panel, or wiring harness is easily separable with standard hand tools or by means of connectors. Each module, except the main body wiring harness, shall be removable and replaceable in less than 1 hour by a Mechanic 1. Power plant wiring shall be an independent wiring module. Replacement of the engine compartment wiring module(s) shall not require pulling wires through any bulkhead or removing any terminals from the wires.

5.4.2.12.5 Enclosure Requirements
All electrical components, other than those components necessary to be exposed to perform the intended function such as an operator control or light fixture, and SAE #8 wire or smaller wire terminations shall be mounted in easily accessible electrical enclosures. The enclosure shall be of sufficient volume to provide the space necessary to perform maintenance and repairs. All enclosures exposed to the outside environment shall be corrosion resistant and sealed. Additionally, enclosures for components mounted within the bus shall meet the requirements of Interior Trim and components mounted on the exterior of the bus shall meet the requirements for Structure Design and Exterior Requirements. Operator controls shall be mounted in accordance with the requirements.
of operator hand controls. The location of each device and wire connection in an electrical enclosure shall be permanently identified by a permanent drawing, showing the same information, attached to the inside of each enclosure access panel or door.

5.4.2.12.6 Wiring Requirements

5.4.2.12.6.1 Wire Type
Wiring shall utilize a stranded conductor. SAE #8 and smaller shall be type SXL per SAE J1128. Where the connectors required to interface to major sub-system components (i.e. transmission, engine ECM, etc.) will not accept SXL wire, the largest possible of GXL or TXL shall be used between that connector and the next. Wiring SAE #6 and larger shall be type SGX per SAE J1127. Wires that are contained in a manufactured casing, such as multi conductor cable, shall have rating equal or greater than type SXL wire.

5.4.2.12.6.2 Wire Size
The ampacity for wire sizes 18 AWG and larger shall be in accordance with the Wire Ampacity Chart found at (www.powerstream.com/Wire_Size.htm). There shall be no more than a 0.5-volt accumulative voltage drop on any circuit, measured from the initiating source to the load and from the load to ground.

5.4.2.12.6.3 Wire Identification
Type SXL wire, SAE #8 and smaller shall be permanently identified by the color of insulation and alpha-numerically at a maximum interval of 6 inches. Wires SAE #6 and larger shall be permanently identified by the color of insulation and alphanumerically at each end. Wires that are contained in a manufactured casing, such as multi conductor cable, shall be permanently identified at each casing end. The alphanumerical identification of each wire shall be unique and part of a identification or numbering system applied to the entire bus.

5.4.2.12.6.4 Insulation Requirements
All wiring shall have a second layer of insulation. This insulation layer may be flexible such as loom or rigid such as PVC conduit. The second layer of insulation shall be maintained as close as possible to a junction box, electrical compartment, or terminal. Conductors size SAE #8 and smaller may be grouped together as necessary in a common flexible or rigid insulation. Conductors size SAE #6 and larger may be grouped together in a common rigid insulation but shall not be grouped together in a common flexible insulation. Flexible insulation shall not be used to directly protect the enclosed wiring. A wiring harness shall not contain wires of different voltage classes unless all wires within the harness are insulated for the highest voltage present in the harness. Wiring and/or a group of cables shall not occupy more than 80% of the cross section of a loom, conduit or raceway.

5.4.2.12.6.5 Routing
The routing of all electrical wiring shall be engineered and be exactly duplicated from bus to bus. The bend radius of all wiring shall be no less than recommended by the manufacturer or common practice. There shall be no discretion of routing issues left to
assembly personnel at the time of bus assembly. To the extent practicable, wiring shall not be located in exposed locations under the bus. Wiring and electrical equipment necessarily located under the bus shall be protected from water, heat, corrosion, and mechanical damage. Where feasible, front to rear electrical harnesses should be installed above the window line of the bus. Drip loops shall be supplied on all under floor termination points.

5.4.2.12.6.6 Fastening and Support
The fastening and support method used to secure all electrical wiring shall be engineered and be exactly duplicated from bus to bus. There shall be no discretion of fastening/support issues left to assembly personnel at the time of bus assembly. The fastening and support method shall be electrically non-conductive and have the same or greater corrosion resistance as the fastened/supported component. Wiring shall be supported near terminations so that connectors and terminals are not under stress. Under floor wiring runs >10’ in length shall be run in PVC conduit. Rigid components shall be supported at a maximum interval of 24 inches. Flexible components shall be supported at a maximum interval of 12 inches. Wiring shall be supported and fastened directly to the frame. No tubing, hose, line, piping or wiring shall support any other tubing, hoses, lines, piping or wiring. The use of a wiring management system, such as that manufactured by Panduit or submitted deviation (www.panduit.com), is preferred but not required.

5.4.2.12.6.7 Spare Wires
All wiring harnesses over five feet long and containing at least five wires shall include 10 percent (minimum one) spare wires. This requirement for spare wires does not apply to data links and/or communication cables.

5.4.2.12.6.8 Terminals
Terminals shall be installed according to the connector manufacturer’s requirements. Terminations that utilize crimp-type terminals shall be applied with a certified tool of the same manufacturer as the terminal. Crimped terminals shall be corrosion-resistant and a full ring type or interlocking lugs with insulating ferrules. Terminals may be soldered only if the wire is not stiffened above the terminal and no flux residue remains on the terminal. When using pressure type screw terminal strips, only stranded wire shall be used. Insulation clearance shall ensure wires have a minimum of “visible clearance” and a maximum of two (2) times the conductor diameter or 1/16”, whichever is less. All exposed termination points shall be coated with approved conductive coating. Wiring length shall allow end terminals to be replaced twice without pulling, stretching, or replacing the wire. Wires shall not be spliced between terminations. Terminations or splices shall not be concealed within the second layer of insulation. T-splices are prohibited.

5.4.2.12.6.9 Connectors
When it necessary to terminate a wire or harness outside an enclosure, an approved weatherproof connector shall be provided. Such a connector shall utilize a seal between the connector halves and around each wire that enters a connector half and utilize crimp contact type removable pins, of the correct size and rating for the wire being terminated.
All supply-side terminations shall end in a socket, not a pin. Unused pin positions shall be sealed with sealing plugs. Adjacent connectors shall either use opposing pin genders, different insert orientations, or different connectors to prevent incorrect connections. All cable connectors shall be placed to provide adequate space for ease of removal and disconnection. All electrical connectors subjected to environmental exposure outside the passenger compartment shall be corrosion resistant and splash proof. The terminals within a connector shall be coated with approved dielectric grease. All electrical connectors shall be replaceable.

5.4.2.12.6.10 Ground Connections
The battery shall be grounded to the bus chassis at only one location, as close to the batteries as possible. When using a chassis ground system, the chassis shall be grounded to the frame in multiple locations, evenly distributed throughout the bus 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.

5.4.2.12.7 Battery Requirements

5.4.2.12.7.1 Battery Type
Batteries shall be easily accessible for inspection and service from the outside of the bus. Two 8D battery units conforming to SAE Standard J537 shall be provided. Each battery shall have a minimum of 1400 cold cranking amps. Each battery shall have a purchase date no more than 120 days from date of release, and shall be fully maintained prior to shipment to PDRTA. The bus manufacturer shall determine that the specified batteries are sufficient to meet the needs of the bus electrical system, and if necessary, recommend a different battery configuration. PDRTA shall approve the battery configuration.

5.4.2.12.7.2 Battery Cables
The battery cables shall be terminated with properly sized ring terminals. The cable shall be permanently marked with a "+" and "-" at the battery end and shall be color-coded with red for the primary positive, black for negative. The cables shall be flexible, of sufficient length and routed in the battery box so as not to chafe or rub on the battery tray and other components. Cable ends shall be crimped, soldered and sealed to eliminate corrosion from battery acid and/or fumes. Cable ends shall be attached to the battery studs with non-corroding flat washers, spring washers and brass nuts. Both battery terminals shall be a 3/8 inches NC stud. Stud length shall be 1 inch (25 mm) as measured from the terminal face. Cable ends will be coated with a corrosion inhibitor after being attached to the batteries. Except as connected to the master battery switch and battery, the cables shall be continuous. Connections shall be secured by bolted terminals; and shall conform to specification requirements of SAE Standard J1127 – Type SGT or SGX and SAE Recommended Practice J541.

5.4.2.12.7.3 Battery Compartment
The battery compartment or enclosure shall be constructed of corrosion resistant materials and be vented and self-draining. It shall be accessible only from outside the
bus. All components within the battery compartment, and the compartment itself, shall be protected from damage or corrosion from the electrolyte and gases emitted by the battery, and from snow, slush, salt spray, mud, etc. generated from environmental conditions outside the bus. The inside surface of the battery compartment's access door shall be electrically insulated, as required, to prevent the battery terminals from shorting on the door if the door is damaged in an accident or if a battery comes loose.

5.4.2.12.7.4 Battery Trays
The batteries shall be securely mounted on a stainless steel or equivalent tray that can accommodate the size and weight of the batteries. The battery tray shall pull out easily and properly support the batteries while they are being serviced. The tray shall allow each battery cell to be easily serviced and filled. A locking device shall retain the battery tray in the stowed position.

5.4.2.12.8 Battery Disconnect Switch
A single master switch shall be provided near the battery compartment for the disconnecting of all battery positives (12V & 24V) except for specified subsystems. The location of the master battery switch shall be clearly identified on the exterior access panel, be accessible in less than 10 seconds for de-activation. The battery disconnect switch shall be resistant to corrosion and protected from battery acid and fumes.

5.4.2.12.9 Alternator Requirements
An alternator, a Delco 50DN alternator (www.delcoremy.com) or submitted deviation, with a minimum continuous output of 300 amps @ 24 VDC. The alternator shall be belt driven by the engine. The alternator shall be sized to provide electrical system demands and maintain the charge on fully charged batteries except when the bus is in normal idle with the total alternator load exceeding 70% of the alternator rating. The use of fast idle speed shall meet the electrical demand of the bus and maintain a charge on fully charged batteries provided the total alternator load does not exceed 90 percent of the alternator rating.

5.4.2.12.10 Battery Equalizer
A #66100 Vanner battery equalizer (www.vanner.com) or submitted deviation, shall be provided on each bus.

5.4.2.13 POWER PLANT SERVICE

5.4.2.13.1 General Requirements
The power plant shall be arranged so that accessibility for all routine maintenance is assured. The muffler, exhaust system, air cleaner, air compressor, starter, alternator, radiator, all accessories, and any other component requiring service or replacement shall be easily removable and independent of the engine and transmission removal.

5.4.2.13.2 Engine Run Box
An engine run box shall be accessibly mounted in the engine compartment. Such a box shall be water tight and constructed of stainless steel and include:
- Oil pressure gauge
- Coolant temperature gauge
• Engine front/rear control switch
• Engine start button
• Drivetrain Level diagnostic port
• Engine compartment light switch

The engine start pushbutton on the engine run box shall be enabled when the engine run box front/rear selector switch in the rear position and configured with the same interlocks as the operator’s engine start push button.

5.4.2.13.3 Fluid Fill Requirements
Engine oil and coolant fill caps shall be hinged and closed with spring pressure and/or positive locks. All fluid fill locations shall be properly labeled to help ensure correct fluid is added and all fillers shall be easily accessible with standard funnels, pour spouts, and automatic dispensing equipment. Coolant shall be added only when the system pressure is equalized with atmospheric pressure. No special fitting shall be required to add coolant. The coolant fill point shall be no more than 60 inches above the pavement surface.

5.4.2.13.4 Fluid Sample Fittings
A Titan Probalyzer (www.titanlab.com), or submitted deviation, fluid sample fitting shall be provided to obtain an engine oil and transmission fluid samples.

5.4.2.13.5 Test Ports
Suitable fittings shall be provided as required by the engine and bus manufacturer to check conditions, in accordance with maintenance requirements, such as pressure and/or flow of the engine air intake, engine exhaust and hydraulic systems.

5.4.2.13.6 Filter Requirements
The engine and transmission shall be equipped with sufficient heavy-duty fuel and oil filters for efficient operation and to protect the engine and transmission between scheduled filter changes. To the extent practicable, the filters shall be of the spin-on, disposable type or integral with the engine and transmission. All filters shall be easily accessible and the filter bases shall be plumbed to assure correct reinstallation.

5.4.2.13.6.1 Oil Filter

5.4.2.13.6.1.1 Engine Mounted Oil Filter
An engine mounted oil filter as required by the engine manufacturer shall be provided.

5.4.2.13.6.1.2 Auxiliary Oil Filter
A remote mounted centrifugal bypass oil filter, a Spinner II Model 976 (www.spinnerii.com) or submitted deviation, shall be provided.

5.4.2.13.6.2 Air Filter

5.4.2.13.6.2.1 General Requirements
The air cleaner shall be a dry type in-line separator as required by the engine manufacturer.

5.4.2.13.6.2.2 Air Filter Indicator
A graduated air filter restriction indicator, Donaldson Model RBX00-2277 (www.donaldson.com) or submitted deviation, shall be provided.

5.4.2.13.6.3 Fuel Filter

5.4.2.13.6.3.1 Main Fuel Filter
A fuel filter as required by the engine manufacturer shall be provided.

5.4.2.13.6.3.2 Auxiliary Fuel Filter
A secondary fuel filter, fuel/water separator, a Davco 382 (www.davcotec.com) without electric heat or submitted deviation, shall be provided.

5.4.2.13.6.4 Coolant Filter
The engine cooling system shall be equipped with a properly sized water filter with a spin-on element and an automatic system for releasing supplemental coolant additives as needed to replenish and maintain protection properties.

5.4.2.13.6.5 Transmission Filter
A transmission fluid filter shall be provided as required by the transmission manufacturer.

5.4.2.13.6.6 Hydraulic Filter
The hydraulic system shall be equipped with a filter to contamination from the hydraulic system. Such a filter may be contained within the hydraulic system reservoir.

5.4.2.14 POWER PLANT MOUNTING

5.4.2.14.1 General Requirements
The power plant shall be mounted in a compartment in the rear of the bus. All power plant mounting shall be mechanically isolated to minimize transfer of vibration to the body structure. Mounts shall control movement of the power plant so as not to affect performance of belt driven accessories or cause strain in piping and wiring connections to the power plant.

5.4.2.14.2 Special Tools Not Required
No special tools, other than dollies and hoists, shall be required to remove the power plant.

5.5 EXTERIOR REQUIREMENTS

5.5.1 BODY COMPONENTS

5.5.1.1 GENERAL REQUIREMENTS
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 exterior rearview mirrors and required lights and reflectors are exempt from the protrusion requirement. Grilles, doors, bumpers and other features on the sides and rear of the bus shall be designed to minimize the ability of unauthorized riders to secure toeholds or handholds.
5.5.1.2 FRONT AND REAR BODY ASSEMBLIES
The front and rear of the bus shall each utilize a single piece, non-metallic, molded assembly appropriately attached to the bus structure and consist of a material such as fiberglass to facilitate repairs.

5.5.1.3 WINDOWS

5.5.1.3.1 General Requirements
Each window glazing shall be glazed with tempered ¼ inch thick, conforming to FMVSS 205 and applicable requirements of ANSI Z26.1-1997. Glazing color shall be consistent from window to window. Maximum solar energy transmittance shall be 44 percent gray as measured by ASTM E-424 except upper destination glazing, which is clear.

All passenger windows shall be top hopper window assemblies with the exception of the driver window and destination window assemblies. All aluminum and steel material will be clear anodized to help prevent corrosion. All passenger windows and driver’s window shall be quick-change design manufactured by Transit Care, Inc. Colton, CA or submitted deviation.

All windows must meet FMVSS 205 and the minimum requirements. Irregular shaped windows are to be split fix non-egress. The destination window assembly shall be split fix with the transom glazing clear. All emergency handles shall be located on the right side of the window assemblies. Emergency exit and window release lever operation instructions must be metal and bolted to window frame rail adjacent to each seat. Emergency instructions must be printed in both English and Spanish.

5.5.1.3.2 Windshield
The windshield shall permit an operator's field of view as referenced in SAE Recommended Practice J1050. The vertically upward view shall be a minimum of 15 degrees, measured above the horizontal and excluding any shaded band. The vertically downward view shall permit detection of an object 3-1/2 feet high no more than 2 feet in front of the bus. The horizontal view shall be a minimum of 90 degrees above the line of sight. Any binocular obscuration due to a center divider may be ignored when determining the 90-degree requirement, provided that the divider does not exceed a 3-degree angle in the operator's field of view. Windshield pillars shall not exceed 10 degrees of binocular obscuration. The windshield shall be designed and installed to minimize external glare as well as reflections from inside the bus. The windshield shall be easily replaceable by removing zip-locks from the windshield retaining moldings. The windshield glazing material shall have a 1/4-inch or 6-mm nominal thickness laminated safety glass conforming to the requirements of ANSI Z26.1 Test Grouping 1A and the Recommended Practices defined in SAE J673. The glazing material shall have single density tint. The upper portion of the windshield above the operator's field of view shall have a dark, shaded band with a minimum luminous transmittance of 6 percent when tested in accordance to ASTM D-1003.

5.5.1.3.3 Operator’s Side Window
The operator's side window shall be the sliding type, requiring only the rear half of sash to latch upon closing and shall open sufficiently to permit the seated operator to easily adjust the street side outside rearview mirror. The window shall have a ratchet mechanism to prevent uncontrolled sliding and shall be configured so that it can easily be adjusted with one-hand. When in an open position, the window shall not rattle or close during braking. The entire assembly shall be hinged and have a single release for emergency egress. The operator's side window shall not be bonded in place and shall be easily replaceable. The glazing material shall have a single density tint. The operator's view, perpendicular through operator's side window glazing, should extend a minimum of 840 mm (33 inches) to the rear of the Heel Point on the accelerator, and in any case must accommodate a 95th percentile male operator. The view through the glazing at the front of the assembly should begin not more than 560 mm (26 inches) above the operator's floor to ensure visibility of an under-mounted convex mirror. Operator's window construction shall maximize ability for full opening of the window. A “bug deflector” or similar device shall be installed to prevent small objects such as an insect from entering the window opening when the bus is in motion.

5.5.1.3.4 Passenger Area Side Windows

5.5.1.3.4.1 General Requirements

All passenger area side windows shall be manufactured by Transit Care Inc. or submitted deviation. A minimum of 10,000 square inches of window area, including operator and door windows, shall be required on each side of the standard configuration bus. Glazing in each sash shall be capable of being replaced without removing the window from its installed position or manipulation of the rubber molding surrounding the glazing. Windows of the same size shall be interchangepable.

Window glazing shall be designed where it can be replaced in three (3) minutes or less by a trained technician. Glazing in the window assembly shall be replaced without removing the window from its installed position on the bus or manipulation of the rubber molding surrounding the glazing. The glazing shall be held in place mechanically by formed metal pressure clips constructed to last the life of vehicle. The metal pressure clips system shall act as part of the structure of the window and then house the sacrificial liner. The metal pressure clips shall hold in place the 1/16-inch or 1/8-inch sacrificial liner. The sacrificial liner shall mount flush to the glazing to prevent moisture and dust from gathering between the exterior glazing and sacrificial liner. The metal pressure clips shall conceal the edges of the sacrificial liner from the passenger. The mechanic or service worker using simple hand tools should be able to replace the sacrificial liner in 30 seconds or less. Pulling the sacrificial liner upward, then pulling the sacrificial liner from the bottom, releases the sacrificial liner from the metal pressure clips. This acrylic sacrificial liner must be replaced without removing the window from its installed position on the bus, without removing the tempered glazing from the sash, and without the removal or manipulation of the window assembly’s rubber molding. No additional parts except the sacrificial liner itself are to be used in the system. The exterior glazing shall be mounted securely in the existing window extrusion with or without the sacrificial liner installed in the window assembly. The removal of the sacrificial liner shall not prevent the vehicle from going back into service.
replacement of the sacrificial liner shall not require the removal or the modification of any other parts or fasteners.

5.5.1.3.4.2 Transom Windows
The lower section of the window, approximately 30 inches, shall be fixed. The upper portion, approximately 9 inches, shall have the ability to be opened inwardly. Transom locks are required.

5.5.1.3.4.3 Egress Windows
Egress windows shall be provided only on the low floor portion of the bus. Each egress handle shall be located on the front or leading edge of each egress window.

5.5.1.3.5 Front Destination Sign Window
The glass installed over the front destination sign shall be equipped with an electric strip-defrosting element. The element shall function when the windshield defrosting system is activated.

5.5.1.4 SIDE SKIRT PANELS
Side skirt panels below the lower daylight opening shall be essentially flat, without ripples and with minimal visible joints. The maximum length of a side skirt panel shall be 8 feet. Side panels shall be simple enough in shape to allow fabrication with no more tooling than a shear and brake. Welding, riveting, or adhesive attachment shall not be permitted. Metal panels with compound curves, fluting, curved indentations, etc. shall not be permitted. PDRTA shall allow for fiberglass side panels and thermoplastic skirt panels to be allowed as a deviation.

5.5.1.5 FENDER SKIRTS
Features to minimize water spray from the bus in wet conditions shall be included in wheel housing design. Fender skirts shall be flexible. Wheels and tires shall be removable with the fender skirts in place.

5.5.1.6 SPLASH APRONS
Splash aprons, composed of 1/4-inch-minimum composition or rubberized fabric, shall be installed behind and/or in front of wheels as needed to reduce road splash and protect underfloor components. The splash aprons shall extend downward to within 4 inches of the road surface at static conditions. Apron widths shall be no less than tire widths, except for the rear apron that shall extend across the width of the bus. Splash aprons shall be bolted to the bus understructure. Splash aprons and their attachments shall be inherently weaker than the structure to which they are attached. The flexible portions of the splash aprons shall not be included in the road clearance measurements. Other splash aprons shall be installed where necessary to protect equipment that extends below the frame rails behind the rear axle. Aprons shall have a maximum width compatible with the understructure of the bus.

5.5.1.7 WINDSHIELD WIPERS
The bus shall be equipped with an electrically powered, Sprague Industries, or submitted deviation, variable speed windshield wiper for each half of the windshield.
For non-synchronized wipers, separate controls for each side shall be supplied. A variable intermittent feature shall be provided to allow adjustment of wiper speed for each side, or a synchronized pair, ranging approximately 5 to 25 cycles per minute. No part of the windshield wiper mechanism shall be damaged by manual manipulation of the arms. At 60 mph, no more than 10 percent of the wiped area shall be lost due to windshield wiper lift. Both wipers shall park along the edges of the windshield glass. Windshield wiper motors and mechanisms shall be easily accessible for repairs or service and shall be removable as complete units. The fastener that secures the wiper arm to the drive mechanism shall be corrosion resistant.

5.5.1.8 WINDSHIELD WASHERS
An electrically powered windshield washer system shall deposit washing fluid on the windshield and, when used with the wipers, shall evenly and completely wet the entire wiped area. The windshield washer system shall have a minimum 3-gallon reservoir, located for easy refilling from outside of the bus and protected from freezing. Reservoir pumps, lines, and fittings shall be corrosion-resistant, and the reservoir itself shall be translucent for easy determination of fluid level.

5.5.1.9 RAIN GUTTERS
Rain gutters shall be provided to prevent water flowing from the roof onto the passenger doors, side windows, and exterior mirrors. When the bus is decelerated, the gutters shall not drain onto the windshield, or operator's side window, or into the door boarding area. Cross sections of the gutters shall be adequate for proper operation.

5.5.1.10 ROOF VENTILATORS / ESCAPE HATCHES
Two roof ventilators shall be provided in the roof of the bus, one approximately over or just forward of the front axle and the other, approximately over the rear axle. Roof ventilator(s) shall be sealed to prevent entry of water when closed. Each ventilator shall be easily opened and closed manually by a 50th percentile female. If a roof ventilator(s) cannot be reached by a 50th percentile female, then a tool shall be provided for this purpose and be stored behind the operator's seat. The ventilator shall cover an opening of no less than 425 square inches and shall be capable of being positioned as a scoop with either the leading or trailing edge open no less than 4 inches, or with all four edges raised simultaneously to a height of no less than 3-1/2 inches. An escape hatch shall be incorporated into the roof ventilator.

5.5.1.11 LICENSE PLATE PROVISIONS
Provisions shall be made to mount standard size U.S. license plates per SAE J686 on the front and rear of each bus. These provisions shall direct mount or recess the license plates so that they can be cleaned by automatic bus washing equipment without being caught by the brushes. License plates shall be mounted at the lower center or lower street side of the bus and shall not allow a toehold or handhold for unauthorized riders. The license plates shall not be located in any area that may be concealed by advertising.

5.5.1.12 SERVICE COMPARTMENTS AND ACCESS DOORS - EXTERIOR

5.5.1.12.1 General Requirements
Conventional hinged doors shall be used for the engine compartment and for all auxiliary equipment compartments including doors for checking the quantity and adding to the engine coolant, engine lubricant, transmission fluid and windshield washer fluid. The fluids listed in this paragraph shall only be accessible from the exterior of the bus. Pantograph hinged doors shall not be permitted. Access openings shall be sized for easy performance of tasks within the compartment including tool-operating space. Access doors shall be of rugged construction and shall maintain mechanical integrity and function under normal operations throughout the service life of the bus. They shall close flush with the body surface. All doors shall be hinged at the top or on the forward edge and shall be prevented from coming loose or opening during transit service or in bus washing operations. Doors with top hinges shall have safety props stored behind the door or on the doorframe. All access doors shall be retained in the open position by props or counterbalancing with over-center or gas-filled springs and shall be easily operable by a 5th percentile female. Springs and hinges shall be corrosion resistant. Rubber hinges shall not be permitted. Latch handles shall be flush with, or recessed behind, the body contour and shall be sized to provide an adequate grip for opening. Access doors, when opened, shall not restrict access for servicing other components or systems.

5.5.1.12.2 Door Locks

5.5.1.12.2.1 Locks for Doors > 100 Square Inches
Access doors > 100 square inches in area shall be equipped with corrosion resistant locks, manufactured by Southco (www.southco.com) or submitted deviation. Such access door locks shall be standardized throughout the bus and utilize a tool or key that has a round barrel and an internal square cavity to correspond with the lock. Locks are not required on the rear engine compartment door, provided that the door is held closed with a reliable gas spring and/or toggle arrangement.

5.5.1.12.2.2 Locks for Doors < 100 Square Inches
No tool shall be required to open an access door < 100 square inches and each door shall be equipped with a “push to open” latch as manufactured by Southco or submitted deviation.

5.5.1.13 BUMPERS

5.5.1.13.1 Location
Bumpers shall provide impact protection for the front and rear of the bus with the top of the bumper being 28 inches above the ground. Bumper height shall be such that when one bus is parked behind another, a portion of the bumper faces will contact each other.

5.5.1.13.2 Front Bumper
The Bumper shall be manufactured by Romeo RIM (Romeo RIM, 74000 Van Dyke Ave, Romeo, MI 48065) or submitted deviation. No part of the bus, including the bumper, shall be damaged as a result of a 5-mpg impact of the bus at curb weight with a fixed, flat barrier perpendicular to the bus’s longitudinal centerline. The bumper shall return to its pre-impact shape within 10 minutes of the impact. The bumper shall protect the bus from damage as a result of 6.5 mph impacts at any point by the Common Carriage with Contoured Impact Surface defined in Figure 2 of FMVSS 301 loaded to 4,000 pounds.
parallel to the longitudinal centerline of the bus and 5.5-mph impacts into the corners at a 30 degree angle to the longitudinal centerline of the bus. The energy absorption system of the bumper shall be independent of every power system of the bus and shall not require service or maintenance in normal operation during the service life of the bus. The bumper may increase the overall bus length by no more than 7 inches.

5.5.1.13.3 Rear Bumper
The Bumper shall be manufactured by Romeo Rim or submitted deviation. No part of the bus, including the bumper, shall be damaged as a result of a 2-mph impact with a fixed, flat barrier perpendicular to the longitudinal centerline of the bus. The bumper shall return to its pre-impact shape within 10 minutes of the impact. When using a yard tug with a smooth, flat plate bumper 2 feet wide contacting the horizontal centerline of the rear bumper, the 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 rear bumper shall protect the bus, when impacted anywhere along its width by the Common Carriage with Contoured Impact Surface defined in Figure 2 of FMVSS 301 loaded to 4,000 pounds, at 4 mph parallel to, or up to a 30 degree angle to, the longitudinal centerline of the bus. The rear bumper shall be shaped to preclude unauthorized riders standing on the bumper. The bumper shall be independent of all power systems of the bus and shall not require service or maintenance in normal operation during the service life of the bus. The bumper may increase the overall bus length by no more than 7 inches.

5.5.1.13.4 Bumper Material
Bumper material shall be corrosion-resistant and withstand repeated impacts of the specified loads without sustaining damage. Visible surfaces shall be black. These bumper qualities shall be sustained throughout the service life of the bus.

5.5.1.14 FINISH AND COLOR
All exterior surfaces shall be smooth and free of wrinkles and dents. Exterior surfaces to be painted shall be properly prepared as required by the paint system supplier, 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 bus. Drilled holes and cutouts in exterior surfaces shall be made prior to cleaning, priming and painting to prevent corrosion. The bus shall be completely painted prior to installation of exterior lights, windows, mirrors and other items that are applied to the exterior of the bus unless the vehicle has a corrosion resistant fiberglass outer body. If it has the fiberglass outer body painting may occur after installation of the above listed features. Body filler materials may be used for surface dressing, but not for repair of damaged or improperly fitted panels.

Paint shall be applied smoothly and evenly with the finished surface free of dirt and the following other imperfections:

A. Blisters or bubbles appearing in the topcoat film.
B. Chips, scratches, or gouges of the surface finish.
C. Cracks in the paint film.
D. Craters where paint failed to cover due to surface contamination.
E. Overspray.
F. Peeling
G. Runs or sags from excessive flow and failure to adhere uniformly to the surface.
H. Chemical stains and water spots.

To the degree consistent with industry standards for commercial vehicle finishes, painted surfaces shall have gloss and orange peel shall be minimized. All exterior finished surfaces shall be impervious to diesel fuel, gasoline and commercial cleaning agents. Finished surfaces shall resist damage by controlled applications of commonly used graffiti-removing chemicals.

5.5.1.15 NUMBERS AND SIGNS
Numbers and signs as specified by PDRTA shall be applied as required by appendix B to the exterior of the bus. All exterior vinyl graphics shall be 3M 680CR, or submitted deviation.

5.5.1.16 EXTERIOR ADVERTISING REQUIREMENTS
Provisions are not required to be made to integrate advertising into the exterior design of the bus. Advertising media, frames, or supporting structures shall not detract from the readability of destination signs and signal lights, and shall not compromise passenger visibility. Advertising provisions shall not cause pedestrian hazards or foul automatic bus washing equipment, and shall not cover or interfere with doors, air passages, fittings, and license plates or in any other manner restrict the operation or serviceability of the bus. The advertising shall be spaced from the bus body to facilitate air circulation between the bus body and the advertising media. The method of fastening used to integrate advertising on the exterior of the bus shall be made of stainless steel and only penetrate the body skin. A plastic or suitable non-metallic material may be used for spacing.

5.5.1.17 BICYCLE RACK
A Sportworks model #DL2 bicycle rack (www.sportworks.com) or submitted deviation, with a stainless steel finish, shall be provided and installed adjacent to the front bumper of the bus.

5.5.2 EXTERIOR LIGHTING

5.5.2.1 GENERAL REQUIREMENTS
All exterior lights shall be designed to prevent entry and accumulation of moisture or dust. Commercially available LED (Light Emitting Diode)-type lamps, manufactured by Dialight or submitted deviation, shall be used wherever possible, including doorway and exterior compartments and except for the headlights. Lights mounted on compartment doors shall be protected from the impact shock of door opening and closing. Lamps, lenses and fixtures shall be interchangeable to the extent practicable. The hazard lamps at the rear of the bus shall be visible from behind when the engine service doors are opened. Light lenses shall be designed and located to minimize dirt entrapment and to prevent damage when running the bus through an automatic bus washer. Lights
located on the roof and sides of the bus shall have protective shields or be of the flush mount type to protect the lens against minor impacts. The exterior lighting arrangement shall be approved by PDRTA.

5.5.2.2 EXTERIOR DOORWAY LIGHTS
Lamps at the front and rear passenger doorways shall comply with ADA requirements and shall activate only when the doors open. These lamps shall illuminate the street surface to a level of no less than 1 foot-candle for a distance of 3 feet outward from the outboard edge of the door threshold. The lights may be positioned above or below the lower daylight opening of the windows and shall be shielded to protect passengers’ eyes from glare. The exterior doorway lighting may be integrated with the interior doorway lighting.

5.5.2.3 FRONT LIGHT INSTALLATION
Headlamps shall be guide lamp, rectangular or round sealed beam, dual, 12 volt Halogen H50 54. Front directional signals shall have amber lenses and shall be located on the right and left front corner areas of the bus.

5.5.2.4 SIDE LIGHT INSTALLATION
Four turn-signal lights shall be provided on each side of the bus. Side turn signal lamps shall be located on each side of the bus at the forward edge of the front wheel housing. These lights shall be guarded for protection. The light shall be visible from the rear and front of the bus as well as outward. A warning light mounted near the curbside of the front door, a minimum 2 inch diameter with an amber lens, shall be provided that will illuminate when the kneel function is activated.

5.5.2.5 REAR LIGHT INSTALLATION
The rear lamp installation shall consist of:

- 4 – 7” round red, combination tail and stop lamps
- 2 – 7” round amber, turn signals
- 2 – 4” round or 1 rectangular or oval red auxiliary stop lamp(s)
- 2 – 4” round amber, auxiliary turn signals installed as high as possible
- 2 – 4” round white back up lamps

5.5.2.6 CLEARENCE, MARKER AND ID LIGHT INSTALLATION
All clearance and I.D. lights shall be surface or flush mount LED type. The units shall protrude not more than 1.5 inches when mounted on the bus. If a surface mount marker design is used, a custom guard to prevent damage to the light during contact shall protect the marker lights.

5.5.2.7 EXTERIOR SERVICE COMPARTMENT LIGHTING
Lights shall be provided in the engine and all other compartments, where service may be required, to generally illuminate the area for repairs or adjustments. Sealed lamp assemblies shall be provided in the engine compartment and shall be controlled by a switch located near the rear start controls in the engine compartment. Necessary lights,
located in other service compartments, shall be provided with switches on the light fixture or convenient to the light.

5.5.3 EXTERIOR AUDIBLE WARNING DEVICES

5.5.3.1 HORN
Dual electric horns shall be mounted behind the front bumper and be protected from road splash. Such horns shall be controlled by a push button located in center of steering wheel.

5.5.3.2 BACK-UP ALARM
An audible warning shall sound when reverse gear is selected. Visible reverse operation warning shall conform to SAE Standard J593. Audible reverse operation warning shall conform to SAE Recommended Practice J994 Type C or D.

5.5.3.3 KNEEL ALARM
An indicator visible to the operator shall be illuminated until the bus is raised to a height adequate for safe street travel. An audible warning alarm will sound simultaneously with the operation of the kneeler to alert passengers and bystanders.

5.5.4 EXTERIOR CONNECTIONS

5.5.4.1 SHOP AIR CONNECTIONS
A shop air connection, Parker H2C (www.parker.com) or submitted deviation, shall be provided in the engine compartment and near the front bumper area. Retained caps shall be installed to protect against dirt and moisture when not in use. Each connection shall be equipped with a check valve, filter and pressure relief valve.

5.5.4.2 BATTERY CHARGE CONNECTION
An electrical receptacle, Anderson 350 (www.hubbellpowersystems.com) or submitted deviation, shall be installed in the engine compartment. This connector shall be sized to carry the electric current necessary to charge the bus batteries and configured to maintain proper polarity. A retained cap shall be installed to protect against dirt and moisture when not in use.

5.5.4.3 TOWING AIR CONNECTION
A towing air connection shall be provided behind the front bumper. The connection shall be used to release the parking brake when a bus is being towed. A retained cap shall be installed to protect fitting against dirt and moisture when not in use.

5.5.4.4 TOWING LIGHTS CONNECTION
An electrical receptacle shall be provided behind the front bumper of each bus, adjacent to the air connector, to receive 12-volt power for illuminating the taillights, stop light and directional signals from a towing vehicle. The receptacle shall be a 7-wire receptacle assembly, "Cole-Hersee" No. 12080 (www.colehersee.com) or submitted deviation.
5.6 INTERIOR REQUIREMENTS

5.6.1 INTERIOR TRIM

5.6.1.1 GENERAL REQUIREMENTS
Materials shall be selected on the basis of maintenance, durability, appearance, safety, flammability, and tactile qualities. Trim and attachment details shall be kept simple and unobtrusive. Materials shall be strong enough to resist everyday abuse and vandalism; they shall be resistant to scratches and markings. Interior trim shall be secured to avoid resonant vibrations under normal operational conditions. Interior surfaces more than 10 inches below the lower edge of the side windows or windshield shall be shaped so that objects placed on them fall to the floor when the bus is parked on a level surface. The interior of the bus shall be configured to prevent debris accumulation and to prevent equipment mounted within the interior from being damaged. The interior shall be free of protrusions, pinch points and sharp edges. The entire interior shall be cleanable with a hose, using a liquid soap attachment. Water and soap should not normally be sprayed directly on the instrument and switch panels.

5.6.1.2 MODESTY PANELS
Sturdy divider panels constructed of durable, unpainted, corrosion-resistant material complementing the interior trim shall be provided to act as both a physical and visual barrier for seated passengers. Modesty panels shall be located at doorways to protect passengers on adjacent seats, and along front edge of rear upper level. Design and installation of modesty panels located in front of forward facing seats shall include a handhold/grabhandle along its top edge. These dividers shall be mounted on the sidewall and shall project toward the aisle no farther than passenger knee projection in longitudinal seats or the aisle side of the transverse seats. Modesty panels shall extend no higher than the lower daylight opening of the side windows and those forward of transverse seats shall extend downward to a level between 1-1/2 and 1 inches above the floor. A clear polycarbonate panel shall extend from the top of each modesty panel to the top of the side windows. Gray or smoked polycarbonate shall be used for the modesty panel adjacent to the front door. Panels forward of longitudinal seats shall extend to below the level of the seat cushion. Dividers positioned at the doorways shall provide no less than a 2-1/2-inch clearance between the modesty panel and the opened door to protect passengers from being pinched. Modesty panels installed at doorways shall be equipped with grab rails. The modesty panel and its mounting shall withstand a static force of 250 pounds applied to a four-inch by four-inch area in the center of the panel without permanent visible deformation.

5.6.1.3 OPERATOR'S BARRIER
A full height barrier beginning 6 inches (152 mm) above the floor shall be provided directly in back of the operator's station to separate the operator from the passenger compartment. The barrier shall extend from the left side bus wall to the stanchion at the right rear of the operator's station. This panel shall in no way interfere with the safe normal operation of the bus or restrict movement of the operator's seat. The barrier shall
be opaque and minimize glare and reflections in the windshield directly in front of the barrier from interior lighting during night operation.

5.6.1.4 REAR BULKHEAD
The rear bulkhead paneling shall be contoured to fit the ceiling, sidewalls. Any air vents in this area shall be louvered to reduce airflow noise and to reduce the probability of trash or litter being thrown or drawn through the grille. If it is necessary to remove the panel to service components located on the rear bulkhead, the panel shall be hinged. Grilles where access to or adjustment of equipment is required shall be heavy duty and designed to minimize damage. The panel behind rear settee shall be covered with a fabric material containing the PDRTA approved logo. The fabric shall have no seams and be approved by PDRTA.

5.6.1.5 HEADLINING / CEILING
Ceiling panels shall be a melamine-type laminated material. Headlining shall be supported to prevent buckling, drumming, or flexing and shall be secured without loose edges. Headlining materials shall be treated or insulated to prevent marks due to condensation where panels are in contact with metal members. Moldings and trim strips, as required to make the edges tamperproof, shall be stainless steel, aluminum, or plastic, colored to complement the ceiling material. Headlining panels covering operational equipment that is mounted above the ceiling shall be on hinges for ease of service but retained to prevent inadvertent opening.

5.6.1.6 SIDEWALLS PANELS
Sidewall trim/panels below the windows shall be melamine (or submitted deviation), 0.050 inches minimum thickness.

5.6.1.7 SIDEWALL POSTS
Sidewall posts between the windows shall be covered with a suitable material and must be approved by PDRTA.

5.6.1.8 FASTENERS
Fasteners shall be of such type that they will not loosen because of vibration. Panels shall be supported so as to prevent buckles, drumming, or flexing when the bus is in service. All panel joints shall be sealed and covered with protective trim strips to guard against sharp edges.

5.6.1.9 FLOOR COVERING
5.6.1.9.1 General Requirements
The floor covering shall be Altro Mineral (www.altrofloors.com) or submitted deviation, and have a non-skid walking surface that remains effective in all weather conditions and complies with all ADA requirements. The floor covering, as well as transitions of flooring material to the main floor and to the entrance and exit area, shall be smooth and present no tripping hazards. The floor covering shall extend, at a minimum, to the top of the cove. Any part or component utilizing a fastener that penetrates the floor covering shall be sealed with sealant/adhesive. The floor covering shall utilize mechanical fasteners in
conjunction with an adhesive when installed over a metal surface. Mechanical fasteners are not necessary when the floor covering is adhered to a non-metal surface on each side of a metal surface.

5.6.1.9.2 Standee Line
The standee line shall be at least 2 inches wide and shall extend across the bus aisle. This line shall be the same color as the outboard edge of the entrance/exit areas.

5.6.1.9.3 Step Nosing

5.6.1.9.3.1 Stepwell Requirements
Yellow, rubber coated nosing, with integral LED lighting, shall be provided on the stepwell or step side.

5.6.1.9.3.2 Operator and Farebox Platform Requirements
Integral yellow step nosing, of the same manufacture of the floor covering, shall be provided on the operator and farebox platforms.

5.6.1.9.4 Operator’s Platform Floor Requirements

5.6.1.9.4.1 General Requirements
The floor on the operator’s platform shall be of the same manufacture and type used throughout the passenger compartment and be arranged to minimize debris accumulation.

5.6.1.9.4.2 Floor Wear Protection
An aluminum or stainless steel plate of suitable size shall be placed at the base of accelerator and brake pedals to prevent wear of the floor material. The plate shall be of a suitable texture to provide proper adhesion for the heel of an operator's shoe.

5.6.1.9.5 Floor Covering Joints
Floor covering joints shall be kept to a minimum, preferably one longitudinal seam on each floor area. Such joints shall not be located in an aisle except for the standee line.

5.6.1.9.6 Floor Covering Trim
Exposed floor covering edges on the stepwell, wheel housings and platforms shall be covered with stainless steel trim material. Such material shall have a slip resistant texture and be installed with an adhesive caulk and suitable stainless steel fasteners. The floor covering trim when used in areas of frequent foot traffic shall be yellow. All other trim shall have a satin or brushed finish or a color that corresponds with other floor materials.

5.6.1.9.7 Floor Covering Penetrations
All floor penetrations shall utilize a suitable bushing to protect the component that extends through the penetration. Such bushings shall be caulked and/or sealed and mechanically fastened in place. The component that extends through the penetration shall be caulked and/or sealed in place after such a component is installed.

5.6.1.9.8 Components Contacting the Floor Covering
All components that contact the floor covering shall be sealed and/or caulked before the component is installed.

5.6.1.10 NUMBERS AND SIGNS
Numbers and signs as specified by PDRTA shall be applied as required by appendix C to the interior of the bus.

5.6.1.11 INTERIOR ADVERTISING REQUIREMENTS

5.6.1.11.1 Operators Barrier or Electronic Equipment Enclosure
Provisions shall be made on the rear of the operator’s barrier or main electronic equipment enclosure for sufficient vertically flat space to mount a PDRTA “Rider Information Center”. Such space shall have a minimum dimension of 19 inches wide and 22 inches high. The bottom edge of the space shall be a minimum of 36 inches from the bus floor.

5.6.1.11.2 Ceiling/Sidewall
Advertising media 11 inches high and 0.09 inches thick shall be retained near the juncture of the bus ceiling and sidewall. The retainers may be concave and shall support the media without adhesives. Interior advertisement racks shall be reinforced by use of structural members attached directly to the bus structure. The advertisement racks shall be hinged to provide access to the air plenum at every fixture location without removing the fixture from the bus structure. The card racks shall be retained in the closed position by use of threaded closing screws. The card racks shall be self-retained in the open position to allow maintenance accessibility. The media shall be illuminated by the interior fluorescent light system. The card racks may be integral to the fluorescent light fixtures.

5.6.2 INTERIOR LIGHTING

5.6.2.1 PASSENGER AREA LIGHTING

5.6.2.1.1 General Requirements
An LED interior lighting system shall provide general passenger compartment illumination and shall be controlled through the “RUN” switch. The LED modules shall be of sufficient density to effectively "mask" individual LEDs and there shall be no “hot spots” or “pebble” effect. The system shall provide 15 to 25 foot-candles of illumination on a one (1) square foot plane at an angle of 45 degrees centered 33 inches above the floor and 24 inches in front of the seat back at each seating position except at the rear settee, where the illumination may be decreased to 10 foot candles. Floor surface in the aisles shall be a minimum of 10 foot-candles, vestibule area a minimum of 4 foot-candles with the front doors open and a minimum of 2 foot-candles with the front doors closed. LED modules shall be placed at the juncture of the sidewall and ceiling.

5.6.2.1.2 LED Module Type
High-power, solid-state LEDs shall be in one-foot modular sections, and shall maintain 70% of original brightness after 60,000 hours of operation. The brightness of each
individual module shall be programmable through software to minimize glare. A photo sensor shall detect and adjust light levels relative to ambient light for passenger comfort. LED modules shall be fully interchangeable and easily removable for service.

5.6.2.1.3 Blue Shields
No Blue Shields are required.

5.6.2.1.4 Lens Type
Lens material shall be clear polycarbonate. Lens shall be designed to effectively "mask" the LEDs. Lens shall be sealed to inhibit infiltration of dust and insects yet are easily removable for service. If threaded fasteners are used they must be held captive in the lens.

5.6.2.1.5 Access Panels
Access panels shall be provided to allow servicing of components located behind light panels. If necessary, the entire light fixture shall be hinged.

5.6.2.1.6 Watertight Requirements
All interior lighting fixtures shall be sufficiently watertight, so that interior washing with detergent soap spray and pressure rinsing does not force excessive water into the fixture.

5.6.2.2 INTERIOR DOORWAY LIGHTING
Lamps at the front and rear passenger doorways shall comply with ADA requirements and shall activate only when the doors open. These lamps shall illuminate the street surface to a level of no less than 1 foot-candle for a distance of 3 feet outward from the outboard edge of the door threshold. The lights may be positioned above or below the lower daylight opening of the windows and shall be shielded to protect passengers’ eyes from glare. The exterior doorway lighting may be integrated with the interior doorway lighting.

5.6.2.3 STEP LIGHTING
LED step lighting shall be integral to the step nosing on each step.

5.6.2.4 OPERATOR’S LIGHT
An adjustable light fixture shall be recess-mounted in the ceiling above operator’s area.

5.6.2.5 FAREBOX LIGHT
An adjustable light fixture shall be mounted in the ceiling above the farebox location. The fixture shall be capable of projecting a concentrated beam of light on the farebox.

5.6.3 INTERIOR ACCESS PANELS AND DOORS

5.6.3.1 GENERAL REQUIREMENTS
Access for maintenance and replacement of equipment shall be provided by panels and doors that appear to be an integral part of the interior. Access doors shall be hinged with gas props or over-center springs, where practical, to hold the doors out of the mechanic's
Panel fasteners shall be captive to the panel or door and standardized so that only one tool is required to service all special fasteners within the bus.

5.6.3.2 FLOOR OPENINGS
Access openings in the floor shall be sealed to prevent entry of fumes and water into the bus interior. Flooring material shall be flush with the floor and shall be edge-bound with stainless steel, or other material that is acceptable to PDRTA, to prevent the edges from coming loose. Access openings shall be asymmetrical so that reinstalled flooring shall be properly aligned. Fasteners shall tighten flush with the floor.

5.6.3.3 INTERIOR ENGINE COMPARTMENT ACCESS
The rear seat over the engine access panel must be hinged to provide easy access to the engine. A prop must be supplied to keep the seat in a lifted position.

5.7 PASSENGER REQUIREMENTS

5.7.1 PASSENGER SEATING

5.7.1.1 ARRANGEMENT AND SEAT STYLE

5.7.1.1.1 General Requirements
The passenger seating shall be USSC Aries (www.4one.com), American Seating Metropolitan (www.americanseating.com) or submitted deviation. Each bus manufacturer shall include pricing for the USSC Aries passenger seats in its base unit bus price, plus a price per bus variation for the provision of the American Seating Metropolitan seating product in place of the Aries. This price per bus variation shall indicate whether the amount is an "ADD" (in the event that the American Seating Metropolitan seating product will cost more than the USSC Aries), a "DEDUCT" (in the event that the American Seating Metropolitan seating product will cost less) or "No Change" (if the price per bus of the American Seating Metropolitan seating product is the same as the USSC Aries).

The passenger seating arrangement in the bus shall be such that seating capacity is maximized and in compliance with the following requirements. The passenger seats shall be stainless steel with non-padded fabric inserts. The general design of the seat structure shall provide optimum comfort for the passenger. All seats shall have fabric inserts installed in a tamper proof manner. All cushion and back inserts (Aries) shall be recessed into the stainless steel assembly or the use of an insert (Metropolitan) which attaches to the frame assembly is acceptable. All workmanship shall be of the highest quality providing component consistency and freedom from such defects as sharp edges, misaligned sections, etc. Inserts are to fit the shell perfectly to preclude tampering or rattles, and to exclude dirt from entering the insert-shell interface. Seat suspension shall be designed to preclude seat/wall rattles over the life of the bus. Seat assemblies and components of identical seats shall be mechanically interchangeable. PDRTA recognizes that ramp location, foot room, hip-to-knee room, doorway type and width, seat construction, floor level type, seat spacing requirements, etc. ultimately affect seating capacity and layout.
5.7.1.1.2 **Forward Facing Seats Required**
Passenger seats shall be arranged in a transverse, forward facing configuration. Rearward facing seats shall not be permitted.

5.7.1.1.3 **Forward Facing Seat Exceptions**
Aisle facing seats shall be permitted at wheel housings, with regard for passenger access and comfort, at wheelchair securement areas and at required platforms such as fuel tank space.

5.7.1.1.4 **Seat Insert Interchangeability**
To the extent practicable, inserts shall be interchangeable throughout the bus. Seat inserts shall be securely attached and shall be detachable by means of a simple release mechanism employing a special tool so that they are easily removable by maintenance personnel but not by passengers.

5.7.1.1.5 **Thickness of seatbacks**
Thickness of the transverse seat backs shall be minimized at the bottom to increase passenger knee room and passenger capacity. The area between the longitudinal seat backs and the attachment to the bus sidewalls shall be designed to prevent debris accumulation.

5.7.1.2 **SEATING DIMENSIONS**
Seat dimensions for the various seating arrangements shall have the dimensions as follows (refer to the figure above):

- The width, W, of the seat shall be 36 inches maximum.
- The length, L, shall be 17 ±1 inches.
- The seat back height, B, shall be a minimum of 15 inches.
- The foot room, F, shall be specified in 5.7.1.2.2
- The seat cushion slope, S, shall be between 5° to 11°.
- The seat back slope, C, shall be between 8° to 17°.
- The hip to knee room, K, shall be a minimum of 26.5 inches
- The pitch, P, is shown as reference only.
- The seat height, H, shall be 17 ± 1 inches. For the rear lounge (or settee) and longitudinal seats, and seats located above raised areas for storage of under floor components, a cushion height of up to 18 ±2 inches will be allowed. This shall also be allowed for limited transverse seats, but only with expressed approval of PDRTA.
5.7.1.2.1 Minimum Aisle Width
The aisle between the seats shall be no less than 20 inches wide at seated passenger hip height. Seat backs shall be shaped to increase this dimension to no less than 24 inches at standing passenger hip height.

5.7.1.2.2 Minimum Foot Room
Foot room, measured at the floor forward from a point vertically below the front of the seat cushion, shall be no less than 14 inches. Seats immediately behind the wheel housings and modesty panels may have foot room reduced, provided the wheelhouse is shaped so that it may be used as a footrest or the design of modesty panel effectively allows for foot room.

5.7.1.3 STRUCTURE AND DESIGN

5.7.1.3.1 General Requirements
Pedestal mounted transverse seats shall be permitted. For these type seats, the structure shall be attached to the sidewall and supported by a pedestal attached to the floor. The lowest part of the seat assembly that is within 12 inches of the aisle, excluding the pedestal, shall be at least 10 inches above the floor. The underside of the seat and the sidewall shall be configured to prevent debris accumulation.
5.7.1.3.2 Compressive Seat Load
All transverse objects, including seat backs, modesty panels, and longitudinal seats, in front of forward facing seats shall not impart a compressive load in excess of 1,000 pounds onto the femur of passengers ranging in size from a 5th-percentile female to a 95th-percentile male during a 10g deceleration of the bus. This deceleration shall peak at \(0.05 \pm 0.015\) seconds from initiation. Permanent deformation of the seat resulting from two 95th-percentile males striking the seat back during this 10g deceleration shall not exceed 2 inches, measured at the aisle side of the seat frame at height \(H\). Seat back should not deflect more than 14 inches, measured at the top of the seat back, in a controlled manner to minimize passenger injury. Structural failure of any part of the seat or sidewall shall not introduce a laceration hazard.

5.7.1.3.3 Vertical Seat Load
The seat assembly shall withstand static vertical forces of 500 pounds applied to the top of the seat cushion in each seating position with less than 1/4-inch permanent deformation in the seat or its mountings. The seat assembly shall withstand static horizontal forces of 500 pounds evenly distributed along the top of the seat back with less than 1/4-inch permanent deformation in the seat or its mountings. The seat backs at the aisle position and at the window position shall withstand repeated impacts of two 40-pound sandbags without visible deterioration. One sandbag shall strike the front 40,000 times and the other sandbag shall strike the rear 40,000 times. Each sandbag shall be suspended on a 36-inch pendulum and shall strike the seat back 10,000 times each from distances of 6, 8, 10, and 12 inches. Seats at both seating positions shall withstand 4,000 vertical drops of a 40-pound sandbag without visible deterioration. The sandbag shall be dropped 1,000 times each from heights of 6, 8, 10, and 12 inches. Seat cushions shall withstand 100,000 randomly positioned 3-1/2-inch drops of a squirming, 150-pound, smooth-surfaced, buttocks-shape striker with only minimal wear on the seat covering and no failures to seat structure or cushion suspension components.

5.7.1.3.4 Transverse Seat Back Handhold
The back of each transverse seat shall incorporate a handhold no less than 7/8 inch in diameter for standees and seat access/egress. The handhold shall not be a safety hazard during severe decelerations. The handhold shall extend above the seat back near the aisle so that standees shall have a convenient vertical assist, no less than 4 inches long that may be grasped with the full hand. This handhold shall not cause a standee using this assist to interfere with a seated 50th-percentile male passenger. The handhold shall also be usable by a 5th-percentile female, as well as by larger passengers, to assist with seat access/egress for either transverse seating position. Seat handholds may be of the same construction and finish as the seat frame.

5.7.1.3.5 Seat Back/ Seat Back Handhold Energy Absorption Requirements
The upper rear portion of the seat back and the seat back handhold immediately forward of transverse seats shall be padded and/or constructed of energy absorbing materials. During a 10g deceleration of the bus, the HIC number (as defined by SAE Standard J211a) shall not exceed 400 for passengers ranging in size from a 5th percentile female through a 95th percentile male.
5.7.1.3.6 Seat Back Handhold not required
The seat back handhold may be deleted from seats that do not have another transverse seat directly behind and where vertical assist is required. Armrests shall not be included in the design of transverse seats.

5.7.1.3.7 Aisle Facing Seats
Longitudinal seats shall be the same general design as transverse seats but without seat back handholds. Armrests shall be included on the ends of each set of longitudinal seats except on the forward end of a seat set that is immediately to the rear of a transverse seat, the operator's barrier, or a modesty panel and these fixtures perform the function of restraining passengers from sliding forward off the seat. Armrests are not required on longitudinal seats located in the wheelchair parking area that fold up when the armrest on the adjacent fixed longitudinal seat is within 1\(\frac{1}{2}\) to 3\(\frac{1}{2}\) inches of the end of the seat cushion. Armrests shall be located from 7 to 9 inches above the seat cushion surface. The area between the armrest and the seat cushion shall be closed by a barrier or panel and shall be constructed or trimmed to complement the modesty panels. The top and sides of the armrests shall have a minimum width of 1 inch and shall be free from sharp protrusions that form a safety hazard.

5.7.1.3.8 Seat Back Handhold and Armrest Strength and Durability
Seat back handhold and armrests shall withstand static horizontal and vertical forces of 250 pounds applied anywhere along their length with less than 1/4-inch permanent deformation. Seat back handhold and armrests shall withstand 25,000 impacts in each direction of a horizontal force of 125 pounds with less than 1/4-inch permanent deformation and without visible deterioration.

5.7.1.4 CONSTRUCTION AND MATERIALS

5.7.1.4.1 Seat Insert Durability
Seat inserts shall consist of a molded plastic substrate to which a vandal resistant fabric is adhered. The intent of this construction is to provide a cut resistant insert with fabric sufficiently adhered in accordance with the following specifications. Fabric shall be manufactured by Camira (www.camirafabrics.com/us) or submitted deviation. The upholstered seat and back inserts must meet all test requirements as specified herein. After each test, the seat inserts and fabric must retain the contoured shape and must be free from delamination or deformation.

5.7.1.4.1.1 Heat and Artificial Aging Test
Exposure to 180° F for 72 hours after 7 days aging.

5.7.1.4.1.2 Squirming Test - Non-Cut
The seat inserts shall be assembled to a seat shell. The test shall consist of a 155-pound wood buttocks covered with a one-inch foam pad with 30,000 rotations shall be performed on the seat insert. The bonded fabric shall not delaminate from the molded substrate.

5.7.1.4.1.3 Squirming Test - Cut
The seat inserts shall be cut by hand using a sharp knife, Stanley Model #10-402 with #11-413 blade or equivalent resulting in a series of four parallel, eight-inch long cuts, spaced at 1-1/2" on center in two directions. Four initial cuts shall be made parallel to the front edge of the insert with the cut pattern centered on the seat insert. The second four cuts shall be made at 90° to the initial four cuts and shall be centered on the insert. The prior squirming test shall be repeated and the bonded fabric shall not delaminate from the substrate.

5.7.1.4.1.4 Fabric Adhesion
Fabric to substrate bond shall be tested for peel (stripping) strength after 7 days aging in accordance with ASTM standard D-903-49. Samples so tested shall exhibit a bond strength exceeding the tensile strength of the fabric or a minimum bond strength of 25 pounds per inch width of fabric.

5.7.2 PASSENGER ASSISTS

5.7.2.1 GENERAL REQUIREMENTS
Passenger assists in the form of full grip, vertical stanchions or handholds shall be provided for the safety of standees and for ingress/egress. Passenger assists shall be convenient in location, shape, and size for both the 95th-percentile male and the 5th-percentile female standee. Starting from the entrance door and moving anywhere in the bus and out the exit door, a vertical assist shall be provided either as the vertical portion of seat back assist (see Section 5.7.1.3.8) or as a separate item so that a 5th-percentile female passenger may easily move from one assist to another using one hand and the other without losing support. Assists shall withstand a force of 300 pounds applied over a 12-inch lineal dimension in any direction normal to the assist without permanent visible deformation. All passenger assist components, including brackets, clamps, screw heads, and other fasteners used on the passenger assists shall be designed to eliminate pinching, snagging and cutting hazards and shall be free from burrs or rough edges. Any joints in the assist structure shall be underneath supporting brackets and securely clamped to prevent passengers from moving or twisting the assists. Connecting tees and angles shall be powder coated metal castings. No more than 5 percent of the full grip feature shall be lost due to assist supports.

5.7.2.1.1 Color
All vertical and angled stanchions and all assists mounted on a door shall be powder coated yellow.

5.7.2.1.2 Diameter and Clearance
Excluding those mounted on the seats and doors, the assists shall have a cross-sectional diameter between 1-1/4 and 1-1/2 inches or shall provide an equivalent gripping surface with no corner radii less than 1/4 inch. All passenger assists shall permit a full hand grip with no less than 1-1/2 inches of knuckle clearance around the assist.

5.7.2.1.3 Drawstring Test
Passenger assists shall be designed to minimize catching or snagging of clothes or personal items and shall be capable of passing the NHTSA Drawstring Test.

5.7.2.2 FRONT DOORWAY
Front doors, or the entry area, shall be fitted with ADA compliant assists. Assists shall be as far outward as practicable, but shall be located no farther inboard than 6 inches from the outside edge of the entrance step and shall be easily grasped by a 5th-percentile female boarding from street level. Door assists shall be functionally continuous with the horizontal front passenger assist and the vertical assist and the assists on the wheel housing or on the front modesty panel.

5.7.2.3 VESTIBULE
The aisle side of the operator's barrier, the wheel housings, and when applicable the modesty panels shall be fitted with vertical passenger assists that are functionally continuous with the overhead assist and that extend to within 36 inches of the floor. These assists shall have sufficient clearance from the barrier to prevent inadvertent wedging of a passenger's arm.

A horizontal passenger assist shall be located across the front of the bus and shall prevent passengers from sustaining injuries on the fare collection device or windshield in the event of a sudden deceleration. Without restricting the vestibule space, the assist shall provide support for a boarding passenger from the front door through the fare collection procedure. Passengers shall be able to lean against the assist for security while paying fares. The assist shall be no less than 36 inches above the floor. The assists at the front of the bus shall be arranged to permit a 5th-percentile female passenger to easily reach from the door assist, to the front assist, to vertical assists on the operator's barrier, wheel housings, or front modesty panel.

5.7.2.4 REAR DOORWAY
Vertical assists that are functionally continuous with the overhead assist shall be provided at the aisle side of the transverse seat immediately forward of the rear door and on the aisle side of the rear door modesty panel(s). Passenger assists shall be provided on modesty panels that are functionally continuous with the rear door assists. Rear doors, or the exit area, shall be fitted with assists no less than 3/4 inch in width and shall provide at least 1-1/2 inches of knuckle clearance between the assists and their mounting. The assists shall be designed to permit a 5th-percentile female to easily move from one assist to another during the entire exiting process. The assists shall be located no farther inboard than 6 inches from the outside edge of the rear doorway.

5.7.2.5 OVERHEAD
Except forward of the standee line and at the rear door, a continuous, full grip, overhead assist shall be provided. This assist shall be convenient to standees anywhere in the bus and shall be located over the center of the aisle seating position of the transverse seats. The assist shall be no less than 72 inches above the floor.

5.7.2.6 PASSENGER STRAPS
Straps or other extensions as necessary shall be provided for sections where vertical assists are not available and for the use by passengers that cannot reach to 70 inches. PDRTA requires the installation of spring loaded, stainless steel grab straps. There must be 6 per bus. PDRTA shall provide details of type and locations at which such extensions are to be located.

5.7.2.7 LONGITUDINAL SEATS
Longitudinal seats shall have vertical assists located between every other designated seating position, except for seats that fold/flip up to accommodate wheelchair securement. Assists shall extend from near the leading edge of the seat and shall be functionally continuous with the overhead assist. Assists shall be staggered across the aisle from each other where practicable and shall be no more than 52 inches apart or functionally continuous for a 5th percentile female passenger.

5.7.2.8 WHEEL HOUSING
If no passenger seating is provided on top of wheel housing, passenger assists shall be mounted around the exposed sides of the wheel housings (and propulsion compartments if applicable) which shall also be designed to prevent passengers from sitting on wheel housings. Such passenger assists shall also effectively retain items, such as bags and luggage, placed on top of wheel housing.

5.7.3 PASSENGER DOORS

5.7.3.1 GENERAL REQUIREMENTS
Two doorways shall be provided in the curbside of the bus for passenger ingress and egress. The front doorway shall be forward of the front wheels and located so that the operator will be able to collect or monitor the collection of fares. The rear doorway centerline shall be rearward of the point midway between the front door centerline and the rearmost seat back. Passenger doors and doorways shall comply with ADA requirements. All elements of the door and actuator system shall operate without a Class 3 failure for a minimum of 50,000 miles as determined by the Design Operating Profile. The front door shall be an inward opening slide glide configuration. The rear door shall be an outward opening flip configuration or a slide glide configuration. The floor area swept by a door shall be marked with yellow markings.

5.7.3.2 ACTUATORS
Door actuators, Vapor or submitted deviation, shall be powered by compressed air. The door opening and closing speeds shall be independently adjustable.

5.7.3.3 MECHANISM
The door operating mechanism, mounted on a removable steel base plate in a compartment directly above the door shall be concealed from passengers but shall be easily accessible for servicing. The compressed air exhaust from the door system shall be routed below the floor of the bus to prevent accumulation of any oil that may be present in air system and to minimize sound. Door linkage wear points shall be lubricated by a grease fitting.
5.7.3.4 CLOSING FORCE
Doors shall open or close completely in not more than 3.5 seconds from the time of control actuation. The rear doors shall be equipped with a sensitive edge or other obstruction sensing system such that if an obstruction is struck by a closing door edge, the doors will stop and/or reverse direction prior to imparting a 10-pound force on 1 square inch of that obstruction. It shall be possible to withdraw a 1-1/2 inch diameter cylinder from between the center edges of a closed and locked door with an outward force not greater than 35 pounds.

5.7.3.5 PASSENGER OPERATED REAR DOOR
When the rear doors are enabled by the operator, such doors shall open when a passenger is detected next to the door. Such detection shall be manufactured by Vapor or submitted deviation and be controlled by infrared, ultrasonic or similar means. A green light over the rear door shall illuminate when the rear door is enabled. The doors shall automatically close within 3 seconds when a passenger is no longer detected.

5.7.3.6 MATERIALS AND CONSTRUCTION
Structure of the doors, their attachments, inside and outside trim panels, and any mechanism exposed to the elements shall be corrosion-resistant. Door panel construction shall be of corrosion-resistant metal. The doors, when fully opened, shall provide a firm support and shall not be damaged if used as an assist by passengers during ingress or egress. The front leaves of the passenger doors shall overlap the rear leaves. Meeting edges of door shall have four inches (4 inches), extruded overlapping type rubber safety edges one inch (1 inch) on each half.

5.7.3.7 DOOR GLAZING
The upper section of both front and rear doors shall be glazed for no less than 45 percent of the respective door opening area of each section. The lower section of the front door shall be glazed for no less than 25 percent of the door opening area of the section. The rear door shall not have glazing installed in the lower section and the internal and external surfaces of the rear door shall be continuous and contain no outline of omitted glazing. Two individual pieces of glazing shall be installed on each half of the front door. The front door panel glazing material shall have a nominal ¼ inch or 6 mm thick laminated safety glass conforming with the requirements of ANSI Z26.1 Test Grouping 2 and the Recommended Practices defined in SAE J673. Glazing material in the rear doorway door panels shall be the same material, thickness and color as the side windows defined in Section 5.4.7.4.2.

5.7.3.8 DOOR PROJECTION
The exterior projection of the front doors beyond the side of the bus shall be minimized and shall not block the line of sight of the rear exit door via the curbside mirror when the doors are fully open. The exterior projection of both doors shall be minimized and shall not exceed 13 inches during the opening or closing cycles or when doors are fully opened. Projection inside the bus shall not exceed 21 inches. The closing edge of each door panel shall have no less than 2 inches of soft weather stripping. The doors, when closed, shall be effectively sealed and the hard surfaces of the doors shall be at least 4 inches apart.
The combined weather seal and window glazing elements of the front door shall not exceed 10 degrees of binocular obstruction of the operator's view through the closed door.

5.7.3.9 EMERGENCY OPERATION
In the event of an emergency, it shall be possible to open the doors manually from inside the bus using a force of no more than 25 pounds after actuating an unlocking device at each door. The unlocking devices shall be clearly marked as an emergency-only device and shall require two distinct actions to actuate. The respective door emergency unlocking device shall be accessible from the entrance and exit areas. When the rear door emergency device is actuated, the door interlock throttle system shall return the engine to idle and the door interlock brake system shall apply to stop the bus. When the front door emergency device is actuated only the door interlock throttle system shall be actuated. Locked doors shall require a force of more than 100 pounds to open manually. When the locked doors are manually forced to open, there shall be no resulting damage to the doors, actuator, or mechanism.

5.7.4 ACCESSIBILITY PROVISIONS

5.7.4.1 GENERAL REQUIREMENTS
The design and construction of the bus shall be in accordance with all requirements defined in 49 CFR, Part 38, Subpart B: ADA Accessibility Specifications for Transportation Vehicles; Buses, Vans and Systems. The design load for this section shall be 800 lbs. Space and body structural provisions shall be provided at the front of the bus to accommodate the wheelchair loading system. Prior to submission of bid, the bus manufacturer shall provide a plan, including layout drawings for entry, maneuvering, parking, and exiting of wheelchair passengers, to show compliance with ADA regulations.

5.7.4.2 RAMP SYSTEM

5.7.4.2.1 General Requirements
An automatically-controlled, power-operated ramp system, a Lift-U Model LU-11 ramp with a 1:6 slope (Lift-U/Hogan Mfg., PO Box 398, Escalon, CA 95320, www.lift-u.com) or submitted deviation, compliant to requirements defined in 49 CFR Part 38, Subpart B, §38.23c shall provide ingress and egress quickly, safely, and comfortably, both in forward and rearward directions, for a passenger in a wheelchair from a level street or curb. The wheelchair loading system shall be located at the front door. The ramp shall be of a simple hinged, flip-out type design. The ramp controls shall be modular in design and of the same manufacture as the ramp. When the system is not in use, the passageway shall appear normal. In the stored position of the ramp, no tripping hazards shall be presented and any resulting gaps shall be minimized. The wheelchair loading system shall not present a hazard, nor inconvenience any passenger. A passenger departing or boarding via the ramp shall be able to easily obtain support by grasping the passenger assist located on the doors or other assists provided for this purpose. The platform shall be designed to protect the ramp from damage and persons on the sidewalk from injury during the extension/retraction or lowering/raising phases of operation. The loading platform shall be covered with a replaceable or renewable, nonskid material and shall be fitted with
devices to prevent the wheelchair from rolling off the sides during loading or unloading. Deployment or storage of the ramp shall require no more than 15 seconds. The device shall function without failure or adjustment for a minimum of 500 cycles or 6,000 miles in all weather conditions on the design operating profile when activated once during the idle phase. Hydraulically powered ramps shall not be permitted unless they are on their own hydraulic system.

5.7.4.2.2 Operator’s Position
The controls shall be mounted in the operator’s area and the loading system operation shall be under the surveillance and complete control of the operator when positioned in the operator’s seat.

5.7.4.2.3 Manual Operation
A manual override system shall permit unloading a wheelchair and storing the device in the event of a primary power failure. The manual operation of the ramp shall not require more than 20 lbs. of force.

5.7.4.3 WHEELCHAIR POSITIONS
Two forward-facing wheelchair positions that comply with ADA requirements, as close to the wheelchair loading system as practical shall be provided.

5.7.4.4 WHEELCHAIR RESTRAINTS
Each position shall include a three-point front ratcheting restraint system, Q'Straint Q'Pod (www.qstraint.com) or submitted deviation. The restraint system shall utilize a spring mechanism to automatically apply the proper amount of tension to a restraint. Each restraint shall have a means of storage to be used when the wheelchair position is used for conventional seating. The restraint mountings shall be integral to the surrounding seating and bus structure. No part of the restraint system shall be mounted on the floor.

5.7.4.5 WHEELCHAIR CIRCULATION
The low floor portion of the bus shall accommodate easy travel for a passenger in a wheelchair to and from the loading device and wheelchair stations. No portion of the wheelchair or its occupant shall protrude into the normal aisle of the bus when parked in a wheelchair station. As a guide, no wheelchair station width dimension should be less than 33.5 inches. Areas requiring 90-degree turns for wheelchairs should have a clearance arc dimension no less than 45 inches and in the area adjacent to the wheelchair stations, where 180-degree turns are expected to occur, provision should be made for a 60-inch-diameter circle. A vertical clearance of 12 inches above the floor surface should be provided on the outside of turning areas for a wheelchair footrest.

5.7.5 PASSENGER STOP REQUEST

5.7.5.1 GENERAL REQUIREMENTS
A passenger “Stop Requested” signal system that complies with applicable ADA requirements defined in 49 CFR, Part 38.37 shall be provided. The system shall consist of a heavy-duty pull cable, chime, and interior sign message. The pull cable shall be
located the full length of the bus on the sidewalls at the level where the transom is located. If no transom window is required, height of pull cable shall approximate this transom level and shall be no greater than 65 inches as measured from floor surface. It shall be easily accessible to all passengers, seated or standing. Pull cable(s) shall activate a solid state or magnetic proximity switch(es).

5.7.5.2 WHEELCHAIR POSITION REQUIREMENTS
Each wheelchair and priority seating positions shall be provided with a stop request signal. Such a signal shall be no higher than 4 feet above the floor. Instructions shall be provided to clearly indicate function and operation of these signals.

5.7.5.3 STANCHION STOP REQUEST PUSH BUTTONS
A stop request signal button shall be installed on each modesty panel stanchion immediately adjacent to the rear door and clearly identified as “Stop Request.”

5.8 OPERATOR REQUIREMENTS

5.8.1 OPERATOR’S AREA

5.8.1.1 GENERAL REQUIREMENTS
The design of the operator’s station shall have as its primary objective, the provision of an environment for the operator that will aid the bus to be operated safely and efficiently for long periods of time with minimum fatigue. Human factors design principles shall be used in the layout and proportioning of the operator’s station and its components with attention given to safety, “comfort and fatigue,” body support; the size, shape and location of switches, levers, pedals and gauges; and all other factors that affect the design objective. The operator’s station shall accommodate operators who are of various heights and body proportions by the use of human factors design in locating and proportioning the devices in the station and by the use of adjustable components such as the operator’s seat and the steering column. The operator’s area shall accommodate operators from the 5th percentile female up to and including the 95th percentile male as defined in SAE J833, “Human Physical Dimensions”. The bus manufacturer shall, with the approval of PDRTA, determine the location of all equipment with respect to proper lighting, ease of operation, accessibility and passenger flow. Factors to be considered include, but are not limited to, the provision of mountings for and deterring the location of the farebox, radio speaker, radio control head and any other equipment supplied by PDRTA.

5.8.1.2 GLARE AND ILLUMINATION
The operator’s work area shall be designed to minimize glare to the extent possible. Objects within and adjacent to this area shall be matte black or dark gray in color wherever possible to reduce the reflection of light onto the windshield. The use of polished metal and light-colored surfaces within and adjacent to the operator’s area shall be avoided. Such objects include dash panels, switches and controls, cowlings, windshield wipers and arms, barriers and modesty panels, fare stanchions, access panels and doors, fasteners,
flooring, ventilation and heating ducting, window and door frames and roller curtains. Interior lighting located ahead of the standee line shall be controlled by the operator.

**5.8.2 OPERATOR HAND CONTROLS**

**5.8.2.1 GENERAL REQUIREMENTS**

All switches and controls necessary for the safe operation of the bus shall be conveniently located in the operator’s area and shall provide for ease of operation. Switches and controls shall be divided into basic groups and assigned to specific areas, in conformance with SAE Recommended Practice J680, Revised 1988, Location and Operation of Instruments and Controls in Motor Truck Cabs, and be essentially within the hand reach envelope described in SAE Recommended Practice, J287, Driver Hand Control Reach. Operational controls, instrumentation, switches, and other system controls shall not be mixed with ventilation diffusers and non-operational controls or readouts. Controls shall be located so that boarding passengers may not easily tamper with control settings. The door control, kneel control, windshield wiper/washer controls, and run switch shall be in the most convenient operator locations. They shall be identifiable by shape, touch, and permanent markings. Doors shall be operated by a single control, conveniently located and operable in a horizontal plane by the operator’s left hand. The setting of this control shall be easily determined by position and touch. All panel-mounted switches and controls shall be marked with easily read identifiers. Text designating control positions (on/off) and identifying legends shall be a minimum of 11 points. Extremely condensed or italic type fonts shall not be used. Graphical symbols shall conform to SAE Recommended Practice J2402, Road Vehicles – symbols For Controls, Indicators, and Tell Tales, where available and applicable. Color of switches and controls shall be dark with contrasting typography or symbols. As an example, red type on a black or gray field (or vice versa) shall not be used. Mechanical switches and controls shall be replaceable, and the wiring at these controls shall be serviceable from the vestibule or the operator’s seat. Switches, controls, and instruments shall be dust and water-resistant consistent with the bus washing practices.

**5.8.2.2 HAND CONTROL LOCATION**

Figure 1 below is provided as an illustrative guide to instrument and control grouping:

**Area 1:**
Operational gauges – speedometer, air pressure (primary and secondary), voltmeter(s), fuel and diagnostics shall be located immediately in front of the operator’s field of view.

**Area 2:**
Operational controls and switches, including but not limited to emergency controls and flashers, roof mounted strobe beacon controls, transmission controls, and lighting switches, located adjacent the left side of the instruments.

**Area 3:**
Operational controls and switches, including but not limited to washer controls, knee and ramp switches, operator’s climate controls, located adjacent the right side of the instruments.
**Area 4:**
Secondary operating controls including door, mirror and engine controls, located to the left of the operator ahead of the Seat Reference Point (SRP) of the 5 percentile female.

**Area 5:**
System function controls, including destination sign keypad, cabin climate controls, fire suppression, located on the operator’s centerline, above the operator’s upper sight cutoff line.

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### 5.8.2.3 MASTER RUN SWITCH – 4 POSITION ROTARY SWITCH

The master run switch shall be configured with the listed functions:
- **OFF** – All electrical systems off, except power available for the passenger interior lighting, stoplights, turn lights, hazard lights, radio, silent alarm, horn, fare box, fire detection equipment, engine compartment lights, and auxiliary heater.
- **RUN** – All electrical systems and engine on, headlights at 50%.
- **NITE/RUN** – All electrical systems and engine on.
- **CL/ID** – All electrical systems off except those listed in OFF and power to destination signs, interior lights and marker lights.

### 5.8.2.4 ENGINE

#### 5.8.2.4.1 Engine Start – Momentary switch or pushbutton

The bus engine start push button shall be enabled with the listed interlocks:
- Master Run Switch in RUN or NITE/RUN and
- Engine Run Box Front/Rear selector switch in the front position and 
- Parking brake applied and 
- Transmission selector in neutral and 
- Necessary fuel pressure and 
- Necessary Engine ECM parameters.
- Major electrical loads disconnected while engaged.

The bus engine start push button shall be disabled with the listed interlocks:
- When engine is running

### 5.8.2.4.2 Engine Fast Idle Switch – 2 Position Maintained Toggle Switch

A maintained toggle switch shall be provided to permit the engine to operate at a high idle speed.

The engine fast idle switch shall be configured with the listed interlocks:
- The parking brake must be applied and 
- The transmission must be in neutral 
- Use of the fast idle switch shall override the automatic EPA compliant engine shutdown.

### 5.8.2.4.3 Engine Shutdown Override – 2 Position Momentary Toggle Switch

An Engine Shutdown Override Switch shall be provided to permit a temporary bypass of the engine protection/shutdown system for 30 seconds if engine power is required to move the bus in emergency conditions.

### 5.8.2.5 TRANSMISSION

#### 5.8.2.5.1 Transmission Shift Selector – as supplied by the transmission manufacturer

The transmission shift selector shall be enabled with the listed interlocks:
- As required by the transmission manufacturer 
- Brake pedal force of >10 lbs to select a gear when in neutral. 
- Energize the backup lights and alarm and extinguish all passenger area lights when reverse is selected 
- Automatically shift to neutral if left in gear with the parking brake and/or door brake applied for 5 minutes.

#### 5.8.2.5.2 Retarder Switch – 2 Position Momentary Guarded Toggle Switch

A guarded toggle switch shall be configured to disable the retarder when the switch is moved to off position. The retarder shall be re-enabled when the bus master run switch is turned to the off position and the bus is restarted. The switch shall return to the on position when the guard is closed. When the retarder is off, an input shall be made to the two-way radio, destination sign and the AVM systems.

### 5.8.2.6 DOORS

#### 5.8.2.6.1 Door Selector – 5 position, as manufactured by Vapor or submitted deviation.

The door selector shall be configured with the listed functions:
- Full forward position – open the front and enable the rear door.
• First forward position – open the front door only.
• Center position – both doors closed and locked.
• First rear position – enable the rear door only.
• Full rear position – open the front and enable the rear door.

The door selector shall be configured with the listed interlocks:
• Enabled when the bus speed is < 2 mph.
• The interior and exterior door lights shall be illuminated when a door is open and/or enabled.
• The door brakes shall be applied when a door is open or enabled.
• The accelerator shall be disabled when a door is open or enabled.
• When the bus is kneeled, an input from the raise position of the kneeling switch shall be necessary to close the front door.

5.8.2.6.2 Rear Door Open Switch – 2 Position Maintained Guarded Toggle Switch
A guarded toggle switch shall be configured to open and close the rear door when the rear door is enabled by the Door Selector. The guard shall return the switch to the door closed position when the guard is closed.

5.8.2.6.3 Front Door Release Valve – 2 Position Maintained Pneumatic Toggle Switch
A valve shall be provided to remove the air from the front doors in order to operate such doors manually.

5.8.2.6.4 Door Interlock Bypass – 2 Position Maintained Guarded Toggle Switch
A guarded toggle switch shall be provided to shut off the electrical power to the doors and bypass all door interlocks when in the bypass or on position. The switch shall return to the normal position when the guard is closed. This switch shall not be accessible to the operator and shall be mounted in a secure location in the operator’s area.

5.8.2.7 ACCESSIBILITY CONTROLS

5.8.2.7.1 Ramp control – as required by the Wheelchair Ramp Manufacturer
The ramp control shall be configured with the listed interlocks:
• Enabled only when the bus is in the lowered kneel position

5.8.2.7.2 Kneeling Switch – 3 Position Momentary Center Off Guarded Toggle Switch
A guarded toggle switch shall be provided to control the kneeling system. The bus shall kneel when the toggle switch is moved to and held in the lower position. When the switch is released, the bus will stop moving and hold the selected position. When the switch is moved to the raise position, the bus will return to normal floor height without the switch being held in the raise position. The bus shall rise to the maximum front suspension height when the kneeling switch is held in the raise position. The bus shall return to normal floor height when the switch is released.

The lower position of the kneeling switch shall be configured with the listed interlocks:
• Enabled only when the front door is open and
• Disabled when the wheelchair ramp is in motion or deployed.
5.8.2.8 LIGHTS

5.8.2.8.1 Passenger Area Light Switch – 3 Position Maintained Toggle Switch
A maintained toggle switch shall be provided to control the passenger area lighting and shall be configured with the listed functions:

- Forward – “ON” – all passenger area lights on. The lights shall automatically turn off after 5 minutes when the engine run switch is in the OFF position
- Center – “OFF” – all passenger area lights off, except when the master run switch is in the NITE/RUN position, the first fixture on the roadside and all fixtures on the curbside shall be illuminated when a door is open and/or enabled.
- Rearward – AUTO – all passenger area lights on when the master run switch is in the “RUN” or “CL/ID” position. All passenger area lights on the roadside shall be illuminated, except for the roadside light nearest the operator’s area and all curbside lights shall illuminate only when a door is open and/or enabled when the master run switch is in the NITE/RUN position.

5.8.2.8.2 Operator’s Area Light Switch – 2 Position Maintained Toggle Switch
A maintained toggle switch shall be provided to control the operator’s area light.

5.8.2.8.3 Farebox Light Switch – 2 position Maintained Toggle Switch
A maintained toggle switch shall be provided to enable the farebox light. The light shall illuminate when the master run switch is in the NITE/RUN or CL/ID position and the front door is open.

5.8.2.8.4 Hazard Lights Switch – 2 Position Maintained Toggle Switch
A maintained toggle switch shall be provided to control the hazard lights.

5.8.2.8.5 Instrument Panel Lighting Intensity Control
A control shall be provided to vary the intensity of the required instrument panel lights.

5.8.2.8.6 Exterior Light Test Switch – 2 Position Momentary Toggle Switch
A momentary toggle switch shall be provided to initiate the illumination of all exterior lights and all exterior warning devices except the horn. The lamp test shall automatically deactivate after 2 minutes or when the parking brake is released.

5.8.2.8.7 Exterior Roof Mounted Strobe Beacon with Branch Guard
5.8.2.8.7.1 Hardware
- 360° strobe beacon
- Epoxy filled
- 7” height, 6.5” base
- Clear lens
- SAE J1318, Class II
- Flashing at 60 - 80 flash per minute (FPM)
- Operating Temperature Range: -22°F to +122°F
- LED indicator showing proper operation of the strobe, mounted near driver
- On – Off switch located near driver
- Field replaceable flash tube
- Field selectable for dual or quad flash
- Voltage spike and surge protected
- High voltage and current protected
- Input voltage: 12 & 24 VDV systems
- Input current: 5 amps DC start-up current
- Output power: 16 joules – quad flash, 10 joules – dual flash
- Maximum power consumption: 40 watts
- Beacon branch guards

5.8.2.8.7.2 Mounting
- 3 bolt flush mount top center of bus roof approximately 12” from rear of bus
- Beacon branch guards one on each side (curb & street sides) of beacon.

5.8.2.8.7.3 Warranty
- Minimum Warranty: Strobe 2 years, Flashtube 6 months

5.8.2.8.7.4 Examples
- ECCO Strobe Beacon - 6770C
- Thomas Built Lens Guard - TBB 52002157
- Approved equals will be considered

5.8.2.9 HVAC CONTROLS

5.8.2.9.1 HVAC System Mode Selector Switch – as required by the HVAC System Manufacturer
A selector switch shall be configured with the listed functions:

- Off – System off.
- Cool – Cooling Mode
- Low Vent – Ventilation Mode with fans on low speed.
- High Vent – Ventilation Mode with fans on high speed.
- Low Heat – Heating Mode with fans on low speed.
- High Heat – Heating Mode with fans on high speed.

5.8.2.9.2 Windshield Defroster Blower Switch – 4 Position Rotary Switch
The rotary switch shall be configured with the listed speed functions:
- Off
- Low
- Medium
- High
The front destination sign defroster shall be energized when the windshield defroster is operating.

5.8.2.9.3 Windshield Defroster Hot/Cold Control
A control shall be furnished to enable the defroster blower to draw air from the defroster heater coil or air from inside the bus.

5.8.2.9.4 Operator’s Heater Control
A control shall be provided to divert a portion of the air from the windshield defroster to the operator’s area near the base of the steering column.

5.8.2.9.5 Operator’s Booster Blower Control – 4 Position Rotary Switch
The rotary switch shall be configured with the listed speed functions:
- Off
- Low
- Medium
- High

5.8.2.9.6 Auxiliary Coolant Heater Switch – toggle switch as required by the Auxiliary Coolant Heater Manufacturer.

5.8.2.10 COMMUNICATIONS

5.8.2.10.1 Boom Microphone
A boom microphone as required by the automated announcement system shall be provided. The location shall be approved by PDRTA.

5.8.2.10.2 Chime Switch – 2 Position Maintained Toggle Switch
A toggle switch shall be configured with the listed functions:
- ON – The chime will sound every time a pull cord is activated
- SINGLE – The chime will sound one time until reset by a door cycle.

5.8.2.10.3 Next Message – 2 Position Momentary Toggle Switch
A momentary toggle switch shall be provided as required by the manufacturer of the automated announcement system. Such a switch shall enable the operator to advance the announcement system.

5.8.2.10.4 PA Speaker Switch – 3 Position Maintained Toggle Switch
A maintained toggle switch shall be configured with the listed functions:
- OUTSIDE – outside PA speaker enabled
- BOTH – both the inside and outside PA speakers enabled
- INSIDE – inside PA speakers enabled

5.8.2.10.5 Emergency Alarm Push Button – Momentary DPDT Pushbutton
A pushbutton Allen-Bradley Part No. 800MR-A2 Series A (www.ab.rockwellautomation.com) or submitted deviation shall be installed to the left of the operator’s seat, the final location to be approved by PDRTA. The pushbutton shall be connected per the cable requirements for Electronic and Data Communication Systems. The cables shall be installed and be continuous from switch to load with no plugs, splices, disconnects, fuses or other interruptions of any kind. The listed functions shall be connected to the pushbutton:
- One set of normally closed contacts shall be connected to the video surveillance system “Tag Alarm” per the system manufacturer’s requirements.
- One set of normally closed contacts shall be run to the six-inch Electronic Equipment Enclosure.
- One set of normally open contacts shall be connected to the destination sign “Call Police” alarm circuit per the system manufacturer’s requirements.
One set of normally open contacts shall be run to the six-inch Electronic Equipment Enclosure.

5.8.2.11 FIRE SAFETY

5.8.2.11.1 Fire Suppression System Annunciator – as required by the Fire Suppression System Manufacturer
An annunciator for the suppression system shall be installed as required by the Operator’s Hand Control Diagram.

5.8.2.11.2 Fire Suppression System Manual Activation Push Button Station
A manual push button to activate the fire suppression system shall be installed as required by the Operator’s Hand Control Diagram. The push button assembly shall be of the same manufacture as the fire suppression system.

5.8.2.12 OTHER CONTROLS

5.8.2.12.1 Windshield Wiper/Washer Control
A control shall be provided to vary the speed of the required windshield wipers. The windshield washer control may be integrated into the windshield wiper speed, preferably with a push or pull motion.

5.8.2.12.1 Exterior Curbside Mirror Remote Control
A control shall be provided to adjust each mirror surface on the exterior curbside mirror.

5.8.2.12.3 Mirror Heat Switch – 2 Position Momentary Toggle Switch
A momentary toggle switch shall be provided to activate the exterior mirror heaters. The heaters shall automatically deactivate after 90 seconds.

5.8.2.12.4 Destination Sign Controller – as required by the Destination Sign System Manufacturer
An Operator’s Control Unit (OCU) for the destination sign system shall be installed as required by the Operator’s Hand Control Diagram.

5.8.3 STEERING

5.8.3.1 STEERING WHEEL
The steering wheel diameter shall be no less than 18 inches and no more than 20 inches; the rim diameter shall be 7/8" to 1-1/4" and shaped for firm grip with comfort for long periods of time. The steering wheel shall be removable with a standard or universal puller. It shall be provided with puller holes in the hub. Steering wheel spokes and wheel thickness should be such as to insure that visibility is within the range as described in SAE 1050.

5.8.3.2 TURNING EFFORT
With the bus on dry, level, commercial asphalt pavement, and tires inflated to recommended pressure and the front wheels positioned straight ahead, the torque required to turn the steering wheel 10 degrees shall be no less than 5 foot pounds and no more than 10 foot pounds. Steering torque may increase to 70 foot pounds when the wheels are approaching
the steering stops, as the relief valve activates. Steering effort shall be measured with the bus at GVWR, stopped with the brakes released and the engine at normal idling speed on clean, dry, level, commercial asphalt pavement and the tires inflated to recommended pressure. Power steering failure shall not result in loss of steering control. With the bus in operation the steering effort shall not exceed 55 pounds at the steering wheel rim and perceived free play in the steering system shall not materially increase as a result of power assist failure. Gearing shall require no more than seven turns of the steering wheel lock-to-lock. Caster angle shall be selected to provide a tendency for the return of the front wheels to the straight position with minimal assistance from the operator.

5.8.3.3 TILT ADJUSTMENT
Placement of steering column must be as far forward as possible, but either in-line or behind the instrument cluster. The steering wheel shall have a rearward tilt adjustment range of no less than 40 degrees as measured from the horizontal and upright position.

5.8.3.4 TELESCOPIC ADJUSTMENT
The steering wheel shall adjust to maximum height of 35 inches and a minimum low-end adjustment of 29 inches. This measurement shall be taken from the top of the rim of the steering wheel in the horizontal position to the cab floor at the heel point. The following chart is acknowledged as the standard for measurements of thigh clearance, resting elbow height, the slope of the steering wheel, and the height of the wheel, and the relationship of one to another, to assist in determining the appropriate telescopic range. (Based on Drillis and Contini, 1966)

<table>
<thead>
<tr>
<th>Thigh Clearance</th>
<th>Resting Elbow Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Percentile Female</td>
<td>19.1&quot;</td>
</tr>
<tr>
<td>95 Percentile Male</td>
<td>25.6&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Steering Wheel Height (Measured from Bottom Portion Closest to Operator)</th>
<th>Relative to Angle of Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>At Minimum Telescopic Height Adjustment (29&quot;)</td>
<td>At Maximum Telescopic Height Adjustment (5&quot;)</td>
</tr>
<tr>
<td>Angle of Slope</td>
<td>Height</td>
</tr>
<tr>
<td>0 degrees</td>
<td>29&quot;</td>
</tr>
<tr>
<td>15 degrees</td>
<td>26.2&quot;</td>
</tr>
<tr>
<td>25 degrees</td>
<td>24.6&quot;</td>
</tr>
<tr>
<td>35 degrees</td>
<td>22.5&quot;</td>
</tr>
</tbody>
</table>

5.8.4 INSTRUMENTATION

5.8.4.1 GENERAL REQUIREMENTS
The speedometer, air pressure gauge(s), and certain indicator lights shall be located in Area 1 Instrument Panel immediately ahead of the steering wheel. The steering wheel spokes or rim shall not obstruct the operator’s vision of the instruments when the steering wheel is in the straight-ahead position. Illumination of the instruments shall be simultaneous with the marker lamps. Glare or reflection from the windscreen, side window, or front door windows from the
instruments, indicators, or other controls shall be minimized. Instruments shall be easily readable in direct sunlight or shielded in such a manner that sunlight does not adversely affect legibility. Instrument covers shall be non-reflective, without electrostatic qualities that attract and hold dust, and shall be resistant to scratching or hazing as a result of cleaning. Text shall be a minimum of 11 points. Extremely condensed or italic type fonts shall not be used. The color of the display field shall be dark with contrasting typography. The instrument panel and wiring shall be easily accessible for service from the operator's seat or top of the panel. The diagnostic panel shall be separately removable and replaceable without damaging the instrument panel or gauges.

5.8.4.2 SPEEDOMETER
An electronic speedometer indicating no more than 80 mph and calibrated in maximum increments of 5 mph shall be provided. The speedometer shall be a rotating pointer type, with a dial deflection of 220 to 270 degrees and 40 mph near the top of the dial. The speedometer shall be sized and accurate in accordance with SAE Recommended Practice J678. The speedometer shall include an odometer with a capacity reading no less than 999,999 miles.

5.8.4.3 AIR PRESSURE GAUGE
An air brake reservoir pressure gauge with indicators for primary and secondary air tanks shall be provided.

5.8.4.4 VOLTMETER
A voltmeter(s) to indicate operating voltage(s) shall be provided.

5.8.4.5 FUEL GAUGE
A fuel gauge shall be provided.

5.8.4.6 COOLANT TEMPERATURE GAUGE
A gauge indicating the coolant temperature shall be provided.

5.8.4.7 OIL PRESSURE
A gauge to indicate the engine oil pressure shall be provided.

5.8.5 VISUAL AND AUDIBLE INDICATIONS AND ALARMS

5.8.5.1 GENERAL REQUIREMENTS
The bus shall be equipped with visual and audible alarms linked to an on-board diagnostic system that will indicate normal operating conditions and conditions that require immediate action by the operator to avoid an unsafe condition or prevent further damage to the bus. An indicator panel or annunciator shall be located in Area 1 of the Instrument Panel. The intensity of visual indicators shall permit easy determination of on/off status in bright sunlight or shielded in such a manner that sunlight does not adversely affect legibility. Indicator illumination shall not cause a visibility problem at night. A lamp test button shall be provided to momentarily activate all visual indicators. Each audible alarm shall be tamper resistant and shall have an outlet level between 80 and 83 dba when measured at the location of the

159
operator’s ear. The sound type emitted by each audible alarm shall be approved by PDRTA. Whenever possible, sensors shall be of the closed circuit type, so that failure of the circuit and/or sensor shall activate the corresponding indicator. Displays visible to the operator should be limited to indicating the status of those functions described herein that are necessary for the safe operation and protection of the bus.

### 5.8.5.2 INDICATION AND ALARM SCHEDULE

<table>
<thead>
<tr>
<th>Name</th>
<th>Color</th>
<th>Audible</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS</td>
<td>Yellow</td>
<td>None</td>
<td>ABS System Malfunction</td>
</tr>
<tr>
<td>ATC</td>
<td>Yellow</td>
<td>None</td>
<td>ATC System Malfunction</td>
</tr>
<tr>
<td>Brakes</td>
<td>Yellow</td>
<td>None</td>
<td>Brakes Applied</td>
</tr>
<tr>
<td>Low Air</td>
<td>Red</td>
<td>Buzzer 1</td>
<td>Insufficient air pressure in any reservoir</td>
</tr>
<tr>
<td>Parking Brake</td>
<td>Red</td>
<td>None</td>
<td>Parking brake is activated</td>
</tr>
<tr>
<td>Door Interlock Bypass</td>
<td>Red</td>
<td>Buzzer 1</td>
<td>Door Interlocks Bypassed, Beeper only when parking brake is released</td>
</tr>
<tr>
<td>Rear Door</td>
<td>Red</td>
<td>None</td>
<td>Rear passenger door is not closed and locked</td>
</tr>
<tr>
<td>Check 12 Volt System</td>
<td>Red</td>
<td>None</td>
<td>Malfunction with 12 Volt Electrical System</td>
</tr>
<tr>
<td>High Beam</td>
<td>Blue</td>
<td>None</td>
<td>Headlamp high beams activated</td>
</tr>
<tr>
<td>High Voltage - 24 Volt</td>
<td>Red</td>
<td>None</td>
<td>High Voltage on 24 Volt System</td>
</tr>
<tr>
<td>Low Voltage - 24 Volt</td>
<td>Red</td>
<td>None</td>
<td>Low Voltage on 24 Volt System</td>
</tr>
<tr>
<td>No Charge</td>
<td>Red</td>
<td>None</td>
<td>Loss of alternator output</td>
</tr>
<tr>
<td>Check Engine</td>
<td>Yellow</td>
<td>None</td>
<td>Engine Electronic Control Unit detects a malfunction</td>
</tr>
<tr>
<td>Coolant Temp</td>
<td>Red</td>
<td>Buzzer</td>
<td>High engine coolant temperature</td>
</tr>
<tr>
<td>Fast Idle</td>
<td>Yellow</td>
<td>None</td>
<td>Fast Idle Activated</td>
</tr>
<tr>
<td>Low Coolant</td>
<td>Red</td>
<td>Buzzer</td>
<td>Insufficient engine coolant level</td>
</tr>
<tr>
<td>Low Hydraulic Fluid</td>
<td>Red</td>
<td>Buzzer 1</td>
<td>Low Hydraulic Fluid</td>
</tr>
<tr>
<td>Low Oil</td>
<td>Red</td>
<td>Buzzer</td>
<td>Insufficient engine oil pressure or high engine oil temperature</td>
</tr>
<tr>
<td>Rear Engine Control</td>
<td>Red</td>
<td>None</td>
<td>Rear Engine Control Enabled</td>
</tr>
<tr>
<td>Stop Engine</td>
<td>Red</td>
<td>Buzzer</td>
<td>Engine Shutdown Enabled</td>
</tr>
<tr>
<td>Wait to Start</td>
<td>Red</td>
<td>None</td>
<td>Enable starter interlocks not complete</td>
</tr>
<tr>
<td>A/C Stop</td>
<td>Yellow</td>
<td>None</td>
<td>A/C Compressor stopped, due to high/low pressure</td>
</tr>
<tr>
<td>Auxiliary Heater</td>
<td>Yellow</td>
<td>None</td>
<td>Auxiliary Heater Activated</td>
</tr>
<tr>
<td>Door Heater</td>
<td>Yellow</td>
<td>None</td>
<td>Door Heater Activated</td>
</tr>
<tr>
<td>Heated Mirror</td>
<td>Yellow</td>
<td>None</td>
<td>Mirror Heat Activated</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>Click</td>
<td>Left turn signal activated</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>Click</td>
<td>Right turn signal activated</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>Click</td>
<td>Hazard Flasher activated</td>
</tr>
<tr>
<td>Bike Rack Deployed</td>
<td>Red</td>
<td>None</td>
<td>Bike Rack in Lowered Position</td>
</tr>
<tr>
<td>Kneel</td>
<td>Yellow</td>
<td>Buzzer 2</td>
<td>Kneeling system activated or deployed, Beeper only when in motion</td>
</tr>
<tr>
<td>Stop Request</td>
<td>Yellow</td>
<td>Chime 1</td>
<td>Passenger stop request has been activated,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Latched until a door is opened and closed</td>
</tr>
<tr>
<td>Wheelchair Ramp</td>
<td>Yellow</td>
<td>Buzzer 2</td>
<td>Wheelchair ramp is not stowed and disabled, Beeper only when in motion</td>
</tr>
<tr>
<td>Wheelchair Request</td>
<td>Yellow</td>
<td>Chime 2</td>
<td>Passenger wheelchair stop request has been activated,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Latched until a door is opened and closed</td>
</tr>
<tr>
<td>Fire</td>
<td>Red</td>
<td>Bell</td>
<td>High temperature condition in engine compartment</td>
</tr>
<tr>
<td>Seat Belt</td>
<td>Red</td>
<td>Buzzer 1</td>
<td>Seatbelt not latched when parking brake is released</td>
</tr>
<tr>
<td>Speed Switch</td>
<td>Green</td>
<td>None</td>
<td>Bus Speed &lt;2 mph</td>
</tr>
<tr>
<td>Check Transmission</td>
<td>Red</td>
<td>None</td>
<td>Transmission Electronic Control Unit detects a malfunction</td>
</tr>
<tr>
<td>Low Transmission Fluid</td>
<td>Red</td>
<td>Buzzer</td>
<td>Low Fluid in the Transmission</td>
</tr>
<tr>
<td>Retarder Applied</td>
<td>Yellow</td>
<td>None</td>
<td>Retarder Applied</td>
</tr>
<tr>
<td>Retarder Disabled</td>
<td>Yellow</td>
<td>None</td>
<td>Retarder Disabled</td>
</tr>
<tr>
<td>Transmission Temp</td>
<td>Red</td>
<td>Buzzer</td>
<td>High Temperature in the Transmission</td>
</tr>
</tbody>
</table>
5.8.6 OPERATOR FOOT CONTROLS

5.8.6.1 GENERAL REQUIREMENTS
Accelerator and brake pedals shall be designed for ankle motion and configured in accordance with SAE J1516, “Accommodation Tool Reference Point”. Foot surfaces of the pedals shall be faced with wear-resistant, nonskid, replaceable material.

5.8.6.1.1 Relative Position between Accelerator Pedal and Brake Pedal
The accelerator and brake pedals shall be positioned such that the spacing between them, measured at the heel of the pedals, is between 1 and 2 inches.

5.8.6.1.2 Accelerator and Brake Pedal Location and Lateral Angle
The location of the brake and accelerator pedals shall be determined by the bus manufacturer, based on space needs, visibility, lower edge of windshield, and vertical H-point. The brake pedal shall have a 0-degree lateral angle, and the accelerator shall have a maximum 13-degree lateral angle to coincide with the position of the operator's leg as it moves outward to operate the accelerator pedal.

5.8.6.2 ACCELERATOR PEDAL

5.8.6.2.1 General Requirements
The accelerator pedal assembly shall be manufactured by Williams, or submitted deviation, with an angle of 27-35 degrees at the point of initiation of contact, and extend downward to an angle of 10-18 degrees at full throttle. The angle of the accelerator pedal shall be determined from a horizontal plane regardless of the slope of the cab floor. The throttle pedal shall be mounted so that it is equal to or higher than brake pedal.

5.8.6.2.2 Accelerator Pedal Dimensions
The floor mounted accelerator pedal shall be 10 - 12 inches long and 3- 4 inches wide.

5.8.6.2.3 Accelerator Pedal Force
The force to depress the accelerator pedal shall be measured at the midpoint of the accelerator. The accelerator force shall be no less than 5 pounds and no more than 12 pounds.

5.8.6.3 BRAKE PEDAL

5.8.6.3.1 General Requirements
The brake pedal assembly shall be manufactured by Bendix (www.bendix.com) or submitted deviation. The angle of the brake pedal shall be determined from a horizontal plane regardless of the slope of the cab floor. The brake pedal shall be positioned at an angle of
27-45 degrees at the point of initiation of contact, and extend downward to an angle of 20-28 degrees at full depression.

5.8.6.3.2 Brake Pedal Dimensions
The floor mounted brake pedal shall be 10 - 12 inches long and 3 - 4 inches wide.

5.8.6.3.3 Brake Pedal Force
The force necessary to activate the brake pedal control shall be an essentially linear function of the bus deceleration rate and shall be no less than 10 pounds and not exceed 50 pounds at a point 7 inches above the heel point of the pedal to achieve maximum braking. The heel point is the location of the operator’s heel when foot is rested flat on the pedal and the heel is touching the floor or heel pad of the pedal.

5.8.6.4 OPERATOR FOOT SWITCHES

5.8.6.4.1 Turn Signal Platform
The angle of the turn signal platform shall be determined from a horizontal plane, regardless of the slope of the cab floor. The turn signal platform shall be angled at a minimum of 10 degrees and a maximum of 28 degrees. It shall be located no closer to the seat-front than the heel point of the accelerator pedal to the left of the steering column.

5.8.6.4.2 Turn Signal Controls
Turn signal controls shall be floor-mounted, foot-controlled, waterproof, heavy-duty, momentary contact switches.

5.8.6.4.3 High Beam and PA Controls
A high beam and a PA control switch shall be floor mounted with the same requirements as the Turn Signal controls.
5.8.7 OPERATOR’S SEAT

5.8.7.1 GENERAL REQUIREMENTS
The operator's seat shall be USSC 9100ALX3 (p/n 9110-10000Z-107) (http://www.usscgroup.com) or submitted deviation, so that persons ranging in size from the 95th-percentile male to the 5th-percentile female may operate the bus. While seated, the operator shall be able to make seat adjustments by hand without complexity, excessive effort, or being pinched. Adjustment mechanisms shall hold the adjustments and shall not be subject to inadvertent changes. Graphical symbols shall conform to SAE Recommended Practice (Proposed) J1458, Universal Symbols for Seat and Suspension Adjustments.
5.8.7.2 SPECIFIC REQUIREMENTS

5.8.7.2.1 Seat Pan Cushion Length
Measurement shall be from the front edge of the seat pan to the rear at its intersection with the seat back. The adjustment of the seat pan length shall be no more than 16.5 inches at its minimum length and no less than 20.5 inches at its maximum length.

5.8.7.2.2 Seat Pan Cushion Height
Measurement shall be from the cab floor to the top of the level seat at its center midpoint. The seat shall adjust in height from a minimum of 14 inches to a maximum of 20 inches, with a minimum of a 6 inches range of adjustment.

5.8.7.2.3 Seat Pan Cushion Slope
Measurement is the slope of the plane created by connecting the two high points of the seat, one at the rear of the seat at its intersection with the seat back and the other at the front of the seat just before it waterfalls downward at the edge. The slope can be measured using an inclinometer and shall be stated in degrees of incline relative to the horizontal plane (0 degrees). The seat pan shall adjust in its slope from no less than plus 5 degrees (rearward “bucket seat” incline), to no less than minus 10 degrees (forward slope). The seat may be mounted an angled riser, if necessary, to meet the negative rake adjustment.

5.8.7.2.4 Seat Base Fore/Aft Adjustment
Measurement is the horizontal distance from the heel-point to the front edge of the seat. The minimum and maximum distances shall be measured from the front edge of the seat when it is adjusted to its minimum seat pan depth (approximately 15 inches). The seat-base shall travel horizontally a minimum of 9 inches. It shall adjust no closer to the heel-point than 6 inches. Double locking seat tracks with stainless steel bearings are required. The seat shall utilize a manual track release.

5.8.7.2.5 Seat Pan Cushion Width
Measurement is the horizontal distance across the seat cushion. The seat pan cushion shall be 17-21 inches across at the front edge of the seat cushion and 20-23 inches across at the side bolsters.

5.8.7.2.6 Seat Pan Suspension
The operator’s seat shall be appropriately dampened to support a minimum weight of 380 pounds. The suspension shall be capable of dampening adjustment.

5.8.7.2.7 Operator Area Depth
The measurement is the horizontal distance from the heel-point to the barrier at the height at which the top of the seat back reclines. The operator area depth shall be a minimum of 45 inches and be able to accommodate the full range of seat adjustment and travel.
5.8.7.2.8 Seat Back Width
Measurement is the distance between the outer-most points of the front of the seat back, at or near its midpoint in height. The seat back width shall be no less than 19 inches.

5.8.7.2.9 Seat Back Lumbar Support
Measurement is from the bottom of the seat back at its intersection with the seat pan, to the top of the lumbar cushioning. The seat back shall provide adjustable depth lumbar back support in at least two locations, within a minimum range of 7 to 11 inches.

5.8.7.2.10 Seat Back Angle Adjustment
The seat back angle shall be measured relative to a level seat pan, whereas 90 degrees is the upright position and 90 degrees-plus represents the amount of recline. The angle can be measured using a protractor (or its equivalent) with the X-axis being the horizontal plane of a level seat pan, and the Y-axis the upright plane of the seat back. The angle is created by the intersection of the two planes, with the upright plane parallel to the frame of the seat back. The seat back shall adjust in angle from a minimum of no more than 90 degrees (upright) to at least 105 degrees (reclined), with infinite adjustment in between.

5.8.7.2.11 Seat Belt
Seat belts shall be provided across the operator’s lap and diagonally across the operator’s chest. The operator shall be able to use both belts by connecting a single buckle on the right side of the seat cushion. The belts shall be fastened to the seat so that the operator may adjust the seat without resetting the seat belt. Seat belts shall be stored in automatic retractors.

5.8.7.2.12 Seat Controls
The suspension control will be ergonomically designed so that the operator can adjust the seat without looking. The seat suspension height adjustment and lumbar switches shall be operated with rocker switches.

5.8.7.2.13 Seat Suspension
The seat suspension shall be capable of dampening varying frequencies that are transmitted through the bus caused by varying road conditions. The seat shall be cushioned by a dual shock absorbers design. One shock shall be adjustable to allow the operator to control the ride settings. A rubber bumper is required to prevent bottoming out.

5.8.7.2.14 Headrest
A four way adjustable headrest with six position vertical adjustment shall be provided.

5.8.7.2.15 Materials and Durability
The operator’s seat shall be contoured to provide maximum comfort for extended period of time. Cushions shall be fully padded with at least 3 inches of closed-cell polyurethane foam or material with equal properties, in the seating areas at the bottom and back. Upholstery shall be ventilated, transportation grade material. All visually exposed metal on the operator’s seat, including the pedestal, shall be unpainted
aluminum or stainless steel. The seat and seatbelt assemblies as installed in the bus shall withstand static horizontal forces as required in FMVSS 207 and 210. The seat shall withstand 10,000 impacts of a 40-pound sandbag dropped from a height of 12 inches without visible deterioration. The seat shall be tested in the lowest vertical position and repeated with the seat in the top vertical position. The 40-pound sandbag shall be suspended on a 36-inch pendulum and shall strike the seat back 10,000 times from distances of 6, 8, 10, and 12 inches. Seat cushion shall withstand 100,000 randomly positioned 3-1/2-inch drops of a squirming, 150-pound, smooth-surfaced, buttocks-shape striker with only minimal wear on the seat covering. At the request of PDRTA, the Bus Manufacturer shall provide a certified test report fully documenting compliance with all the requirements defined above. The test report shall contain a record of all testing activities, test diagrams, testing equipment, as well as test data related to loads, deflections and permanent deformation of the seat assembly.

5.8.8 MIRRORS

5.8.8.1 EXTERIOR MIRRORS

5.8.8.1.1 General Requirements
The bus shall be equipped with an outside rearview mirror as manufactured by Hadley, (www.hadley-products.com) or submitted deviation, on each side of the bus. Mirrors shall permit the operator to view the roadway along both sides of the bus, including the rear wheels. Each mirror shall have flat mirror with a minimum of 50 sq. in. of surface area and a convex mirror with a minimum of 30 sq. in. of surface area. The mirror head shall have an overall approximate dimension of 7 inches wide and 15 inches high. The glass shall be easily replaceable and be secured by a non-metallic lock ring. All arms, housings and hardware utilized for the exterior mirrors shall be stainless steel. All exterior mirrors shall be electrically heated. The heaters shall be energized whenever the operator’s heater and/or defroster is activated. Each mirror shall be mounted on a retractable arm. Mirrors shall retract or fold sufficiently to allow bus-washing operations.

5.8.8.1.2 Roadside Mirror Location #RS-7-U910HRF-5X7MC or submitted deviation.
The roadside mirror shall be mounted on the street-side front corner post just above lower edge of operator’s roadside window.

5.8.8.1.3 Curbside Mirror Location #CS-15-D1011HRF-5X7MC or submitted deviation.
The curbside rearview mirror shall be mounted on the curbside front corner post so that its lower edge is no less than 80 inches above the street surface.

5.8.8.1.4 Remote Curbside Mirror
The operator shall be able to remotely adjust each mirror surface in the curbside mirror while seated in the driving position. The control for remote positioning of the mirror shall be a single switch or device.

5.8.8.1.5 Mirror Attachment
Each mirror shall be attached to a replaceable load bearing stainless steel plate. The load bearing plate shall be attached to the bus with a minimum of four 3/8" bolts and at
least two fasteners with a minimum spacing of 10 inches. Mirrors shall be firmly attached to the bus to minimize vibration and prevent loss of adjustment, but not so firmly attached that the bus or its structure is damaged when the mirror is struck in an accident.

5.8.8.2 INTERIOR MIRRORS

5.8.8.2.1 General Requirements
Mirrors shall be provided for the operator to observe passengers throughout the bus without leaving his seat and without shoulder movement. The operator shall be able to observe passengers in the front/entrance and rear/exit areas, anywhere in the aisle, and in the rear seats. Each mirror shall have a non-reflective black rim and steel mounting bracket. Each mirror shall be mounted to allow for adjustment but to eliminate, to the maximum practical extent, mirror vibration.

5.8.8.2.2 Aisle Rearview Mirror
An 8x16 inch mirror shall be mounted on the windshield header panel above and in front of the operator to view the main aisle.

5.8.8.2.4 Roadside Seats Rearview Mirror
A 6-inch round mirror shall be mounted to the right of the aisle rearview mirror to view the seating roadside seating area behind the operator.

5.8.8.2.4 Rear Door Mirror
A 12-inch diameter convex mirror shall be mounted above and behind the rear exit door to view the rear door area.

5.8.8.2.5 Bicycle Rack Mirror
A 4-inch convex mirror shall be mounted to the right of the roadside seats rearview mirror to view the area immediately in front of the bus.

5.8.9 OTHER REQUIREMENTS

5.8.9.1 ROLLER CURTAINS
An adjustable roller type roller curtain, manufactured by Silent Gliss (www.silentgliss.com) or submitted deviation, shall be provided over the operator’s windshield and the operator’s side window. The roller curtain shall be capable of being lowered to the midpoint of the operator’s window and be infinitely adjustable. When deployed, the screen shall be secure, stable and shall not rattle, sway or intrude into the operator’s field of view due to the motion of the bus or as a result of air movement. Once lowered, the screen shall remain in the lowered position until returned to the stowed position by the operator. A pull string shall be provided on each roller curtain that enables the roller curtain to be adjusted and automatically retract. The roller curtain color shall be gray or black. The lower half of the roller curtain shall be opaque and the upper half shall be screen.

5.8.9.2 OPERATOR STORAGE BOX
An enclosed Operator storage area shall be provided with a positive latching door and lock; minimum approximate size: 355 mm x 355 mm x 355 mm (14” x 14” x 14”)

5.8.9.3 OPERATOR’S COAT HANGER
A suitable hanger shall be installed in a location approved by PDRTA.

5.8.9.4 FIRE EXTINGUISHER
A five-pound dry chemical fire extinguisher shall be installed in each bus. The location shall be approved by PDRTA.

5.8.9.5 ROAD HAZARD EQUIPMENT
A road hazard kit shall be installed in each bus. The location shall be approved by PDRTA.

5.8.9.6 REGISTRATION HOLDER
A registration holder shall be installed in each bus adjacent to the bus nameplate. Such a holder shall securely hold the registration document and require the use of a tool such as a screwdriver to remove the document from the holder.

5.8.9.7 EQUIPMENT STORAGE
An enclosure of a size suitable to provide storage for the fire extinguisher, road hazard equipment, and wheelchair restraint cutter, shall be installed on the curbside front wheel well. The enclosure shall contain a polycarbonate window so that the required safety equipment, including the fire extinguisher pressure gauge, can be observed without opening the enclosure. The enclosure shall not obstruct the window behind the front door. A latch that can be operated with one finger shall be used to secure the enclosure cover. A suitable decal listing the contents of the enclosure shall be attached to the enclosure. PDRTA shall approve the decal and the decal location.

5.9 HEATING VENTILATING AND AIR CONDITIONING

5.9.1 BUS HVAC SYSTEM

5.9.1.1 GENERAL REQUIREMENTS
The Heating, Ventilation and Air Conditioning (HVAC) climate control system shall be manufactured by Thermo King “T” Series (www.thermoking.com) or submitted deviation and be capable of maintaining the interior of the bus at the temperature and humidity levels and to provide practical maximum comfort to passengers and the operator. Heating and ventilating system shall utilize no outside air.

5.9.1.2 OPERATING AND PERFORMANCE CRITERIA
With the bus running at the design operating profile with corresponding door opening cycle, and carrying a number of passengers equal to 140 percent of the seated load, the HVAC system shall maintain an average passenger compartment temperature within a range between 65°F and 80°F, while controlling the relative humidity to a value of 50 percent or less. The system shall maintain these conditions while subjected to any
outside ambient temperatures within a range of 0° to 105° F and at any ambient relative humidity levels between 5 and 50 percent. When the bus is operated in outside ambient temperatures of 95° to 115°F, the interior temperature of the bus shall be permitted to rise one degree for each degree of exterior temperature in excess of 105°F. When bus is operated in outside ambient temperatures in the range of -10° to +10°F, the interior temperature of the bus shall not fall below 55°F while bus is running on the Design Operating Profile. The heating air outlet temperature shall not exceed 120°F under any normal operating conditions.

5.9.1.2.1 Temperature Distribution
Interior temperature distribution shall be uniform to the extent practicable to prevent hot and/or cold spots. After stabilization with doors closed, the temperatures between any two points in the passenger compartment in the same vertical plane, and 6 inches to 72 inches above the floor, shall not vary by more than 5°F with doors closed. The interior temperatures, measured at the same height above the floor, shall not vary more than ±5°F, from the front to the rear, from the average temperature determined in accordance to APTA Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System. Variations of greater than ±5°F will be allowed for limited, localized areas provided the majority of the measured temperatures fall within the specified requirement.

5.9.1.2.2 Air Flow
The cooling mode of the interior climate control system shall introduce air into the bus at or near the ceiling height at a minimum rate of 25 cubic feet per minute (cfm) per passenger based on the standard configuration bus carrying a number of passengers equal to 140 percent of the seated load. Airflow shall be evenly distributed throughout the bus with air velocity not exceeding 100 feet per minute on any passenger. The ventilating mode shall provide air at a minimum flow rate of 20 cfm per passenger. Airflow may be reduced to 15 cfm per passenger (140 percent of seated load) when operating in the heating mode.

5.9.1.2.3 Testing Procedure
System capacity testing, including pull down/warm-up, stabilization and profile, shall be conducted in accordance to the APTA Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System. Temperature measurements shall be made in accordance to this document with the following modifications:

The three primary locations used for temperature probes are (1) 6 inches aft of front wheel housing, (2) centered between the two axles and (3) 6 inches aft of rear wheel housing. At each primary location, the nine (9) temperature sensing devices shall be (A) 72 inches above floor level, (B) 6 inches above top surface of seat cushion and (C) 6 inches above floor.

The recommended locations of temperature probes are only guidelines and may require slight modifications to address actual bus design. Care must be taken to avoid
placement of sensing devices in immediate path of air duct outlet. In general, the locations are intended to accurately represent the interior passenger area.

5.9.1.3 SYSTEM CONTROL
The HVAC system shall be controlled by Thermo King Intelligaire III or submitted deviation and be an electronic/diagnostic control system with provisions for extracting/reading data. Manual selection of a climate control system operation mode shall result in the automatic attainment of a specified temperature with a tolerance of ±2°F. The interior climate control system shall switch automatically to the ventilating mode in the event of a refrigeration system failure. The fans shall not activate until the heating element has warmed sufficiently to assure at least 70°F air outlet temperature.

5.9.1.4 EQUIPMENT LOCATION AND ACCESSIBILITY
The HVAC unit shall be rear-mounted above the engine compartment. On rear-mounted HVAC units accessibility and serviceability of components shall be provided without requiring maintenance personnel to require access to the roof of the bus. The condenser shall be located to efficiently transfer heat to the atmosphere, and shall not ingest air warmed above the ambient temperature by the bus mechanical equipment, or to discharge air into any other system of the bus. PDRTA will consider a roof-mounted HVAC unit as a deviation.

5.9.1.5 REFRIGERATION EQUIPMENT
5.9.1.5.1 Refrigerant
The system shall utilize R134a refrigerant

5.9.1.5.2 Compressor (Option)
The system shall utilize a Thermo King X426 or submitted deviation, engine powered, belt driven compressor. A screw type compressor, a Thermo King S391 or submitted deviation, shall be provided as an option.

5.9.1.5.3 Refrigerant Lines and Valves
Suction and discharge flexible lines shall be provided to connect the air conditioning unit to the compressor. The hoses shall have reusable swivel fittings, Teflon liner, stainless steel interior support coil, stainless steel exterior braid, and an exterior sleeve for abrasion protection. The length of such hoses shall be kept to a minimum. Manual shutoff valves in the refrigerant lines shall allow isolation of the compressor and dehydrator filter for service.

5.9.1.5.4 Receiver Tank, Moisture Indicator, Filter/Dehydrator
The unit shall be equipped with a refrigerant receiver tank installed vertically to ensure a steady liquid feed to the expansion valve. The receiver tank shall meet all ASTM requirements and have two (2) sight glasses for checking refrigerant level. The top sight glass shall have a floating plastic ball to indicate proper refrigerant level. A refrigerant dry eye shall be provided in the liquid line, or in the lower sight glass of the receiver tank, to indicate the presence of moisture in the refrigerant system. The unit shall have a disposable liquid line filter/dehydrator.
5.9.1.5.5 Condenser/Evaporator Drains
Separate drains shall be provided for the condenser and evaporator/heater sections to allow moisture to be routed out of the unit to the street. Drain seals and/or traps shall be installed at the outlet of the evaporator/heater drain tubes to prevent entrance of dirt or fumes into the bus.

5.9.1.6 AIR FILTRATION
Air shall be filtered before discharge into the passenger compartment. The filter shall meet the ANSI/ASHRAE 52.1 requirement for 5 percent or better atmospheric dust spot efficiency, 50 percent weight arrestance, and a minimum dust holding capacity of 120 gram per 1,000 cfm cell. More efficient air filtration may be provided to maintain efficient heater and/or evaporator operation. Air filters shall be easily removable for service. Air filters shall be of disposable type.

5.9.2 OPERATOR’S AREA HVAC EQUIPMENT

5.9.2.1 GENERAL REQUIREMENTS
A combined defroster and heating system and a separate ventilation system for the operator’s area shall be provided and controlled by the operator.

5.9.2.2 DEFROSTER REQUIREMENTS
The windshield defroster system shall meet the requirements of SAE Recommended Practice J382, Windshield Defrosting Systems Performance Requirements. Forced and when necessary, heated air shall be supplied by a separate heating unit, Red Dot or submitted deviation. The defroster-heating/blower unit shall utilize a 3-speed brushless motor. The defroster heating/blower unit shall be sized and configured to provide sufficient forced and when necessary, heated air to the operator’s area. The defroster supply outlets shall be located at the lower edge of the windshield. The outlets shall be such that foreign objects such as coins or tickets cannot fall into the defroster air outlets. Adjustable vents shall be provided at the left of the operator's position to permit airflow onto the side windows. Vents shall be provided adjacent to the front door to permit airflow onto the front door windows.

5.9.2.3 HEATER REQUIREMENTS
Forced and when necessary, heated air shall be supplied to the operator’s area per the design operating profile and corresponding door opening cycle at a minimum of 100cfm. The air shall be supplied by the defroster system and directed at the operator’s feet.

5.9.2.4 VENTILATION REQUIREMENTS
A 3-speed ventilation/blower unit utilizing a brushless motor shall be provided to move conditioned air from the Bus HVAC system to the operator’s area. The outlets shall be adjustable, located in front of the operator and face rearward.
5.10 ELECTRONIC AND DATA COMMUNICATION SYSTEMS

5.10.1 DESIGN

5.10.1.1 DATA COMMUNICATION REQUIREMENTS

All data communication networks shall be either in accordance with a nationally recognized interface standard such as those published by SAE, IEEE, or ISO, or shall be published to PDRTA with the following minimum information:

- Protocol requirements for all timing issues (bit, byte, packet, inter-packet timing, idle line timing, etc.) packet sizes, error checking, and transport (bulk transfer of data to/from the device)
- Data definition requirements that ensure access to diagnostic information and performance characteristics
- The capability and procedures for uploading new application or configuration data
- Access to revision levels of data, application software and firmware
- The capability and procedures for uploading new firmware or application software
- Any electronic bus components used on a network shall be conformance tested to the corresponding network standard.

5.10.1.2 COMPONENT REQUIREMENTS

All electronic components shall be self-protecting in the event of short circuits in the cabling, and also in over-voltage and reverse polarity conditions. If an electronic component is required to interface with other components, it shall not require external components. If an electronic component has an internal clock, it shall provide its own battery backup to monitor time when battery power is disconnected. Any networked component that maintains its own time shall allow that time to be updated via the network.

5.10.1.3 CABLE/WIRING REQUIREMENTS

5.10.1.3.1 General Requirements

The cable and wiring used for each system shall meet or exceed the requirements for Electrical Wiring Requirements. Cable connectors shall be installed or cable assemblies manufactured in accordance with the requirements set forth by the connector and/or system manufacturer. The data network cabling shall be selected and installed according to the selected protocol requirements. The physical layer of all network communication systems shall not be used for any other purpose other than communication between the system components, unless provided for in the network specifications. Communications networks that use power line carriers (e.g. data modulated on a 24V-power line) shall meet the most stringent applicable wiring and terminal specifications.

5.10.1.3.2 Cable Length

The cables and wiring that enter the Electronic Equipment Enclosure(s) shall have a minimum length of 72 inches after entering the box. Cables and wiring that terminate at a component mounted in a location other than the Electronic Equipment Enclosure(s)
shall have an additional length of 24 inches or greater to facilitate component replacement.

5.10.1.3.3 Shielding
All wiring that requires shielding shall meet the following minimum requirements. A shield shall be generated by connecting to a ground, which is sourced from a power distribution bus bar or chassis. A shield shall be connected at one location only, typically at one end of the cable. Certain standards or special requirements, such as SAE J1939 or RF applications, have separate shielding techniques that shall also be used as applicable. When using shielded or coaxial cable, upon stripping of the insulation, the metallic braid shall be free from frayed strands, which can penetrate the insulation of the inner wires. To prevent the introduction of noise, the shield shall not be connected to the common side of a logic circuit.

5.10.1.3.4 Radio Frequency (RF)
RF components, such as radios, video devices, cameras, global positioning systems (GPS), etc, shall use coaxial cable to carry the signal. All RF systems require special design consideration for losses along the cable. Connectors shall be minimized, since each connector and crimp has a loss, which will attribute to attenuation of the signal. Cabling should allow for the removal of antennas or attached electronics without removing the installed cable between them. The corresponding component vendors shall be consulted for proper application of equipment including installation of cables.

5.10.1.4 MOUNTING REQUIREMENTS
All electronic components shall be mounted on a panel to facilitate replacement. The mounting of the hardware shall not be used to provide the only source of electrical ground, and all hardware shall be isolated from potential EMI/RFI. All electrical/electronic hardware mounted in the interior of the bus 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/electronic hardware mounted on the exterior of the bus, that is not designed to be installed in an exposed environment, shall be mounted in a sealed enclosure. All electrical/electronic hardware and its mounting shall comply with the shock and vibration requirements of SAE J1455.

5.10.1.5 ENCLOSURE REQUIREMENTS
Each component shall have an enclosure suitable to the application and correspond to the requirements of enclosures for the Electrical System. Additionally, enclosures for components mounted within the bus shall meet the requirements of Interior Trim and components mounted on the exterior of the bus shall meet the requirements for Structure Design and Exterior Requirements. Operator controls shall be mounted in accordance with the requirements of operator hand controls.

5.10.1.6 SYSTEM TESTING REQUIREMENTS
All systems in this section shall be tested for complete function before the bus is delivered.
5.10.2 DRIVETRAIN LEVEL

5.10.2.1 GENERAL REQUIREMENTS
This data level includes systems related to the drivetrain including the engine, transmission, and anti-lock braking system (ABS) and automatic traction control (ATC). It is intended to use an SAE protocol such as J1939, or other open protocols as referenced in this section to manage this data and provide data access as required for maintenance and data sharing purposes.

5.10.2.2 DIAGNOSTICS AND FAULT DETECTION
Drivetrain performance, maintenance and diagnostic data, and other electronic messages shall be formatted and transmitted on the communications networks. The Drivetrain Level shall have the ability to record abnormal events in memory and provide diagnostic codes and other information to service personnel. At a minimum, this network level shall provide live/fail status, current hardware serial number, software/data revisions, and uninterrupted timing functions.

5.10.2.3 DATA ACCESS
Access to Drivetrain data shall be provided through diagnostic device connector ports. A diagnostic connector port shall be located on the engine run box and in the operator’s area. Data transfer from the Drivetrain Level to the Multiplex Level, Information Level, and Central Data Access System shall comply with this section.

5.10.2.4 PROGRAMABILITY AND SOFTWARE
The Engine and Transmission Drivetrain Level components shall be programmable by PDRTA with limitations as specified by the sub-system and bus manufacturer.

5.10.3 MULTIPLEX LEVEL

5.10.3.1 GENERAL REQUIREMENTS
This data level is intended to utilize a multiplexed control system to control devices with input/output signals including discrete, analog, and serial data information. Multiplexing is used to control components not typically found on the Drivetrain or Information Levels such as lights, wheelchair ramps, doors, and heating, ventilation, air conditioning (HVAC) systems. It is intended for the control system to provide data access as required for maintenance and data sharing purposes.

5.10.3.2 DATA ACCESS (OPTION)
At a minimum, information shall be made available via a communication port on the multiplex system. The location of the communication port shall be mounted in the operator’s area. A dedicated and separate wireless communications path specifically for the multiplex system shall be provided as an option. Such a path shall be used for the maintenance and repair of the multiplex system.

5.10.3.3 DIAGNOSTICS AND FAULT PROTECTION
The multiplex system shall have a proven method of determining its status (system health and input/output status) and detecting either active (Online) or inactive (Offline) faults through the use of on-board visual/audible indicators. The multiplex system shall employ an advanced diagnostic and fault detection system, which shall be accessible via either a personal computer (PC) or a hand held unit (PDA). Either unit shall have the ability to check logic function. The diagnostic data shall be incorporated into the Information Level Network and the Central Data Access System.

5.10.3.4 PROGRAMMABILITY AND SOFTWARE
The multiplex system shall have security provisions to protect its software from unwanted changes. This shall be achieved through any or all of the following procedures: password protection, limited distribution of the configuration software, limited access to the programming tools required to change the software, and hardware protection that prevents undesired changes to the software. Provisions for programming the multiplex system shall be possible through a PC/laptop. The multiplex system shall have proper revision control to insure that the hardware and software is identical on each bus equipped with the system. Revision control shall be provided by all of the following: hardware component identification where labels are included on all multiplex hardware to identify components; hardware series identification where all multiplex hardware displays the current hardware serial number and firmware revision employed by the module; and software revision identification where all copies of the software in service displays the most recent revision number, and a method of determining which version of the software is currently in use in the multiplex system.

5.10.3.5 MULTIPLEX SYSTEM

5.10.3.5.1 General Requirements
A programmable multiplexed electrical control system, I/O Controls DINEX G2/T2 (www.iocontrols.com) or G3 Multiplex System or submitted deviation, shall be provided. It is intended to include as many functions as possible in the multiplex system. The system shall utilize a distributed configuration to minimize electrical wiring. The system shall consist of several modules connected to form a control network. This system shall meet the network communications requirements of this section. Components shall be modular and interchangeable with self-diagnostic capabilities. The modules shall be easily accessible for performing troubleshooting and system maintenance. Multiplex input/output modules shall use solid-state devices to provide extended service life and individual circuit protection.

5.10.3.5.2 System Requirements
The system shall be expandable with a minimum communication data rate of 250K baud. The system power source shall be isolated to minimize electrical noise and the maximum system current draw for sleep mode shall be 3 ma. The components of the system shall be of modular design thereby providing for ease of replacement by field maintenance personnel. The system shall provide programmable time delay functions and integrated flasher capabilities. The system shall be programmable to monitor and view, via a PC laptop or PDA, the current draw of selected outputs. The system shall be programmable to provide warning if the current draw of selected outputs exceeds
programmed limits and be programmable to shut down selected outputs if current draw exceeds preset limits. A single download point shall be located on the bus for reprogramming. A minimum of 10% spare system inputs and 10% spare system outputs are required for each multiplex module or group of modules. The system components shall be capable of performing reliable operation in an environment of between minus 30°C to plus 80°C while encountering mobile shock and vibrations. If required to interface with the bus engine/transmission, optional J1939 or J1708 gateways shall be available. If required to interface with other bus subsystems optional gateways shall be available. The proposed multiplex network system shall provide an external device containing an ID number that can be easily attached to or removed from a component.

5.10.3.5.3 Module Requirements
Loads that require a maximum current of 10 amps continuous / 20 amps intermittent or less shall be driven directly from a multiplex module output without the use of relays. All internal components, to include all integrated circuits and connections, shall be soldered. Internal sockets or plugs shall not be used. Each output of a module shall be equipped with its own fuse to protect each individual load circuit for over current protection. Highly visible, easily accessible fuses are required to assist in the rapid diagnostic of malfunctions of the load circuit. Self-resetting fuses shall not be used. Modules shall be adequately shielded for EMI and RFI. A dedicated feedback point for each output shall be part of the system to provide capability of monitoring each isolated output load and fuse status via PDA or PC. Each module shall utilize LED’s to indicate input status, output status, circuit integrity and assist in rapid circuit diagnostics and verification of output load and wiring integrity.

5.10.4 INFORMATION LEVEL

5.10.4.1 GENERAL REQUIREMENTS
This data level includes systems that collect, control or display data that is not necessary for the safe operation of the bus. These systems include destination signs, fare boxes, passenger counters, automated voice and sign systems, video surveillance, and similar systems. It is intended to use an approved protocol to manage this data and provide data access as required for maintenance and data sharing purposes.

5.10.4.2 WIRELESS COMMUNICATION REQUIREMENTS
The bus manufacturer shall provide the necessary equipment on each bus and at the PDRTA Administrative Facility to form a wireless path to control the flow of data to and from the bus with regard to the programming of the destination signs other data as necessary from the drive train and multiplex levels and the video surveillance system. The data shall be transmitted using an industry-standard and the most advanced version of 802.11xx with security enhancements. A separate similar path shall be utilized to retrieve data from the video surveillance system.

5.10.4.3 COMPONENT INTEGRATION

5.10.4.3.1 General Requirements
Information Level components when necessary shall function independently of each other and be integrated with other components through a communications network to achieve greater functionality. All Information Level components shall be networked on the Information Level and have the capabilities as outlined in the following sub-sections.

5.10.4.3.2 Programming Requirements
All programmable components shall be capable of being reprogrammed without replacing the component. A wireless network shall be the preferred method to perform reprogramming. A hand-held device or PC Card shall be used as a secondary or backup means to perform reprogramming.

5.10.4.3.3 Diagnostic Data
Component diagnostic data shall be available upon request of the network. If an error condition is self-detected on a component, then that condition, and any relevant diagnostic data, shall immediately be broadcast on the network.

5.10.4.4 ELECTRONIC EQUIPMENT ENCLOSURE(S)
An enclosure assembly as listed below or a space of the same dimensions of the enclosure assembly shall be provided on the roadside front wheelwell. If space is provided, such space shall be secure and include a provision for mounting the tray and equipment for each corresponding enclosure. The enclosure or space shall contain all information systems control equipment. Beginning nearest the operator’s area the listed enclosures based on PDRTA’s part #’s or space shall be provided. The actual box shall be a minimum of 33” high x 22 ½” wide with a depth of 20 ½ “. The enclosure shall be vented to ensure excessive heat that is generated shall be removed from said enclosure. A fan or vent may be required to accomplish venting.

The enclosure or space, mounting method, tray layouts and locks shall be approved by PDRTA. The mounting method should preferably form a secure closeout or a secure closeout shall be furnished to contain the required excess length of all wiring entering the enclosures. All enclosures shall be keyed alike. All keys shall be shipped independently of the buses.

5.10.4.5 VEHICLE AREA NETWORK

5.10.4.5.1 General Requirements
The Information Level shall be integrated into a network utilizing an open and published data protocol that allows component manufacturers to interface to the network and communicate with other components. The FTA recommended Vehicle Area Network is SAE J1708/J1587. Alternative networks may be furnished due to considerations such as component cost, compatibility, availability, and data transmission speeds. Any alternative network selected shall comply with the requirements of this section. The cabling shall be as required by the specifications of the furnished VAN protocol. Data communications cabling shall be completely installed in each bus. Cabling used for SAE J1708/J1587 protocols shall meet the requirements of SAE J2496.

5.10.4.5.2 Integration with Other Networks
There shall be a gateway installed between the Information Level network and the Drivetrain and Multiplex networks. The gateway(s) shall provide a translation between network protocols of information specified and a filter to prevent overloading of any network level, and to prevent network transmissions to the Drivetrain Level.

5.10.4.5.3 Wireless Data Transfer (Option)
The buses shall be equipped with a Wireless Data Transfer system. The base station hardware and software for wireless transfer of data between a centralized base station and individual buses shall be provided as an option. The data shall be transmitted using an industry-standard and the most advanced version of 802.11xx with security enhancements. The data and network shall include 128-bit encryption, rolling keys, VPN, and authentication (RADIUS server) compatibility. Data speeds shall be a minimum of 54Mbps. The wireless technology shall not require PDRTA to obtain a transmission license. The system shall communicate in both point-to-point and point-to-multipoint configurations. The wireless system shall be automatically enabled when a bus comes within range of specified GPS coordinates. The software utilized by this option shall permit the remote operation of the wireless system from various locations and transmittal of retrieved records via PDRTA local access network (LAN).

The Wireless Data Transfer system shall be bi-directional and shall be used for the purposes of remote data collection from bus systems such as APC and AVM and for on-bus software and data updates. The system shall permit date-specific deployment of changes and incremental updates (e.g., the system shall transmit only the voice announcements, destination sign text, route and schedule changes, etc. that have changed.) The wireless server software shall be configurable to determine frequency of data transmission and types of data transferred. The software shall make it possible to specify a future time and date for an update to become active.

The system shall allow automatic data transfer initiation (when the bus is in range of the base station) and requires no operator interaction. Data collected from each bus shall be clearly labeled at the base station, and the software shall permit sorting/filtering/searching of parameters. Pre-configured, standard-reporting options shall be available within the software package itself, and the data may be exported in industry standard delimited formats for external use and specific software applications.

5.10.4.6 AUTOMATED ANNOUNCEMENTS
5.10.4.6.1 Internal Display Sign
The internal display sign shall display coordinating text for next stop and other audio announcements. The sign shall meet all ADA requirements for internal signage. The sign shall be a Light Emitting Diode (LED) type sign with 16 characters per line with yellow LED’s (with a light wavelength of 590 NM). Sign shall be no larger than 27” x 2 1/8” x 1 1/8” (single line) or 6 1/8” (double line). Speed, delays, and looping shall be programmable. Busy/ready status shall be poll-able. Forced reset capability shall exist. The internal LED display sign shall be used to display the words “Stop Requested” and shall be visible to passengers. This shall be illuminated when the passenger chime is activated and shall remain on until the front or rear door is opened. The internal LED
display sign shall also be used to display “Ramp Requested” when the passenger chime is activated provided there are separate outputs on the bus to designate different chimes for stop requested and lift requested. The enclosure shall be aluminum with welded seams, black powder paint finish and a polycarbonate fascia with matte finish for reduction of reflected glare. The sign shall be constructed to withstand the harsh environmental conditions found in transit applications.

5.10.4.6.2 Public Address Speakers
The DR-VLU stop announcement system shall utilize six to eight, 4-ohm speakers for internal announcements. Internal speakers shall have a range of 70 - 15,000 Hz at a minimum. The external speaker(s) shall be a weatherproof; horn-type constructed of a hard plastic or aluminum material and have a minimum range of 200 - 15,000 Hz. All internal and external speaker locations shall require prior approval by PDRTA.

5.10.4.6.3 Boom Microphone
A Mobilpage model 157-with an on/off switch or submitted deviation shall be located in the operator compartment area. When the operator presses the microphone’s push-to-talk button, any DR-VLU pre-recorded message shall be simultaneously muted.

5.10.4.7 DESTINATION SIGNS

5.10.4.7.1 General Requirements
A light emitting diode (LED) destination sign system, as manufactured by TwinVision (www.luminatortechnologygroup.com) or submitted deviation, shall be installed on each bus. The characters formed by the system shall meet the requirements of the Americans with Disabilities Act (ADA) of 1990 Reference 49 CFR Section 38.39. A J1708 interface shall be provided for the Destination Sign System, an auxiliary J1708 port shall be provided on the J1708 OCU so that auxiliary J1708 commands may be provided to the Destination Sign system from a wireless source that conforms to the J1708 command structure.

5.10.4.7.2 Sign Illumination Requirements
The source of illumination shall consist of pixels utilizing high intensity light emitting diodes (“LED”) with a light wavelength of 590 NM. The LED’s shall have a UV resistant epoxy lens and be resistant to the effects of moisture. Each pixel shall have a dedicated LED for illumination of the pixel in all lighting conditions. The sign system shall have multi-level intensity changes, which adjust automatically as a function of ambient lighting conditions. The intensity of the illumination of the display pixels shall appear uniform throughout the full viewing cone. The LED’s shall be mounted such as to be visible directly to the observer positioned in the viewing cone, allowing for full readability 65 degrees either side of the destination sign centerline. The LED’s shall be the only means of illumination. The LED illumination source shall have an operating life of not less than 100,000 hours. Each LED shall not consume more than 0.02 watts.

5.10.4.7.3 Sign Enclosures
The signs shall be enclosed in a manner such as to inhibit entry of dirt, dust, water and other contaminants during normal operation or cleaning. Access shall be provided to clean the inside of the Bus window(s) associated with the Sign and to remove or replace
the Sign components. Access panels and display boards shall be mounted for ease of maintenance/replacement. Any exterior Rear Sign enclosure used shall be made of Polycarbonate material containing fiberglass reinforcement.

5.10.4.7.4 Controller (see Automated Announcement OCU)
A single Operator’s Control Unit (OCU) shall control all signs. The OCU shall contain a display of at least two lines of 20-character capability to display selected and displayed messages. The OCU shall utilize a multi-key conductive rubber pad keyboard and be designed for transit operating conditions and contain an audio annunciator that beeps indicating that a key is depressed. The OCU shall continuously display the message associated with the selected destination readings (except the emergency message). The OCU shall also contain the capability to manually select the block number sign information (from 1 to 4 alpha-numeric characters) to be sent to the block number sign, independent of any pre-programmed destination sign message information. Pre-programmed messages shall be capable of being changed without re-entering a message code. An auxiliary port shall be made provided for wireless inputs. (This component is not required when a DR600 automated announcement system is installed and integrated with the destination sign system).

5.10.4.7.5 Sign Size and Location

5.10.4.7.5.1 Front Sign
The front sign shall be located in a separate compartment adjacent to the roofline and shall be a minimum size of 16 rows x 160 columns; 7”h x 63”w. The front sign message shall be readable by a person with 20/20 vision from a distance not less than 350 feet for signs of display height greater than 8 inches and from a distance not less than 275 feet for display heights less than 8 inches.

5.10.4.7.5.2 Side Sign
The side sign shall be located adjacent to the upper edge of the first fixed window behind the front door and shall be a minimum size of 14 rows x 108 columns; 4”h x 42”w. The side sign shall be protected by an enclosure consistent with the conditions found in the passenger compartment. The side sign message shall be readable by a person with 20/20 vision, from a distance of not less than 110 feet.

5.10.4.7.5.3 Rear Sign
The rear sign shall be located on the rear of the bus above the engine compartment door and shall be a minimum size of 16 rows x 48 columns, 6”h x 18”w. The rear sign message shall be readable by a person with 20/20 vision, from a distance of not less than 225 feet.

5.10.4.7.6 Software Requirements
A WINDOWS® 2000 PRO, XP Pro or 10 programming software package shall be supplied, under limited-use license, to generate message lists for the sign system. The programming software shall be intuitive, of design to facilitate ease of training, and use context-sensitive help features. This software shall provide the capability for custom message writing by the selection of preprogrammed standard variable width fonts, the
creation of graphic displays with or without text by selecting preprogrammed graphic
sign images and the use of multiple fonts and graphic symbols placed anywhere within
the display area. The various signs shall be capable of displaying the same or
independent messages. Public relations messages shall be capable of being displayed
alternately with the regular text and route messages or displayed separately. The length
of time a message can be displayed shall be adjustable from 1.6 seconds to twenty-five
seconds in 0.1-second increments.

5.10.4.7.7 System Programming
The primary means of programming the destination sign system on a bus shall be with
an approved wireless means. The secondary method shall utilize a PCMCIA card, of not
less than one (1) megabyte memory capacity, to be programmed directly from a PC to a
PCMCIA card port on the OCU. The maximum amount of time
to program a Destination Sign system with a PCMCIA card shall be 30 seconds.

5.10.4.7.8 Message Selection

5.10.4.7.8.1 General Requirements
The primary means of message selection shall utilize the present method of route
selection utilizing a RS232 / J1708 connection. The secondary means of message
selection shall utilize the OCU.

5.10.4.7.8.2 Emergency Message
An emergency message shall be activated by a momentary emergency push button.
The emergency message shall be displayed on signs facing outside the bus while signs
inside the bus, including the OCU display, remain unchanged. The emergency
message shall be canceled by entering a new destination code, or power cycling (after
removal of the emergency signal).

5.10.4.8 FAREBOX
Provision shall be made to connect a GFI Odyssey Farebox (provision of the farebox is
not part of this specification). A 10 amp, 12 VDC, circuit breaker protected, circuit shall
be provided to power the farebox. The power shall be always "on" when the main
battery disconnect switch is closed. This power service shall be two conductor shielded
cable, Belden 19348 (www.belden.com) or submitted deviation. The cable shall be run
to the farebox platform and have a minimum of six feet of slack to reach the farebox. A
Farebox Tamper cable (Belden 8205 or equal) shall be run from the farebox base area
to the six-inch radio system enclosure. A farebox J1708 Circuit cable (Belden 9841 or
equal) shall be run from the farebox base area to the internal destination sign area.

5.10.4.9 VIDEO SURVEILLANCE

5.10.4.9.1 General Requirements
The system and its data are to be used for improvement of operator driving skills and to
enhance operator security. A system is designed specifically to monitor and save both
video and audio events based upon either predetermined criteria or manually triggered
by an operator, as manufactured by Angel Trax or submitted deviation. Any deviation
from the specified system shall not be approved unless it fully integrates with existing infrastructure for video surveillance system. Specific details regarding the Angel Trax system are available as Appendix G.

5.10.4.9.2 Digital Video Recorder (DVR) Requirements

System Hardware Description

The system must continuously monitor vehicle motion with video, audio, and 4-directions of G-forces subjected to the vehicle and the recorder shall be physically housed in a small, self-contained device.

The saving or recording of events shall be based upon vehicle movement when the vehicle exceeds preset, user-defined G-force settings in any of the 4 directions; the recorder internally saves the triggering event in a digital format for downloading and playback on a computer screen at a later time. Digital format should be an encrypted and proprietary format.

Recorder’s activation settings can be remotely adjusted depending on the vehicle size and type.

Saved events must display forward facing view, exterior to vehicle view in full color video with accompanying audio and g-force measurements every ¼ second or less. Recorders must simultaneously save, a rear-facing video audio/video event directed at the interior of the vehicle at the time of a triggering event.

Saved event must include a maximum of 10 seconds before and 10 seconds after the “triggering” moment with elapsed time also displayed on the video.

Must have capability for the vehicle driver to manually activate the recorder to record and save an event.

Digital event recorder shall provide for installation / de-installation of primary hardware device in 30 minutes or less, without requirement of specialized electronics technicians to perform these tasks.

Recorder is capable of being powered “on” at all times by power supplied from the vehicle battery. An internal, backup battery is required for uninterrupted recording if vehicle power is lost during a crash. A power disconnect feature will notify authorized personnel via a downloaded message when any power to the recorder has been disconnected and reconnected.

Saved events shall be prioritized based upon the significance during a g-force recording. Highest g-force events automatically overwrite a saved, less important event when the capacity of the recorder’s digital storage space is exceeded. Storage should be sufficient to save 12 or more events before overwriting would occur.
An indicator light on the recorder advises personnel that an event is saved.

Recorder software upgrades are automatically uploaded from the computer to each recorder at the time a connection is made to download events.

**In Vehicle Collection/Download**

Stored events on the recorder must download by making either a cable connection from the recorder to a computer network or via the industry open standard for wireless networking, 802.11b.

Downloading requires no keyboard intervention at the vehicle. An indicator on the recorder itself indicates that downloading is complete and cable disconnection can be made or that the wireless download has completed.

**System Software Description**

The system shall provide for a software management system which allows for the review, annotation, storage and reporting of events and system data elements. Provide a methodology for tracking the cycle of activities, which are used, in giving feedback of reviewed video/audio data to operators for the improvement of driving skills.

The software application shall provide management features of trend line analysis, management oversight reporting and activities monitoring modules to provide for a complete management framework for the system.

Event downloading and playback must be accomplished by either a USB or via a wireless network connection to vendor provided software resident on both the recorder and on the computer equipment such that viewing events can take place without removal of any recording equipment from the vehicle.

Event playback must be security restricted so that only authorized personnel can download, view and delete saved events.

Events downloaded can be opened and played back on a computer screen using vendor supplied software. The player functionality shall include normal playback speed, pause, and incremental playback in both forward and reverse directions.

Event editing functions shall include entering driver name, event deletion, “save as”, export, and email attachment capability.

Software includes activity logs showing when recorders are connected and personnel that access the database.

Software shall include a database designed to capture data about the events that have been recorded and downloaded. By selecting an event downloaded to the main screen
inbox, the user will have the option of entering and editing data about the event and reviewing the linked video of the event. Database reporting is included to facilitate quick review of driver and vehicle performance. To minimize personnel time needed to build the event database, the recorders must automatically download into the database the date and time of the event, the type and severity, and the vehicle in which it occurred.

**System Specifications**

**Hardware**
- All digital design with no moving parts
- Both USB and Wireless 802.11b download interfaces
- Operate on continuous 12 volt power
- Environmental operation from -40 to 185 degrees Fahrenheit
- A single self-contained design
- 5 digital cameras (forward facing, Driver, front door, rear forward facing and front rear facing)
- Monitor 4 directions of g-force, forward, back and lateral

**Software**
- Operate within a Microsoft Windows XP/7/8/RT/10 environment on standard Intel-based computer
- Multi-user application with both LAN and WAN networking capability
- Provide for a database application for data management included with the system
- Both the download of data via a USB or/and 802.11b wireless infrastructure

Captured images shall be primarily downloaded utilizing a docking station and a computer. The secondary means shall be downloaded from the DVR via the wireless data transfer system onto a computer. The computers shall have compatible browser software installed, as follows:
- The DVR shall connect through a docking station to a standard desktop PC with Windows XP/7/8/RT/10 as the operating system.
- Once the DVR has been inserted into the docking station at the central station, images from the DVR shall be viewed on a monitor and/or transferred to long-term storage, including but not limited to the following:
  - Recordable CDs and DVD’s

**5.10.4.10 FIRE SUPPRESSION**

**5.10.4.10.1 General Requirements**
A pre-engineered fire suppression system, manufactured by AMEREX (www.amerex-fire.com) or submitted deviation, shall be furnished and installed for the protection of the bus. The system manufacturer shall complete a vehicle hazard analysis. The system shall be approved and listed for use at -65°F (54°C) to +150°F (66°C) by Factory Mutual Research Corporation (FM RC). The automatic detection and actuation system shall provide twenty-four (24) hour fire detection of the engine compartment. The system shall be designed to operate at 12 to 24 VDC and shall not exceed a standby current draw of more than 0.1 amp. The system shall be approved by the Factory Mutual
Research Corporation, and the system manufacturer shall provide a $5 million certificate of insurance.

5.10.4.10.2 Control Requirements
Actuation of the system shall be accomplished automatically by the heat actuated fire detectors or a manual pushbutton station utilizing a control module as supplied by the system manufacturer. Power for the system shall be supplied by the bus electrical system. The control module shall contain a battery back-up sized to operate and actuate the system for a minimum of 24 hours. The control module shall have the visual and audible indicators necessary to indicate normal, fire, alarm and trouble conditions. A silence control shall be provided to silence the audible indicators. The control module shall provide engine shutdown with a zero to thirty second adjustable time delay with simultaneous two-way radio activation.

5.10.4.10.3 Detection
Heat detectors as approved for such use by Factory Mutual Research Corporation shall actuate the fire suppression system

5.10.4.10.4 Extinguishing Agent
The system shall use an ABC dry chemical or submitted deviation as an extinguishing agent. This extinguishing agent shall be approved for use with the system specified herein by Factory Mutual Research Corporation. The system shall not utilize extinguishing agents that are of a known ozone depleting nature or are suspected carcinogens.

5.10.4.10.5 Extinguishing Agent Cylinder
The extinguishing agent cylinder shall be of the stored pressure type and a minimum capacity of 25 pounds. The cylinders shall be constructed of welded steel and must conform to US Department of Transportation (DOT) requirements. The hydrostatic test interval shall be a minimum of 6 years. A gauge, protected by a rust-resistant chrome plated brass gauge guard, shall be provided to indicate cylinder pressure.

5.10.4.10.6 Hose and Fittings
Fittings shall be galvanized malleable or ductile iron, black or galvanized steel, stainless steel, copper or brass. Cast iron fittings shall not be used. Hose shall be, at minimum, single wire braid, rubber hose conforming to and marked as SAE 100 R5 or SAE 100 R1.

5.10.4.10.7 Nozzles
Nozzles shall be brass, and be of the design approved by FMRC for use with the bus suppression system specified herein. Nozzles shall be located to protect specific hazards as identified by the system installer and the equipment owner. All nozzles are to be fitted with dust caps that, upon system actuation, are displaced to allow full chemical flow. The caps are to be constructed so that upon displacement they do not drop into a fire hazard and where they can contribute as fuel to an in progress fire. Nozzles shall be of the type to provide both total flooding and local application coverage. Nozzle coverage shall be modular to provide a minimum single nozzle total flooding coverage of 244 cu. ft. with or local application coverage of 900 sq. ft. Nozzles
shall be combined with appropriate agent cylinders to yield 2, 4, 6, or 8 nozzle combinations. A minimum of four (4) nozzles shall be provided in the engine compartment.
THIS AGREEMENT, is made this day of , 20 by and between the
Pee Dee Regional Transportation Authority (hereinafter referred to as “PDRTA” or
“Authority”), whose principal office and place of business is at 313 S. Stadium Rd.,
Florence SC and ______________________________, whose principal office and
place of business is at ____________________________ (hereinafter "Contractor”):

WHEREAS, the Contractor is willing to contract for the construction/sale and delivery of
certain buses, parts, and equipment to PDRTA upon the terms and conditions
hereinafter set forth;

NOW, WITNESSETH: That PDRTA and Contractor, for the consideration hereinafter
named, agree as follows:

ARTICLE 1. SPECIFIC DESCRIPTION OF GOODS/SERVICES TO BE PROVIDED:
PDRTA agrees to and hereby does retain and employ the Contractor and the Contractor
agrees to provide such buses, parts and equipment as may be ordered, as set forth in
the Proposal attached hereto and made a part of this Agreement as Schedule A
identified as Proposal No. PDRTA 0816-02 and in accordance with the terms of this
agreement and the schedules and appendices annexed hereto and made a part hereof,
to assist PDRTA in carrying out its purposes as set forth in the South Carolina Code of
Laws Chapter 25, Title 58.

ARTICLE 2. PROVISIONS FOR PAYMENT:
A. PDRTA shall pay to the Contractor and Contractor agrees to accept as full
compensation for the buses, parts and equipment that may be ordered under this
agreement, the prices/fees as set forth in the Pricing Schedule contained in the
Proposal, Schedule B (please note that PDRTA is tax exempt and the prices need to
be adjusted accordingly).

B. Unless the proposal should indicate otherwise, the method of paying for the buses,
parts and equipment under this agreement by PDRTA and the manner and form of
submission of invoices by the Contractor shall be payment due within thirty days of
acceptance of delivery by PDRTA.

ARTICLE 3. DURATION AND PUNCTUALITY:
The effective date of this contract shall be the date first appearing above and the
contract shall extend for a duration of two (2) years, extending from the date of this
agreement through the date of PDRTA’s last order thereunder, so that Contractor’s
actual delivery may occur later. In accord with PDRTA’s orders, Contractor shall make
deliveries in accord with the delivery schedule to be formulated for each order. All
charges shall be provided in accord and at the proposed prices and other charges set
forth in Schedule B. It is intended that the parties will exert their best efforts to expedite deliveries.

**ARTICLE 4. CONTRACTOR’S LIABILITY:**
The Contractor assumes all responsibility for and agrees to release, indemnify and save harmless PDRTA from and against all loss of life or property or damage to person or property of any person, firm or corporation including PDRTA and all its members, officers, directors, agents and employees arising or resulting directly from or by reason of any defect in the buses, parts and equipment under this agreement and for any claim or claims, cause or causes of action for loss, injury or damage caused by the negligence of the Contractor or any of its agents, servants, employees or subcontractors, or without negligence or otherwise, and from and against any and all claims, demands, actions, judgments, compensation awards, costs, expenses and liability of any name and nature arising or resulting from any such loss, injury or damage relating to said product.

**ARTICLE 5. CODE OF ETHICS:**
PDRTA specifically agrees that this agreement may be canceled or terminated if any work under this agreement is in conflict with the South Carolina Ethics Reform Act of 2016.

**ARTICLE 6. COPYRIGHT/PATENTS:**
Contractor shall avoid infringements of any copyright or patent rights in the performance of the contract. The Contractor will indemnify and save harmless the PDRTA and the directors, trustees, members, officers and employees of the PDRTA against all claims, demands, complaints, actions, liabilities, costs (including, without limitation, actual legal fees and disbursements), suits or damages arising from or in connection with any product, or in connection with any service provided in relation to this Agreement, arising from any actual or alleged infringement or alleged infringement of any patent, trademark, copyright, intellectual property right, moral right, or industrial design;

**ARTICLE 7. NOTICES:**
All notices required or permitted under this agreement shall be in writing and shall be deemed sufficiently served if sent by Registered or Certified Mail to the addresses set forth in the initial paragraph of this agreement. Either party may at any time designate a different address by giving notice as provided above, to the other party.

**ARTICLE 8. TAXES, ROYALTIES AND EXPENSES:**
The Contractor shall pay all applicable taxes, royalties and expenses incurred in connection with providing the goods and services described in this agreement.

**ARTICLE 9. WARRANTIES:**
Neither the final payment nor any provision in this agreement nor partial or entire use of the work embraced in this agreement by PDRTA or the public shall constitute an acceptance of buses, parts and equipment under this agreement or relieve the
Contractor of liability in respect to any express warranties or responsibility for faulty
materials or workmanship.

Delivery of the material by the Contractor shall be construed as a warranty by said
Contractor that said material is both in good operating and usable condition and fit for
the purpose intended in accordance with the General and Detailed Specifications
herein. Such warranty will not be a substitution for warranties implied or deemed to be
made under the law. In addition, the Contractor shall assign, convey or transfer to
PDRTA all rights and benefits under the material manufacturer’s warranties available to
or previously given to the Contractor.

ARTICLE 10. COLLUSION:
The Contractor represents there was no collusion whatsoever with the making of any
bid or proposal connected with this Agreement. Contractor certifies and affirms that
there were no incentives or inducements offered, paid or promised to secure
acceptance of Contractor’s offer of sale other than those set forth in Contractor’s
Bid/Proposal and accompanying documents, all of which are incorporated into this
Contract and made part hereof.

ARTICLE 11. DOCUMENTS COMPRISING THIS AGREEMENT, COMPLIANCE
WITH APPENDIX A {South Carolina} and APPENDIX B {Federal} REQUIREMENTS:
The contract documents shall be deemed to include this agreement (with its
accompanying schedules and appendixes), the Legal Notice to Bidders, Detailed Notice
to Bidders, Bid Proposal Instructions, Detailed Specifications and the completed Non-
Collusion Affidavit, Buy America Certificate, D/WBE program (as required), Lobbying
Certification/Disclosure (as applicable) and Addenda (as required); the terms and
provisions of which shall be binding upon the parties hereto. The terms, contents and
requirements of said appendices A and B shall be deemed a part of this agreement and
binding upon the parties hereto and enforceable by PDRTA, the State of South Carolina
and the Federal Government.

ARTICLE 12. CONFLICTS
This contract contains all agreements of the parties hereto; there are no promises,
agreements, terms, conditions, warranties, representations or statement other than
contained herein. There may be no modification or amendment of this agreement except
in writing, executed by the parties hereto.
In the event of a conflict between the terms of the contract (including any and all
attachments thereto and amendments thereof) priority shall be given to the provisions
contained in this agreement as follows: (1) this Agreement, (2) Appendix A (Standard
Clauses for all Contracts as required by the State of South Carolina), (3) Appendix B
(Required Federal Clauses), (4) Schedule A (Scope of Services, including Detailed
Specifications in that order), (5) Schedule B.

ARTICLE 13. APPROVALS:
The Contractor agrees that this agreement may be subject to the approval in all respects of the Federal Transit Administration (FTA) and the South Carolina Department of Transportation (SCDOT).

ARTICLE 14. VALIDITY OF PROVISIONS:
The Contractor agrees that if any provision of this agreement is held invalid, the remainder of the agreement shall not be affected thereby, if such remainder would then continue to conform to the terms and requirements of the applicable law.

ARTICLE 15. FINANCIAL LIABILITY:
The liability of PDRTA under this contract shall be limited to the purchase of buses/parts/services that are actually ordered over the life of the contract. The Contractor specifically agrees that the agreement shall be deemed executory only to the extent of the moneys available, and no liability shall be incurred by PDRTA beyond the moneys available for the purpose thereof.

ARTICLE 16. INSURANCE REQUIREMENTS:
Insurance requirements set forth below do not in any way limit the amount or scope of liability of Contractor under this Agreement. The amounts listed indicate only the minimum amounts of insurance coverage the PDRTA is willing to accept to help insure full performance of all terms and conditions of this Agreement. All insurance required by Contractor under this Agreement shall list PDRTA and its subsidiaries as additional insured and shall meet the following minimum requirements:

16.1 Certificates; Notice of Cancellation
On or before the effective date and thereafter during the Agreement term, Contractor shall provide the PDRTA with current certificates of insurance, executed by a duly authorized representative of each insurer, as evidence of all insurance policies required under this Section. No insurance policy may be canceled, materially revised, or non-renewed without at least thirty (30) days prior written notice being given to the PDRTA. Insurance must be maintained without any lapse in coverage during the Agreement term. Insurance allowed to lapse without PDRTA consent shall be deemed an immediate event of default under this Agreement. The PDRTA shall also be given certified copies of Contractor's policies of insurance, upon request. Failure of the PDRTA to demand such certificates or other evidence of full compliance with these insurance requirements, or failure of the PDRTA to identify a deficiency from evidence that is provided, shall not be construed as a waiver of Contractor's obligation to maintain the insurance required by this Agreement.

16.1.1 Company Ratings
All policies of insurance must be written by companies having an A.M. Best rating of "A-" or better, or equivalent. The PDRTA may, upon thirty (30) days written notice to Contractor, require Contractor to change any carrier whose rating drops below an "A-" rating.
16.2 Required Insurance
At all times during this Agreement, Contractor shall provide and maintain the following types of coverage:

16.2.1 General Liability Insurance
Contractor shall maintain an occurrence form commercial general liability policy or policies insuring against liability arising from premises (including loss of use thereof), operations, independent contractors, products-completed operations, personal injury and advertising injury, and liability insured under an insured contract (including the tort liability of another assumed in a business contract) occurring on or in any way related to the premises or occasioned by reason of the operations of Contractor. Such coverage shall be written on an ISO occurrence form (or a substitute form providing equivalent coverage) in an amount of not less than ONE MILLION DOLLARS ($1,000,000.00) per occurrence and not less than ONE MILLION DOLLARS ($1,000,000.00) aggregate.

16.2.2 Umbrella Excess Liability Insurance
Contractor shall maintain an occurrence form excess liability policy or policies insuring against liability arising from premises (including loss of use thereof), operations, independent contractors, products-completed operations, personal injury and advertising injury, and liability insured under an insured contract (including the tort liability of another assumed in a business contract) occurring on or in any way related to the premises or occasioned by reason of the operations of Contractor or arising from automobile liability as described above. Such coverage shall be written on an ISO occurrence form (or a substitute form providing equivalent coverage) providing excess coverage to the amount of not less than FIVE MILLION DOLLARS ($5,000,000.00) per occurrence/aggregate.

16.2.3 Contractor’s Risks
Contractor shall be responsible for obtaining any insurance it deems necessary to cover its own risks, including without limitation: (a) business interruption, such as gross earnings, extra expense, or similar coverage, (b) personal property, and/or (c) automobile physical damage and/or theft. In no event shall the PDRTA be liable for any (a) business interruption or other consequential loss sustained by Contractor, (b) damage to, or loss of, personal property, or (c) damage to, or loss of, an automobile, whether or not such loss is insured.

ARTICLE 17. COMPLIANCE WITH CIVIL RIGHTS ACT OF 1964 and AMERICANS WITH DISABILITIES ACT OF 1990:
Contractor hereby warrants and agrees that at the time of delivery all of the buses, parts or other equipment provided pursuant to this contract is compliant with the requirements of title VI of the Civil Rights Act of 1964 and the Americans with Disabilities Act of 1990, as amended.
ARTICLE 18. LITIGATION:
By executing this agreement, Contractor agrees to submit to the jurisdiction of the State of South Carolina courts and further agrees that any lawsuit shall be venued in Florence County. Contractor agrees that service of process upon the Contractor shall be made by certified mail, return receipt requested, to the executing officer at the Contractor’s principal place of business.

ARTICLE 19. COMPLETE AGREEMENT:
This contract contains all agreements of the parties hereto; there are no promises, agreements, terms, conditions, warranties, representations or statements other than contained herein. There may be no modification or amendment of this agreement except in writing, executed by the parties hereto.

IN WITNESS WHEREOF, this agreement has been duly executed by PDRTA, acting by and through its Chairman, who has caused its seal to be affixed hereto and the Contractor, acting by and through [ ] its President, who has caused its seal to be affixed hereto; or [ ] a Partner, if a partnership; or [ ] the Owner, if an individual proprietorship (provide d/b/a certificate where applicable).

Vendor

By _________________________________________
[Signature]

___________________________________________
[Print name and title]

VENDOR TAXPAYER IDENTIFICATION NUMBER: (IMPORTANT FOR EXPEDITING PAYMENTS)

___________________________________________

Pee Dee Regional Transportation Authority

By _________________________________________
Executive Director
ACKNOWLEDGMENTS

State of South Carolina  
COUNTY OF FLORENCE  

On this ____ day of __________________, 2016, before me personally came_________________, to me personally known, who being by me duly sworn, did depose and say that he resides at ____________, South Carolina, and is the Chief Executive Officer of the Pee Dee Regional Transportation Authority, the Authority described in and which executed the within instrument; that he knows the seal of said Authority; that the seal affixed to this instrument is such Authority seal; that it was so affixed by order of the members of the Authority, and that he signed his name thereto by like order.

__________________________________
Notary Public – State of South Carolina

STATE OF  
COUNTY OF  

On this ____ day of __________________, 2016__, before me personally came _______________________, to me personally known, who being duly sworn, did depose and say that he/she resides at ______________________________ and is the __________________________ of ______________________________, the corporation described in and which executed the within agreement; that he/she knows the seal of said corporation; and that the seal affixed to this agreement is such corporate seal; that of said corporation; and that the seal affixed to this agreement is such corporate it was so affixed by the order of the board of directors of said corporation; and that he/she signed his/her name thereto by like order.

__________________________________
Notary Public - State of South Carolina
APPENDIX A

STANDARD CLAUSES FOR ALL CONTRACTS REQUIRED BY STATE OF SOUTH CAROLINA

Bus Purchase

PLEASE RETAIN THIS DOCUMENT FOR FUTURE REFERENCE.
Appendix A

Pee Dee Regional Transportation Authority

State of South Carolina Required and Other Contract Clauses

Purchase of Buses and Rolling Stock

TABLE OF CONTENTS APPENDIX A – Governing Documents

1. Open Trade Representation
2. Iran Divestment Act of 2014
1. OPEN TRADE REPRESENTATION (JUN 2015): By submitting an Offer, Offeror represents that Offeror is not currently engaged in the boycott of a person or an entity based in or doing business with a jurisdiction with whom South Carolina can enjoy open trade, as defined in SC Code Section 11-35-5300. [02-2A083-1]

OPEN TRADE (JUN 2015): During the contract term, including any renewals or extensions, Contractor will not engage in the boycott of a person or an entity based in or doing business with a jurisdiction with whom South Carolina can enjoy open trade, as defined in SC Code Section 11-35-5300. [07-7A053-1]

2. IRAN DIVESTMENT ACT OF 2014: The Iran Divestment Act List is a list published by the South Carolina Budget and Control Board pursuant to Section 11-57-310 that identifies persons engaged in investment activities in Iran.
Appendix B

Pee Dee Regional Transportation Authority

Federally Required and Other Contract Clauses

Purchase of Buses and Rolling Stock

TABLE OF CONTENTS (Appendix B - Governing Documents)

1. Fly America Requirements
2. Buy America Requirements
3. Charter Bus and School Bus Requirements (not applicable)
4. Cargo Preference Requirements
5. Seismic Safety Requirements (not applicable)
6. Energy Conservation Requirements
7. Clean Water Requirements
8. Bus Testing
9. Pre-Award and Post Delivery Audit Requirements
10. Lobbying
11. Access to Records and Reports
12. Federal Changes
13. Bonding Requirements
14. Clean Air
15. Recycled Products (not applicable)
16. Davis-Bacon and Copeland Anti-Kickback Acts (not applicable)
17. Contract Work Hours and Safety Standards Act
18. [Reserved]
19. No Government Obligation to Third Parties
20. Program Fraud and False or Fraudulent Statements and Related Acts
21. Termination
22. Government-wide Debarment and Suspension (Non-procurement)
23. Privacy Act
24. Civil Rights Requirements
25. Breaches and Dispute Resolution
26. Patent and Rights in Data (not applicable)
27. Transit Employee Protective Agreements (not applicable)
28. Disadvantaged Business Enterprises (DBE)
29. [Reserved]
30. Incorporation of Federal Transit Administration (FTA) Terms
31. Drug and Alcohol Testing (not applicable)
1. **FLY AMERICA REQUIREMENTS** (49 U.S.C. §40118, 41 CFR Part 301-10) **Applies only to contracts valued at $3,000 or more that include travel outside of the U.S. where federal funds will be used to pay for at least a portion of the transportation.** (Not applicable)

2. **BUY AMERICA REQUIREMENTS** (49 U.S.C. 5323(j), 49 CFR Part 661) **Applies only to contracts for Construction and Acquisition of Goods or Rolling Stock valued at more than $100,000.** The contractor agrees to comply with 49 U.S.C. 5323(j) and 49 C.F.R. Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 C.F.R. 661.7, and include final assembly in the United States for 15 passenger vans and 15 passenger wagons produced by Chrysler Corporation, and microcomputer equipment and software. Separate requirements for rolling stock are set out at 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11. Rolling stock must be assembled in the United States and have a 60 percent domestic content.

3. **CHARTER BUS REQUIREMENTS** (49 U.S.C. 5323(d), 49 CFR Part 604) **Applies only to contracts valued at $3,000 or more that involve the purchase of transportation or Operational Service Agreements where federal funds will be used to pay for at least a portion of the service.** (Not applicable)

**SCHOOL BUS REQUIREMENTS** (49 U.S.C. 5323(F), 49 CFR Part 605) **Applies only to contracts valued at $3,000 or more that involve the purchase of transportation or Operational Service Agreements where federal funds will be used to pay for at least a portion of the service.** (Not applicable)

4. **CARGO PREFERENCE REQUIREMENTS** (46 U.S.C. 1241, 46 CFR Part 381) **Applies only to contracts valued at $3,000 or more that involve transportation of equipment, materials, or commodities which may be transported by ocean vessels, where federal funds will be used to pay for at least a portion of the purchase.**

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

5. **SEISMIC SAFETY REQUIREMENTS** (42 U.S.C. 7701 et seq, 49 CFR Part 41) **Applies only to contracts valued at $3,000 or more for the construction of new buildings or additions, where federal funds will be used to pay for at least a portion of the construction, including construction by subcontractors.** (Not applicable)
6. ENERGY CONSERVATION REQUIREMENTS (42 U.S.C. 6321 et seq., 49 CFR Part 18) Applies all contracts valued at $3,000 or more for construction and/or the purchase of goods, services, or rolling stock, where federal funds will be used to pay for at least a portion of the purchase. The contractor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act and to assure compliance by any subcontractors under his/her control.

7. CLEAN WATER REQUIREMENTS (33 U.S.C. 1251) Applies only to contracts valued in excess of $100,000 for construction and/or the purchase of goods, services, or rolling stock, where federal funds will be used to pay for at least a portion of the purchase. (1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office. (2) The Contractor also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by FTA.

8. BUS TESTING, (49 U.S.C. 5323(c), 49 CFR Part 665) Applies only to contracts valued at $3,000 or more that involve the purchase of buses or other rolling stock/turnkey where federal funds will be used to pay for at least a portion of the equipment. The Contractor [Manufacturer] agrees to comply with 49 U.S.C. A 5323(c) and FTA's implementing regulation at 49 CFR Part 665 and shall perform the following:

1) A manufacturer of a new bus model or a bus produced with a major change in components or configuration shall provide a copy of the final test report to the recipient at a point in the procurement process specified by the recipient which will be prior to the recipient's final acceptance of the first vehicle.

2) A manufacturer who releases a report under paragraph 1 above shall provide notice to the operator of the testing facility that the report is available to the public.

3) If the manufacturer represents that the vehicle was previously tested, the vehicle being sold should have the identical configuration and major components as the vehicle in the test report, which must be provided to the recipient prior to recipient's final acceptance of the first vehicle. If the configuration or components are not identical, the manufacturer shall provide a description of the change and the manufacturer's basis for concluding that it is not a major change requiring additional testing.

4) If the manufacturer represents that the vehicle is "grandfathered" (has been used in mass transit service in the United States before October 1, 1988, and is currently being produced without a major change in configuration or components), the manufacturer shall provide the name and address of the recipient of such a vehicle and the details of that vehicle's configuration and major components.
9. PRE-AWARD AND POST DELIVERY AUDITS REQUIREMENTS (49 U.S.C. 5323, 49 CFR Part 663) **Applies only to contracts valued at $3,000 or more that involve the purchase of buses or other rolling stock/turnkey where federal funds will be used to pay for at least a portion of the equipment.** 49 C.F.R. 661.12, but has been modified to include FTA's Buy America requirements codified at 49 U.S.C. A 5323(j).

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

(1) **Buy America Requirements:** The Contractor shall complete and submit a declaration certifying either compliance or noncompliance with Buy America. If the Bidder/Offeror certifies compliance with Buy America, it shall submit documentation which lists 1) component and subcomponent parts of the rolling stock to be purchased identified by manufacturer of the parts, their country of origin and costs; and 2) the location of the final assembly point for the rolling stock, including a description of the activities that will take place at the final assembly point and the cost of final assembly.

(2) **Solicitation Specification Requirements:** The Contractor shall submit evidence that it will be capable of meeting the bid specifications.

(3) **Federal Motor Vehicle Safety Standards (FMVSS):** The Contractor shall submit 1) manufacturer's FMVSS self-certification sticker information that the vehicle complies with relevant FMVSS or 2) manufacturer's certified statement that the contracted buses will not be subject to FMVSS regulations.

10. LOBBYING (31 U.S.C. 1352, 49 CFR Part 19, 49 CFR Part 20) **Applies only to contracts valued at $3,000 or more that involve construction/architectural/engineering, the purchase of buses or other rolling stock/turnkey, professional services or operational service, where federal funds will be used to pay for at least a portion of the goods or services.** The Lobbying requirements mandate the maximum flow down, pursuant to Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352(b)(5) and 49 C.F.R. Part 19, Appendix A, Section 7. Byrd Anti-Lobbying Amendment, 31 U.S.C. 1352, as amended by the Lobbying Disclosure Act of 1995, P.L. 104-65 [to be codified at 2 U.S.C. § 1601, et seq.] - Contractors who apply or bid for an award of $100,000 or more shall file the certification required by 49 CFR part 20, "New Restrictions on Lobbying." Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier shall also disclose the name of any registrant under the Lobbying Disclosure Act of 1995 who has made lobbying contacts on its behalf with non-Federal funds with respect to that Federal contract, grant or award covered by 31 U.S.C. 1352. Such disclosures are forwarded from tier to tier up to the recipient.

11. ACCESS TO RECORDS AND REPORTS (49 U.S.C. 5325, 18 CFR 18.36 (i), 49 CFR 633.17) **Applies to all contracts valued at $3,000 or more where federal funds will be used to pay for at least a portion of the purchase.** The following access to records requirements apply to this Contract:

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

2. Where the Purchaser is a State and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 633.17, Contractor agrees to provide the Purchaser, the FTA Administrator or his authorized representatives, including any PMO Contractor, access to the Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311. By definition, a major capital project excludes contracts of less than the simplified acquisition threshold currently set at $100,000.

3. Where the Purchaser enters into a negotiated contract for other than a small purchase or under the simplified acquisition threshold and is an institution of higher education, a hospital or other non-profit organization and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 19.48, Contractor agrees to provide the Purchaser, FTA Administrator, the Comptroller General of the United States or any of their duly authorized representatives with access to any books, documents, papers and record of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions.

4. Where any Purchaser which is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 U.S.C. 5325(a) enters into a contract for a capital project or improvement (defined at 49 U.S.C. 5302(a)1) through other than competitive bidding, the Contractor shall make available records related to the contract to the Purchaser, the Secretary of Transportation and the Comptroller General or any authorized officer or employee of any of them for the purposes of conducting an audit and inspection.

5. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

6. The Contractor agrees to maintain all books, records, accounts and reports required under this contract for a period of not less than three years after the date of termination or expiration of this contract, except in the event of litigation or settlement of claims arising from the performance of this contract, in which case Contractor agrees to maintain same until the Purchaser, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto. Reference 49 CFR 18.39(i)(11).

7. FTA does not require the inclusion of these requirements in subcontracts.

Sources of Authority:  
1. 49 USC 5325 (a)  
2. 49 CFR 633.17  
3. 18 CFR 18.36 (i)

12. FEDERAL CHANGES (49 CFR Part 18) Applies to all contracts and subcontracts at valued at $3,000 or more where federal funds will be used to pay for at least a portion of the equipment. Contractor shall at all times comply with all applicable FTA regulations, policies, procedures and directives, including without limitation those listed directly or by reference in the Master Agreement between Purchaser and FTA, as they may be
amended or promulgated from time to time during the term of this contract. Contractor's failure to so comply shall constitute a material breach of this contract.

13. BONDING REQUIREMENTS **Applies to all construction or facility improvement contracts or subcontracts exceeding $100,000, where federal funds will be used to pay for at least a portion of the project. Such contracts must meet, at least, the minimum requirements prescribed herein.** Not Applicable.

14. CLEAN AIR (42 U.S.C. 7401 et seq., 40 CFR 15.61, 49 CFR Part 18) **Applies to all contracts and subcontracts with a value exceeding $100,000 or with indefinite quantities more than $100,000 in any year, where federal funds are employed.**

(1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. §§ 7401 et seq. The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

(2) The Contractor also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with Federal assistance provided by FTA.

15. RECYCLED PRODUCTS (42 U.S.C. 6962, 40 CFR Part 247, Executive Order 12873) Applies to the purchase of items designated by the EPA when the purchaser or contractor procures $10,000 or more of the items during the fiscal year using federal funds. (Not applicable)

16. DAVIS-BACON AND COPELAND ANTI-KICKBACK ACTS (40 USC 3141, et seq. and 18 USC 874, 29 CFR 5.5(a) **Applies to contracts for construction or maintenance where federal funds are used where the value exceeds $2,000.**

Davis-Bacon and Copeland Anti-Kickback Acts

(1) **Minimum wages** - (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover
the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) Except with respect to helpers as defined as 29 CFR 5.2(n)(4), the work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and

(4) With respect to helpers as defined in 29 CFR 5.2(n)(4), such a classification prevails in the area in which the work is performed.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes
a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(v)(A) The contracting officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

1. The work to be performed by the classification requested is not performed by a classification in the wage determination; and
2. The classification is utilized in the area by the construction industry; and
3. The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination with 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(v)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(2) Withholding - The PDRTA shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount
of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the PDRTA may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) **Payrolls and basic records** - (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the PDRTA for transmission to the Federal Transit Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under section 5.5(a)(3)(i) of Regulations, 29 CFR part 5. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, DC 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

1. That the payroll for the payroll period contains the information required to be maintained under section 5.5(a)(3)(i) of Regulations, 29 CFR part 5 and that such information is correct and complete;

2. That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

3. That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Federal Transit Administration or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) **Apprentices and trainees** - (i) **Apprentices** - Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeymen's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator of the Wage and Hour Division of the U.S. Department of Labor determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) **Trainees** - Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not
be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) **Equal employment opportunity** - The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) **Compliance with Copeland Act requirements** - The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) **Subcontracts** - The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the Federal Transit Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) **Contract termination: debarment** - A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) **Compliance with Davis-Bacon and Related Act requirements** - All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) **Disputes concerning labor standards** - Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) **Certification of eligibility** - (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract.
contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).


17. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT (40 USC 3701(b)(3)(A)(iii), 40 USC 3701(b)(1)(B)(iii) and (b)(2), 29 CFR 5.2(h), 49 CFR 18.36(i)(6) Applies only to contracts valued at greater than $100,000.

Contract Work Hours and Safety Standards

(1) Overtime requirements - No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages - In the event of any violation of the clause set forth in paragraph (1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.

(3) Withholding for unpaid wages and liquidated damages - The (write in the name of the grantee) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.

(4) Subcontracts - The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section.

18. [ RESERVED ]

19. NO GOVERNMENT OBLIGATION TO THIRD PARTIES Applies to all contracts valued at $3,000 or more, where federal funds are used.
(1) The Purchaser and Contractor acknowledge and agree that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of the underlying contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this contract and shall not be subject to any obligations or liabilities to the Purchaser, Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.

(2) The Contractor agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.


(1) The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § § 3801 et seq. and U.S. DOT regulations, "Program Fraud Civil Remedies," 49 C.F.R. Part 31, apply to its actions pertaining to this Project. Upon execution of the underlying contract, the Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract or the FTA assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.

(2) The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA under the authority of 49 U.S.C. § 5307, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on the Contractor, to the extent the Federal Government deems appropriate.

(3) The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

21. TERMINATION (49 U.S.C.Part 18, FTA Circular 4220.1E) Applies to all contracts valued in excess of $10,000 where federal funds are employed. The termination clause in the base contract or specifications, in that order, takes precedence over the following provision, provided, however, that all contracts valued in excess of $10,000 must meet the following minimum requirements.

a. Termination for Convenience (General Provision) The PDRTA may terminate this contract, in whole or in part, at any time by written notice to the Contractor when it is in the Government's best interest. The Contractor shall be paid its costs, including contract close-out costs, and profit on work performed up to the time of termination. The Contractor shall promptly submit its termination claim to PDRTA to be paid the Contractor. If the Contractor has any property in its possession belonging to the PDRTA, the Contractor will account for the same, and dispose of it in the manner the PDRTA directs.
b. Termination for Default [Breach or Cause] (General Provision) If the Contractor does not deliver supplies in accordance with the contract delivery schedule, or, if the contract is for services, the Contractor fails to perform in the manner called for in the contract, or if the Contractor fails to comply with any other provisions of the contract, the PDRTA may terminate this contract for default. Termination shall be effected by serving a notice of termination on the contractor setting forth the manner in which the Contractor is in default. The contractor will only be paid the contract price for supplies delivered and accepted, or services performed in accordance with the manner of performance set forth in the contract.

If it is later determined by the PDRTA that the Contractor had an excusable reason for not performing, such as a strike, fire, or flood, events which are not the fault of or are beyond the control of the Contractor, the PDRTA, after setting up a new delivery of performance schedule, may allow the Contractor to continue work, or treat the termination as a termination for convenience.

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

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

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

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

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

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

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

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

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

h. Termination for Default (Construction) If the Contractor refuses or fails to prosecute the work or any separable part, with the diligence that will insure its completion within the time specified in this contract or any extension or fails to complete the work within this time, or if the Contractor fails to comply with any other provisions of this contract, the PDRTA may terminate this contract for default. The PDRTA shall terminate by delivering to the Contractor a Notice of Termination specifying the nature of the default. In this event, the Recipient may take over the work and compete it by contract or otherwise, and may take possession of and use any materials, appliances, and plant on the work site necessary for completing the work. The Contractor and its sureties shall be liable for any damage to the Recipient resulting from the Contractor's refusal or failure to complete the work within specified time, whether or not the Contractor's right to proceed with the work is terminated. This liability includes any increased costs incurred by the PDRTA in completing the work.

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

1. the delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include: acts of God, acts of the Recipient, acts of another Contractor in the performance of a contract with the Recipient, epidemics, quarantine restrictions, strikes, freight embargoes; and

2. the contractor, within [10] days from the beginning of any delay, notifies the PDRTA in writing of the causes of delay. If in the judgment of the PDRTA, the delay is excusable, the time for completing the work shall be extended. The judgment of the PDRTA shall be final and conclusive on the parties, but subject to appeal under the Dispute clauses.

If, after termination of the Contractor's right to proceed, it is determined that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the termination had been issued for the convenience of the PDRTA.

i. Termination for Convenience or Default (Architect and Engineering) The PDRTA may terminate this contract in whole or in part, for the Recipient's convenience or because of the failure of the Contractor to fulfill the contract obligations. The PDRTA shall terminate by delivering to the Contractor a Notice of Termination specifying the nature, extent, and effective date of the termination. Upon receipt of the notice, the Contractor shall (1) immediately discontinue all services affected (unless the notice directs otherwise), and (2) deliver to the Contracting Officer all data, drawings, specifications, reports, estimates, summaries, and other information and materials accumulated in performing this contract, whether completed or in process.
If the termination is for the convenience of the PDRTA, the Contracting Officer shall make an equitable adjustment in the contract price but shall allow no anticipated profit on unperformed services.

If the termination is for failure of the Contractor to fulfill the contract obligations, the PDRTA may complete the work by contact or otherwise and the Contractor shall be liable for any additional cost incurred by the PDRTA.

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

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

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

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

22. GOVERNMENT-WIDE DEBARMENT AND SUSPENSION (NONPROCUREMENT) (49 CFR Part 29, Executive Order 12549) Applies to all contracts and subcontracts valued at or expected to exceed $25,000 where federal funds are employed. This contract is a covered transaction for purposes of 49 CFR Part 29. As such, the contractor is required to verify that none of the contractor, its principals, as defined at 49 CFR 29.995, or affiliates, as defined at 49 CFR 29.905, are excluded or disqualified as defined at 49 CFR 29.940 and 29.945.

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

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

The certification in this clause is a material representation of fact relied upon by the PDRTA. If it is later determined that the bidder or proposer knowingly rendered an erroneous certification, in addition to remedies available to the PDRTA, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment. The bidder or proposer agrees to comply with the requirements of 49 CFR 29, Subpart C while this offer is valid and throughout the period of any contract that may arise from...
# PRIVACY ACT (5 U.S.C. 552)

Applies to all contracts valued at $3,000 or more employing federal funds.

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

1. The Contractor agrees to comply with, and assures the compliance of its employees with, the information restrictions and other applicable requirements of the Privacy Act of 1974, 5 U.S.C. § 552a. Among other things, the Contractor agrees to obtain the express consent of the Federal Government before the Contractor or its employees operate a system of records on behalf of the Federal Government. The Contractor understands that the requirements of the Privacy Act, including the civil and criminal penalties for violation of that Act, apply to those individuals involved, and that failure to comply with the terms of the Privacy Act may result in termination of the underlying contract.

2. The Contractor also agrees to include these requirements in each subcontract to administer any system of records on behalf of the Federal Government financed in whole or in part with Federal assistance provided by FTA.

# CIVIL RIGHTS REQUIREMENTS


Applies to all contracts valued at $3,000 or more that employ federal funds.

The following requirements apply to the underlying contract:

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

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

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

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

(c) **Disabilities** - In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, the Contractor agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

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

25. BREACHES AND DISPUTE RESOLUTION (49 CFR Part 18, FTA Circular 4220.1E) **Applies to all contracts valued in excess of $100,000.** Disputes arising in the performance of this Contract which are not resolved by agreement of the parties shall be decided in writing by the authorized representative of PDRTA's Executive Director. This decision shall be final and conclusive unless within [ten (10)] days from the date of receipt of its copy, the Contractor mails or otherwise furnishes a written appeal to the Executive Director. In connection with any such appeal, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of its position. The decision of the Executive Director] shall be binding upon the Contractor and the Contractor shall abide by the decision.

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

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

Remedies - Unless this contract provides otherwise, all claims, counterclaims, disputes and other matters in question between the PDRTA and the Contractor arising out of or relating to this agreement or its breach will be decided in a court of competent jurisdiction within the State in which the PDRTA is located.

Rights and Remedies - The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law. No action or failure to act by the PDRTA, (Architect) or Contractor shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.
26. PATENT AND RIGHTS IN DATA (37 CFR Part 401, 49 CFR Parts 18 and 19) **Applies only to federally assisted research projects valued at $3,000 or more in which FTA finances the development of a product or information.** (Not applicable)

27. TRANSIT EMPLOYEE PROTECTIVE AGREEMENTS (49 U.S.C. § 5310, § 5311, and § 5333 29 CFR Part 215) **Applies only to transit operations performed by a Contractor such as purchased transportation and/or operational service agreements for an amount of $3,000 or more where federal funds are employed.** (Not applicable)

28. DISADVANTAGED BUSINESS ENTERPRISE (DBE) (49 CFR Part 26) **Applies to all DOT-assisted contracting activities where the contract value is $3,000 or more and where federal funds are employed.**

a. This contract is subject to the requirements of Title 49, Code of Federal Regulations, Part 26, *Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs.* PDRTA’s overall goal for participation of Disadvantaged Business Enterprises (DBE) is 2%. The agency’s overall goal for DBE participation is set on an annual basis, and is available upon request. No specific DBE participation is required for this procurement, but the PDRTA will accord a DBE with appropriate consideration.

b. The contractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of this DOT-assisted contract. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as PDRTA deems appropriate. Each subcontract the contractor signs with a subcontractor must include the assurance in this paragraph (see 49 CFR 26.13(b)).

c. Bidders/offerors are required to document sufficient DBE participation to meet these goals or, alternatively, document adequate good faith efforts to do so, as provided for in 49 CFR 26.53. Award of this contract is conditioned on submission of the following **sealed bid or initial proposal, prior to award:**

1. The names and addresses of DBE firms that will participate in this contract;

2. A description of the work each DBE will perform;

3. The dollar amount of the participation of each DBE firm participating;

4. Written documentation of the bidder/offeror’s commitment to use a DBE subcontractor whose participation it submits to meet the contract goal;

5. Written confirmation from the DBE that it is participating in the contract as provided in the prime contractor’s commitment; and

6. If the contract goal is not met, evidence of good faith efforts to do so.

The successful bidder/offeror will be required to report its DBE participation obtained through race-neutral
d. The contractor is required to pay its subcontractors performing work related to this contract for satisfactory performance of that work no later than 30 days after the contractor’s receipt of payment for that work from the PDRTA. In addition, **the contractor may not hold retainage from its subcontractors.**

e. The contractor must promptly notify PDRTA, whenever a DBE subcontractor performing work related to this contract is terminated or fails to complete its work, and must make good faith efforts to engage another DBE subcontractor to perform at least the same amount of work. The contractor may not terminate any DBE subcontractor and perform that work through its own forces or those of an affiliate without prior written consent of PDRTA.

29. [ RESERVED ]

30. **INCORPORATION OF FEDERAL TRANSIT ADMINISTRATION (FTA) TERMS (FTA Circular 4220.1E) Applies to all contracts valued at $3,000 or more where federal funds are employed.** Incorporation of Federal Transit Administration (FTA) Terms - The preceding provisions include, in part, certain Standard Terms and Conditions required by DOT, whether or not expressly set forth in the preceding contract provisions. All contractual provisions required by DOT, as set forth in **FTA Circular 4220.1E** are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Agreement. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any (name of grantee) requests which would cause (name of grantee) to be in violation of the FTA terms and conditions.

31. **DRUG AND ALCOHOL TESTING (49 U.S.C. §5331, 49 CFR Parts 40 and 655) Applies to all contracts for purchased transportation or operational service agreements valued at $3,000 or more where federal funds are employed.** (Not applicable)
Appendix C- Bus Information

Listed below are the instructions and guidelines to be used when using Appendix “C” BUS INFORMATION.

1. A complete set of submittals must be made for each proposed bus model as identified in APPENDIX “C”.

2. A copy of Appendix “C” listing the required information must be included with the proposal submittals.

3. Submittal Categories:
   - **Description**-Information in the form of a text description about the proposed bus that demonstrates compliance with the specification.
   - **Test Results**-Information consisting of the test results from a test procedure referred to in the specification.
   - **Manufacturer and Model #**-Information consisting of the manufacturer name and model # of a component that is usually manufactured by others.
   - **Drawing or Photograph**-Information in the form of a scale drawing, photograph or graphic representation to be submitted when a description is insufficient.
   - **Option**-Is not a submittal category. This column identifies the items that are quoted as an option. Submittals must be made as required.
   - **Deviation**-If a proposed bus does not conform to the specification, the deviation box must be checked and form 1.1.6.9 “Form for Proposal Deviation” must be submitted.
   - **Section/Page# in Proposal Submittal**-The location of the requested information in the proposal submittal must be listed in the appropriate box.

The requested information is intended to be the minimum amount of information to be submitted. Additional information may be submitted as necessary.
<table>
<thead>
<tr>
<th>Section #</th>
<th>Section Name</th>
<th>Description</th>
<th>Test Results</th>
<th>Mfg and Model #</th>
<th>Certification</th>
<th>Drawing or Photo</th>
<th>Option</th>
<th>Deviation</th>
<th>Section/Page # in Technical Submittal</th>
<th>NOTES</th>
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<tr>
<td>5.1.5.1</td>
<td>COMPLIANCE WITH FMVSS AND FMCSR</td>
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<td>Submit FMVSS certification</td>
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<td>COMPLIANCE WITH ADA</td>
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<td>5.1.5.3</td>
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<td></td>
<td>Compliance with NYSDOT Title 17, 720, 721, 722 &amp; 723</td>
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<td>Length of Bus Service Life</td>
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<td>Altoona Testing</td>
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<td>Results of Altoona test</td>
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<td>5.1.6.11</td>
<td>DESIGN OPERATING PROFILE</td>
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<td>Cold Weather Starting Requirements</td>
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<td>Elevation drawing</td>
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<td>Wheel Area Clearance</td>
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<td>Cross-section drawing</td>
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<td>Overhead drawing or graphic representation</td>
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<td>5.1.6.13.7</td>
<td>Maximum Axle Load</td>
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<td>Balanced Axle Load</td>
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<td>Seating/Standing Capacity</td>
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<td>Floor plan - show standing capacity calculation</td>
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<td>Elevation drawing</td>
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<td>Interior Headroom</td>
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APPENDIX D- JOB & TASK TIMES

INSTRUCTIONS

Listed below are the instructions and guidelines to be used when using APPENDIX “D” JOB AND TASK TIMES.

1. This schedule lists the intended amount of time to accomplish a job or task.

2. The bus manufacturer’s actual job and task time must be listed adjacent to each task for comparison.

3. If it is necessary to remove or disturb a part or component not related to the task, the name of the removed or disturbed part or component shall be listed. The amount of time that affects the unrelated part or component shall be included in the job/task time.
APPENDIX D- JOB & TASK TIMES

The job/task is for removal and replacement of the specified part or component unless otherwise stated.

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INSTRUCTIONS

Listed below are the instructions and guidelines to be used when using APPENDIX “E” DELIVERABLES AND CONTRACT REQUIREMENTS.

- This Schedule will be used to determine the materials, other than complete buses, to be furnished during the proposed 2-year agreement.

- Spare Components per Initial Bus Build - shall be quoted as an option to be purchased with the initial bus build on Appendix E. The price for a “spare component per bus” for an option must be included in Appendix H.

- Test Diagnostic Equipment Initial Bus Build - shall be quoted as an option to be purchased with the initial bus build.

- All other spare components shall be included in the complete bus unit cost and furnished as specified during every bus build including the initial bus build.

- All other test and diagnostic equipment shall be included in the complete bus unit cost and furnished as specified during every bus build including the initial bus build.

- All Materials to be shipped separately unless noted.

- When the requirements specify the provision of software, such software shall be installed and delivered in a PC or laptop as required and as specified by the software manufacturer.

  Exception: The engine and transmission software may be installed and delivered in the same laptop.

- If a spare component required by the initial bus build is not compatible with a different bus model purchased with a subsequent order, the bus manufacturer shall provide the cost of such component(s).

- Materials listed as an option must only be provided when PDRTA selects the option
# Appendix E, Deliverables and Contract Requirements

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<th>Section Name</th>
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<th>Spare Component - Initial Bus Build</th>
<th>Spare Component - Per # of Buses</th>
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<th>Test/Diagnostic/Programming Equipment - Quan - Per Bus Build</th>
<th>Test/Diagnostic/Programming Equipment - Quan - Per # Buses</th>
<th>OEM Maintenance Manuals - Quan per Bus Build</th>
<th>Drawings/Schematics</th>
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Note: Shipped separately: 4 A, B, C 2 5

30 Operator's Manuals per bus build. *If the operator manuals do not adequately address the items identified in the "Operation Manuals" column, the requested # of manuals must be furnished.

NOTES:
**Complete system - bus mounted equipment w/cables
***Complete system - bus mounted equipment, no cables
A - Laptop computer with software installed
B - Handheld device
C - System manufacturer recommended or preferred method
APPENDIX “F”
WARRANTY OFFERING

INSTRUCTIONS

Listed below are the instructions and guidelines to be used when using APPENDIX “F” WARRANTY OFFERING.

- This schedule lists the intended warranty for various subsystems and components on the proposed bus.

- A copy of Appendix F” listing the required information must be included with the bid submittals.

- The original equipment manufacturer (OEM) and/or bus manufacturer’s warranty offering must be listed next to each corresponding entry for comparison.

- If an OEM and/or bus manufacturer offers a warranty for a subsystem or component not listed on Appendix F, the warranty must be listed separately and attached to the warranty submittal.

- If a warranty offering does not exceed the intended warranty, an optional cost must be provided as requested to achieve the level of the intended warranty.

- When necessary, the additional warranty cost for a component must be listed individually in the “notes" column of Appendix F and not included in the bus price.

- The additional warranty for the hybrid system must also be listed separately and not be included in the option price.

- The warranty offering will be scored based on whether or not the intended warranty is not achieved, matched or exceeded and the cost of additional warranty as indicated.
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### Appendix F, Warranty Offering

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### Appendix F, Warranty Offering

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<th>Bus Manufacturer Warranty - Months/Mileage (K)</th>
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General Project Requirements

1. The vendor must have a demonstrated track record of delivery of systems of a similar nature. A minimum of three reference projects should be provided to demonstrate the operation and satisfaction of transit agencies with the manufacturer’s solutions. In addition, further reference projects should be listed to reinforce the acceptance of products in transit agencies.

2. Equipment proposed must be fully tested and proven to provide reliable operation in the transit bus environment. Test reports must be available to demonstrate compliance to environmental standards.

3. Proposed equipment shall have demonstrated field performance to prove the reliability factors.

4. The MDVR should be manufactured, fabricated, assembled, finished and documented with workmanship of the highest production quality. Manufacturing facilities should be registered to ISO 9000:2000 standards.

MDVR Recorder Unit Technical Requirements

General

1. The MDVR must be ruggedized for operation in harsh environments, such as those found in mobile applications for rail, bus and public safety vehicles, as well as in severe industrial settings.

2. The MDVR shall be designed with a mounting system that allows the unit to be installed in tight enclosed spaces (typical in the transit environment – under a seat, in a cabinet).

3. The MDVR shall be able to be mounted horizontally or vertically.

4. The MDVR must be housed in a rugged steel enclosure. The MDVR must have a removable storage subsystem that requires a lock for removal.

5. The MDVR shall support software upgrades over a network connection (wired or wireless).

Environmental

6. The MDVR will be specifically designed and tested to comply with automotive power standards for both 12VDC (9-18V) and 24VDC (18-36V) systems as per SAE-J1455. The unit will automatically detect and switch to required input voltages. A test report must be available to demonstrate compliance.

7. The MDVR shall provide a built-in power back-up to protect system operation against power brownouts, spikes and other fluctuations as defined in J1455 and against any other accidental, short-term power interruptions.

8. Upon main power loss, an internal power backup shall keep the MDVR (including all connected peripherals) running. If power is not restored, the MDVR must execute graceful shutdown.
9. The MDVR must be designed and tested to withstand severe levels of shock and vibration in mobile environments expected in a transit bus environment. In addition, the MDVR must accept a shock equal to 30 g’s and remain operational. A test report must be available to demonstrate compliance.

10. The MDVR must be designed to meet extreme standards for dust and water ingress protection required for the transit vehicle environment, and must be designed to meet IP-65 ingress standards.

11. The MDVR shall be designed for a normal operating temperature range -25°C to +45°C. The MDVR shall have protective temperature monitoring.

12. The MDVR will meet Emissions and Immunity levels as specified by SAE J1455, and must be verified from an accredited laboratory. A test report demonstrating compliance will be available.

13. The MDVR must meet applicable safety standards, and a test report demonstrating compliance must be available.

**Functional**

14. The MDVR shall have separate connections for the main vehicle voltage and the vehicle ignition detection. The ignition connection will provide main unit on/off functionality.

15. When the MDVR is off, it shall not draw more than 10mA from the main vehicle battery system.

16. When the MDVR is operating it must not draw more than 200 watts from the main vehicle power system.

17. The MDVR shall monitor the ignition connection and upon the ignition turning on, the MDVR shall automatically start, and begin recording.

18. The MDVR shall monitor the ignition connection and when the MDVR is operations, if the ignition turns off, the MDVR shall begin a preprogrammed shutdown delay, and continue to record until this delay has expired. The unit will then initiate a graceful shutdown sequence. This programmable delay will be between 0 and 30 minutes.

19. The vendor must specify the required fuse rating for the MDVR system.

20. Access to a MDVR by a user must be logged in an audit file. This audit file must detail the actions of the user such as configuration changes and access to recorded video clips.

21. The MDVR shall support a method of video authentication and this must be provided using a secure cryptographic method. Watermarking of images is not acceptable.

22. The MDVR will have 12 video inputs on standard bulkhead mount BNC connector. The video inputs will be capable of accepting NTSC or PAL video inputs.

23. The MDVR shall be capable of an aggregate frame rate of 240 frames per second of CIF, or 120 frames per second of 4CIF.

24. The MDVR must provide independent preconditioned (clean) 12 VDC current limited power to each of the camera inputs.

25. The MDVR must monitor the health of the camera channels and report Camera Signal Loss or Camera Power Over-current.
26. The MDVR must optionally be able to detect and report Camera Obscurement.
27. The MDVR unit shall have a single video output which is capable of displaying video from selected camera inputs with a programmable dwell sequence being available for each display.
28. The MDVR will support up to two vehicle microphones using line level audio inputs. The MDVR will provide power for up to two vehicle microphones.
29. The MDVR shall provide a removable storage caddy system that provides up to 1.5 Terabytes of storage capacity using standard SATA hard drives.
30. The MDVR shall have all necessary environmental protection systems required to use standard SATA hard drives.
31. The MDVR shall have a hard drive health monitoring system that allows for predictive heath monitoring of hard drives.
32. The MDVR shall be able to interface with a GPS receiver so that it can integrate vehicle location, speed, direction and other telemetry data with the recordings. This data must be synchronized with video and audio for live view or future playback.
33. The MDVR unit shall allow for clock synchronization to occur manually, from a central location through a network time protocol (NTP) server when deployed with a wireless interface, or using GPS receiver data.
34. Should the synchronization with the GPS be lost, the time clock shall free run and auto synchronize when the GPS signal is restored.
35. The MDVR unit shall be capable of automatically adjusting the clock to Daylight Saving Time, and adjusting for deployment in varying time zones.
36. The MDVR shall support a wireless network connection (via an external cellular modem, CDMA 1XRTT and GSM/GPRS) for streaming of live video the vehicle to a central monitoring station, on demand or on alarm.
37. The MDVR shall support wireless network connectivity as per IEEE 802.11g using an integrated wireless bridge, or alternatively an external bridge (Mobile Router). The wireless network security shall be established using WPA-PSK encryption.
38. The MDVR unit shall operate in wired Ethernet or wireless mode using either DHCP or static IP addressing.
39. The MDVR shall support at least one RJ-45 10/100BaseT Ethernet network connection.
40. The MDVR shall provide a remote status indicator that can be located near the driver to indicate that the system is operating normally and recording.
41. The MDVR shall provide a remote event button to allow the driver to “mark” an incident for later review.
42. The MDVR shall support up to 6 alarm inputs.
43. The MDVR shall record in a first in first out basis. Where required for local codes, it shall be possible to place restrictions on the duration of recording retention.
44. Activation of the MDVR event button can mark video for protection until it is retrieved from the MDVR. Pre and post event data periods are programmable in this functionality.

45. Per-camera video capture rates shall have the option of being increased (to the maximum available based on system capability) on alarm or event.

46. The MDVR will have LED indicators on the front panel to allow field technicians to assess the condition of a recorder. At a minimum, the MDVR will provide a System LED to indicate that the system operating within appropriate parameters, and LED for hard drive health.

**MDVR Support Tools**

47. The MDVR will be provided with a software package that can access live or recorded content from the MDVR. This software package must be compatible with a standard PC running Windows® 95/98/NT/ME/2000/XP/7/8/10.

48. The software package will allow a user to conduct a recording search with the following parameters:
   (a) Date
   (b) Time & Duration
   (c) Camera Number(s)
   (d) Vehicle Number
   (e) GPS Locations (if present)

49. It shall be possible for the software package to provide Play forward/reverse (including, frame-by-frame), Play at 1x, 2x, 4x, 8x, and 16x speed, Enhance displayed image with brightness, contrast, hue, and saturation controls, Zoom up to 200%, Save video clips, Save and/or print still images.

50. The software shall allow the synchronization of all cameras and other recorded data during playback.

51. The MDVR must offer an Investigation Station with a USB2.0 interface that allows a removed Storage Subsystem to be connected to a PC Review Station to access the data stored on a hard drive.

52. The MDVR unit shall allow for the use of password authentication to prevent unauthorized access to the MDVR.

53. The MDVR shall support the retrieval of recording by using software on a standard laptop computer, and directly connecting via a standard RJ-45 Ethernet connection.

54. The MDVR shall support the retrieval of recordings by using wireless networking to the vehicle.

**Central MDVR Management and Applications**

**General Software Management System Requirements**

55. A software management system must be offered that will allow wireless connections to the MDVR in the vehicle for the purpose of providing applications.
56. The software management system shall offer an email utility to provide various alerts to personnel who monitor the system.

57. The software management system must be compatible with standard PC Server hardware and operating systems.

58. The software system shall be capable of monitoring thousands of MDVR systems concurrently.

59. The software management system shall have redundancy features such as clustering to enhance the availability of the applications that are offered.

60. The software management system must have a proven track record and reference accounts.

**Health and Status Monitoring Application**

61. The system shall offer an application that can automatically monitor the health and status of an MDVR fleet using wireless networks.

62. The health and status monitoring application must have the ability to be configured to generate an email when the MDVR indicates there is a problem. The email alert shall indicate the MDVR identification, and the nature of the problem detected and the location of the server that logged the event.

63. The health and status monitoring application must have a software client interface that allows the status of many MDVR units to be summarized. This software client must run on a standard PC running the Windows operating system.

64. The health and status monitoring application software client shall be able to be run remotely through a network connection to the software management system server(s).

65. The health and status monitoring application software client shall be connect to more than one software management system server at the same time.

66. The health and status monitoring application shall monitor the time since the last connection of an MDVR to the software management system server, and there shall be an alarm if this threshold is exceeded. This period shall be configurable.

67. The health and status monitoring application shall periodically have the ability to retrieve a 10 second recording from the MDVR for the purpose of post verifying the proper operation of cameras, microphones, and other peripherals that are connected. The period of these retrievals shall be programmable (i.e. every week, every day). The application shall store these recordings on the server in a pre-designated area for offline review.

**Software Update Application**

68. The system shall offer an application that when required, can automatically provide software updates to the MDVR units using wireless networks. Examples of updates can include software updates, or new features.

69. The application must have a software client interface that allows the status of many MDVR units to be summarized. This software client must run on a standard PC running the Windows operating system.

70. The client interface shall be able to be run remotely through a network connection to the software management system server.
71. The software update application client can report the progress of the distribution of software updates, and will summarize units updated, and units pending.

**MDVR Configuration Management Application**

72. The system shall offer an application that when required, can automatically distribute and manage changes to the configuration of the MDVR units. Examples of these changes may include camera frame rate and alarm tag event sequences.

73. The application must have a software client interface that allows the status of many MDVR units to be summarized. This software client must run on a standard PC running the Windows operating system.

74. The client interface shall be able to be run remotely through a network connection to the software management system server.

75. The software update application client can report the progress of the distribution of configuration changes, and will summarize units updated, and units pending.

76. The software update application must allow for different groups of configuration to be managed separately.

**Recording Download Application**

77. The system shall offer an application / capability that when required, can automatically retrieve recordings from the MDVR units using wireless networks. Extracted event data can be resident on a centralized server for retrieval by the Transit Authority.

78. The application must have a software client interface that allows the status of many MDVR units to be summarized. This software client must run on a standard PC running the Windows operating system.

79. The client interface shall be able to be run remotely through a network connection to the software management system server.

80. The Recording Download Application shall monitor the MDVR units for the occurrence of an “Event Tag”. If this is detected, the Recording Download Application shall automatically initiate a recording download of the preconfigured pre event and post event recordings.

81. The Recording Download Software Client shall allow the request for download of recordings by selecting a vehicle ID from a list and specifying date and time as well as duration of the requested download.

82. The Recording Download Application shall allow incremental downloads – if the vehicle is not in the presence of a wireless communication zone long enough to complete a required download, the application shall save the data downloaded, and finish the download when it re-establishes wireless communication. Downloads shall not restart.

83. It shall be possible to trigger an email upon completion of a recording download. The email shall identify the vehicle ID from which the data was downloaded, and shall provide a link to the video files.

**In-Vehicle Advertising Application**

84. The system shall offer an advertising feature that allows a series of JPEG images to be displayed on a monitor in the vehicle.
85. The advertising application shall accept a package of preformatted JPEG images, and shall automatically transfer the package of images to the MDVR over a wireless network.

86. The advertising application shall allow the image packages to be updated on a daily basis if required. The application will provide status on the transfer of the image packages to the MDVR’s.

Revision History

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<td>1</td>
<td>CCG</td>
<td>June 27, 2016</td>
<td>Necessary Updates</td>
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**Appendix H (1.1.6.10) PRICING MATRIX**

The buses and materials to be furnished under the proposed contract shall be priced as listed below. Refer to Appendix E – Deliverables and Contract Requirements - for a list of materials other than complete buses such as spare components, test and/or diagnostic equipment and OEM manuals to be furnished during the contract.

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<th>Cost of Optional “Test/Diagnostic/Programming Equipment - Initial Bus Build”</th>
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<td>List the cost of a complete, single bus without options for each bus model. Include the cost of “Spare Component - Per Bus” Appendix E, column 1. Do not include the cost of the components checked as an option in Appendix E. The cost of training per bus build and delivery per bus shall be provided separately in rows 3 and 4 of this document.</td>
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<td>List the cost of “training per bus build” – as submitted in the maintenance staff training plan per Section 2.5.1 of the instructions to bidders. Note - Eighty (80) training split into at least two weeks separated by one year.</td>
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<td>Vehicles are to be delivered to the Authority’s Florence, South Carolina headquarters at 313 S. Stadium Rd during normal business hours as submitted per Section 2.3.1.1 “Deliveries.” List the cost of delivery charges “per bus” to this location. Bus must be received with fuel tank at or above 75% of capacity.</td>
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<td>List the cost of &quot;Test/Diagnostic/Programming Equipment - Initial Bus Build&quot; – Appendix E, columns 4 &amp; 5. If the required equipment is different between bus models, list the cost of the different equipment.</td>
<td></td>
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<tr>
<td>List the cost change per single bus for Optional Other Brake Types – 5.3.3.1.2</td>
<td></td>
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<tr>
<td>List the cost change per single bus for Optional Hybrid Electric System – 5.4.1.2. Include the cost of “Spare Component - Per Bus” Appendix C, column 1, as checked as an option in Appendix E. Separately list the cost increase for &quot;Spare Components - Initial Bus Build&quot; – Appendix E, column 2 and &quot;Test/Diagnostic/Programming Equipment - Initial Bus Build&quot; – Appendix E, columns 4 &amp; 5</td>
<td></td>
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<tr>
<td>List the cost change per single bus for Optional Multiplex – RF Diagnostics – 5.10.5.2. Separately list the cost increase for &quot;Test/Diagnostic/Programming Equipment - Initial Bus Build&quot; – Appendix E, columns 4 &amp; 5</td>
<td></td>
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<tr>
<td>List the cost change per single bus for Automatic Vehicle Monitoring (AVM) – 5.10.4.7.7</td>
<td></td>
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<tr>
<td>List the cost per facility of Wireless Data Transfer– 5.10.4.7.10</td>
<td></td>
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</tr>
</tbody>
</table>
List the cost change per single bus for Automatic Passenger Counter (APC) – 5.10.4.9

List the cost change per single bus for Video Surveillance – 5.10.4.11

List the cost change per single bus for Optional BRT Design Styling Package (provide package inclusions) – 5.5.1.2

If an option is not available for a bus model, enter "N/A" for "Not Available".

Subsequent year pricing: for orders placed after 180 days from contract execution, an escalator will be applied to the bus model base price and options. The escalator will be determined by the percentage change in the Producers Price Index (PPI) category #WPU1413, Transportation Equipment, Truck and Bus Bodies, that is released by the Federal Government Bureau of Labor Statistics. Any increase as determined by the Producers Price Index shall be limited to a maximum of five percent (5%) per year (Refer to Instruction to Bidders section for more detail).
Appendix H (1.1.6.10) PRICING MATRIX

The buses and materials to be furnished under the proposed contract shall be priced as listed below. Refer to Appendix E – Deliverables and Contract Requirements - for a list of materials other than complete buses such as spare components, test and/or diagnostic equipment and OEM manuals to be furnished during the contract.

<table>
<thead>
<tr>
<th>35 foot bus</th>
<th>Cost of Optional “Spare Components - Initial Bus Build”</th>
<th>Cost of Optional “Test/Diagnostic/Programming Equipment - Initial Bus Build”</th>
<th>Cost Per Facility</th>
</tr>
</thead>
</table>

List the cost of a complete, single bus without options for each bus model. Include the cost of "Spare Component - Per Bus" Appendix E, column 1. Do not include the cost of the components checked as an option in Appendix E. The cost of training per bus build and delivery per bus shall be provided separately in rows 3 and 4 of this document.

List the cost of the "Recommended Spare Parts Inventory" - as submitted per Section 1.1.3.2.2 "Technical Proposal" bullet point # 8.

List the cost of “training per bus build” – as submitted in the maintenance staff training plan per Section 2.5.1 of the instructions to bidders. Note - Eighty (80) training split into at least two weeks separated by one year.

Vehicles are to be delivered to the Authority’s Florence, South Carolina headquarters at 313 S. Stadium Rd during normal business hours as submitted per Section 2.3.1.1 “Deliveries.” List the cost of delivery charges “per bus” to this location. Bus must be received with fuel tank at or above 75% of capacity.

List the cost of "Spare Components - Initial Bus Build" – Appendix E, column 2. Do not include components checked as an option in Appendix E. If the required components are different between bus models, list the cost of the different components.

List the cost of "Test/Diagnostic/Programming Equipment - Initial Bus Build" – Appendix E, columns 4 & 5. If the required equipment is different between bus models, list the cost of the different equipment.

List the cost change per single bus for Optional Other Brake Types – 5.3.3.1.2

List the cost change per single bus for Optional Hybrid Electric System – 5.4.1.2. Include the cost of “Spare Component - Per Bus” Appendix C, column 1, as checked as an option in Appendix E. Separately list the cost increase for "Spare Components - Initial Bus Build" – Appendix E, column 2 and "Test/Diagnostic/Programming Equipment - Initial Bus Build" – Appendix E, columns 4 & 5

List the cost change per single bus for Optional Multiplex – RF Diagnostics – 5.10.5.2. Separately list the cost increase for "Test/Diagnostic/Programming Equipment - Initial Bus Build" – Appendix E, columns 4 & 5

List the cost change per single bus for Automatic Vehicle Monitoring (AVM) – 5.10.4.7.7

List the cost per facility of Wireless Data Transfer – 5.10.4.7.10
List the cost change per single bus for Automatic Passenger Counter (APC) – 5.10.4.9

List the cost change per single bus for Video Surveillance – 5.10.4.11

List the cost change per single bus for Optional BRT Design Styling Package (provide package inclusions) – 5.5.1.2

If an option is not available for a bus model, enter "N/A" for "Not Available".

Subsequent year pricing: for orders placed after 180 days from contract execution, an escalator will be applied to the bus model base price and options. The escalator will be determined by the percentage change in the Producers Price Index (PPI) category #WPU1413, Transportation Equipment, Truck and Bus Bodies, that is released by the Federal Government Bureau of Labor Statistics. Any increase as determined by the Producers Price Index shall be limited to a maximum of five percent (5%) per year (Refer to Instruction to Bidders section for more detail).