Proposals will be received for the following by Chicago Transit Authority at the Bid Office – 2nd Floor, 567 West Lake Street, Chicago, Illinois, 60661-1498, no later than 3:30 P.M. on Monday, April 13, 2020:

Reg. C20FT102342998
Request for Proposals (RFP) for the Manufacture and Delivery of a Base Order of One Hundred (100) Diesel Engine Transit Buses; with Five (5) Options to Purchase up to Five Hundred (500) Additional Buses and Associated Spare Parts.

A Pre-Proposal meeting will be held on Wednesday, March 4, 2020 from 1:00 p.m. –3:00 p.m. at 567 W. Lake Street, Chicago, IL 2nd Floor Bid Office.

Questions regarding this RFP must be submitted in writing no later than 4:00 p.m. (CST) Monday, March 16, 2020 via e-mail to: lbejar@transitchicago.com. Vendors must submit their written questions in a Word document. Questions will not be accepted after this time and date.

For additional information, please contact Luis Bejar, Procurement Administrator, 312/681-2468.

The contractor will be required to furnish certified copies of any and all Insurance Policies required in relation to this contract prior to CTA's execution.

Chicago Transit Authority hereby gives notice that it will affirmatively ensure that in regard to any contract entered into pursuant to this advertisement, Disadvantaged Business Enterprise will be afforded full opportunity to submit responses to this invitation and will not be discriminated against on the grounds of race, color or national origin in consideration for an award.

PLEASE NOTE: Where proposals are sent by mail, delivery service or delivered in-person to the CTA Bid Office, the bidders shall be responsible for their delivery only to the Bid Office before the advertised due date and hour for the proposals. The Bid Office hours are Monday through Friday from 8:00 a.m. to 4:30 p.m. Chicago time, except holidays.

The right is reserved to accept any proposal or to reject any and all proposals.

All inquiries should be directed to and copies of the documents obtained from the Bid Office – 2nd Floor, 567 West Lake Street, Chicago, Illinois 60661-1498.

CHICAGO TRANSIT AUTHORITY

By: Ellen McCormack
Vice President
Purchasing & Supply Chain

February 19, 2020
February 19, 2020

Subject: Requisition No. C20FT102342998 - Request for Proposal (RFP) for the Manufacture and Delivery of a Base Order of One Hundred (100) Diesel Engine Transit Buses; with Five (5) Options to Purchase up to Five Hundred (500) Additional Buses and Associated Spare Parts.

Dear Proposer:

The Chicago Transit Authority is seeking proposals for the subject project. Proposal packages are to be delivered to:

Delivery Service, Drop Off, or Mail
Chicago Transit Authority
Bid Office - 2nd Floor
567 W. Lake Street
Chicago, IL 60661-1465

Pre-Proposal Meeting: Wednesday, March 4, 2020 from 1:00 pm – 3:00 pm at 567 W. Lake Street, 2nd Floor Bid Office, Chicago, IL 60661.

Due Date: Monday, April 13, 2020

Proposals must be received no later than 3:30 p.m., Central Standard Time (CST)

Where proposals are sent by delivery service or delivered in-person to the CTA Bid Office, the proposers shall be responsible for their delivery to the Bid Office, no later than the advertised date and hour for the receipt of the proposals. If the delivery of the proposal is delayed beyond the date and hour set for the receipt of the proposals, proposals thus delayed will not be considered and will be returned unopened. The Bid Office hours are Monday through Friday from 8:00 am to 4:30 pm Chicago time, except holidays.

Written questions regarding this RFP will be accepted no later than 4:00 p.m. Chicago Time. Date: Monday, March 16, 2020. You may send written questions to Luis Bejar via e-mail at lbejar@transitchicago.com.

Your response should identify the requisition number, the name of the project, the name and address of your firm, a contact person and phone number on the cover page in each section.

Sincerely,

[Signature]
John Reinitz
Director, Purchasing

c: File
CHICAGO TRANSIT AUTHORITY

Request for Proposals (RFP)

FOR

MANUFACTURE AND DELIVERY OF A BASE ORDER OF ONE HUNDRED (100) DIESEL ENGINE TRANSIT BUSES; WITH FIVE (5) OPTIONS TO PURCHASE UP TO FIVE HUNDRED (500) ADDITIONAL BUSES AND ASSOCIATED SPARE PARTS.

REQUISITION NO. C20FT102342998

Proposals must be submitted by

DELCIVERY SERVICE, MAIL OR DROP OFF:

Chicago Transit Authority
Bid Office – 2nd Floor
567 West Lake Street
Chicago, IL 60661-1498

Confidentiality and Non-Disclosure: Firms requiring additional assistance must only contact Luis Bejar, Senior Procurement Administrator at (312) 681-2468. Firms, including all team sub-consultants, who contact any other CTA personnel either verbally or in writing, concerning this solicitation package, are in violation of the procedures for this procurement and any submitted proposals may be disqualified.

ISSUED BY:
Chicago Transit Authority, Purchasing Department
567 W. Lake Street, Chicago, IL 60661-1498
Ellen McCormack, Vice President, Purchasing & Supply Chain
Dorval R. Carter Jr., President
Terry Peterson, Chairman
REQUEST FOR PROPOSALS

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SECTION 1: GENERAL REQUIREMENTS

1.1 CTA Background Information

The Chicago Transit Authority (CTA) operates the nation’s second largest public transportation system. On an average weekday, 1.5 million rides are taken on CTA. The CTA is a regional transit system that serves 35 suburbs, in addition to the City of Chicago, and provides 80 percent of the public transit trips in the six-county Chicago metropolitan area either with direct service or connecting service to Metra and Pace.

CTA has 1,862 buses that operate 127 routes and 1,519 route miles. Buses make about 19,237 trips a day and serve 10,715 bus stops.

On the rapid transit system, CTA’s 1,458 rail cars operate eight routes and 224.1 miles of track. CTA trains make about 2,318 trips each day and serve 145 stations.

Chicago is one of the few cities in the world that has rail service to two major airports. CTA’s Blue Line ‘L’ can take customers to O’Hare International Airport. Orange Line trains, which operate clockwise on the Loop ‘L’ structure, travel to Midway Airport.

CTA also provides around-the-clock service on certain routes. During late night and early morning hours, major rail lines and some of CTA’s bus routes offer “Night Owl” service, much of it with connecting schedules and routing.

Additional information about the CTA and its services are available at www.transitchicago.com

Firms that have proven experience are invited to submit proposals to perform the work described in this RFP document. Issuance of this RFP does not commit the CTA to pay any costs incurred in the preparation of this proposal. All technical proposals are to be valid for a period of at least 180 days from the due date of the proposal. The Chicago Transit Authority reserves the right to reject any and all proposals, to negotiate with any or all firms, and to award a contract to the Proposer whose initial proposal is most advantageous to the CTA, without further discussion or negotiations.

1.2 Overview of Scope of Work

The Chicago Transit Authority (“CTA”) is soliciting proposals from Bus Manufacturers (hereinafter “contractor” or “proposer”) for a base order of one hundred (100) low floor, forty (40) foot, ADA accessible, air conditioned, diesel engine transit buses; with five (5) options to purchase up to five hundred (500) additional buses and delivery of associated spare parts.

Contractor will also furnish and deliver associated spare parts, provide relevant warranty services, provide relevant quality assurance documentation and compliance, and provide all other deliverables specified in the Contract. This section is intended as an overview; further detail is provided in Volume 1 - Bus Contract Terms.

1.3 Request for Pre-Offer Change or Approved Equal

Proposers may request, in writing, a clarification or interpretation of any aspect of the RFP, a change to any requirement of the RFP, or any addenda to the RFP. Requests may include suggested substitutes for specified items and for any brand names, which whenever used in this solicitation will mean the brand name or approved equal. Such written requests will be made to Luis Bejar, Sr. Procurement Administrator, Purchasing, on or before the deadline for submitting
questions. The Proposer making the request will be responsible for its proper delivery to the Authority as identified on the form Request for Pre-Offer Change or Approved Equal. Any request for a change to any requirement of the Contract documents must be fully supported with technical data, test results or other pertinent information showing evidence that the exception will result in a condition equal to or better than that required by the RFP, without a substantial increase in cost or time requirements.

All responses to Request for Pre-Offer Change or Approved Equal will be provided to all Proposers. Any response that is not confirmed by a written addendum will not be official or binding on the Authority.

If it should appear to a prospective Proposer 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 of the Contract or with any federal, state, local or Authority law, ordinance, rule, regulation or other standard or requirement, then the Proposer will submit a written request for clarification to the Authority within the time period specified above.

1.4 Addenda to RFP

The Authority reserves the right to amend the RFP at any time. Any amendments to the RFP will be described in written addenda. Notification of addenda will be distributed to all prospective Proposers officially known to have received the RFP. Failure of any prospective Proposer to receive the notification or addenda will not relieve the Proposer from any obligation under the RFP therein. All addenda issued will become part of the RFP. Prospective Proposers will acknowledge the receipt of each individual addendum in their Proposals on the form Acknowledgement of Addenda. Failure to acknowledge the Proposal receipt of addenda may at the Authority's sole option disqualify the Proposal.

If the Authority determines that the addenda requires significant changes in the preparation of Proposals, the deadline for submitting the Proposals may be postponed no fewer than ten (10) days from the date of issuance of addenda or by the number of days that the Authority determines will allow Proposers sufficient time to revise their Proposals. Any new Due Date will be included in the addenda and advertised.

Notification of Addenda will be posted on CTA's website and provided to all firms who received or requested this RFP document from the Authority via email. If an addendum is issued amending this RFP, all provisions that are not modified remain unchanged. While the Authority is confident in the full functionality of this system, as a legal matter, notification services offered through the on-line site are not guaranteed and users of the notification system are ultimately responsible for reviewing postings to the site. The Authority disclaims all liability for damages caused by the use of this site or the information it contains.

1.5 Proposer's Cost and Ownership of the Proposals

Each Proposer responding to this RFP acknowledges and agrees that the preparation of all materials for submittal to the CTA and all presentations, related costs and travel expenses are at the Proposer’s sole expense, and the CTA is not, under any circumstances, responsible for any cost or expense incurred by the Proposer. The CTA retains full title to and ownership of all Proposals, including all copyright and other intellectual property rights, if any, to the unique design elements of the Proposals; provided, however, the Proposers may use and reproduce any design or other elements of a Proposal that are standard and not unique to the subject of the proposal.

All RFP documents are and will remain the property of the CTA. Proposers are instructed to use
the information contained in the RFP and related parts in the preparation of their Proposals and, if awarded the Contract by the CTA, to use such information in the implementation of the final design of the Project. No other use of the information contained in the RFP and related parts, or any part thereof, by any of the Proposers is authorized or permitted.

1.6 Examination of the Contract Documents

Before Proposal submission, the Proposer must carefully examine the form of the Contract Documents. By submitting a Proposal, the Proposer represents that it has thoroughly examined and become familiar with the requirements of this RFP and that it is capable of performing the Work described in Volume 1 to the objectives of the CTA.

If the proposal is accepted, the Proposer will be responsible for all proposal errors or omissions resulting from the Proposer’s failure or neglect to comply with these instructions. The CTA will, in no case, be responsible for any additional costs or expenses resulting from such failure or neglect.

1.7 Validity of Proposals

Price and Technical Proposals and subsequent offers will be valid for a period of one hundred eighty (180) days from the proposal due date.

1.8 Conflict Of Interest

The Proposer is prohibited from performing any work or services for the CTA which would result in an organizational conflict of interest (OCI) for any person (including an entity or other non-natural person). An organizational conflict of interest occurs when (a) a person is unable or potentially unable to render impartial assistance or advice to the CTA, (b) a person’s objectivity in performing service to the CTA is or might otherwise be impaired, or (c) a person has an unfair competitive advantage. In general, OCIs fall into three categories: (x) a person has access to non-public information as part of its performance of services to the CTA and that information might provide that person with a competitive advantage in a future procurement; (y) a person, as part of its performance of contract responsibility to the CTA, has set the ground rules for the performance of a future contract by, for example, writing the statement of work or defining the specifications; and (z) a person, either through an assessment of performance under another contract or through an evaluation of proposals, must assess its own work or that of a competitor.

The Proposer has sole responsibility for compliance with this provision and must submit details of any real or apparent conflict of interest issues as they currently or potentially exist. In the event of a conflict of interest, Proposer must provide the CTA with recommendations to avoid, neutralize or mitigate the conflict, in compliance with Federal Transit Administration rules and all other applicable regulations. The CTA’s Purchasing Department in consultation with the CTA’s General Counsel will make the final determination as to whether a conflict of interest exists and whether the Proposer’s recommendations to avoid neutralize or mitigate it are sufficient.

1.9 Bid Protest Procedure

Any protest regarding this solicitation, or an evaluation or award hereunder, must be submitted in accordance with the CTA’s bid protest procedures, available at http://www.transitchicago.com/asset.aspx?Assetid=5857.

1.10 Taxes

Federal Excise Tax does not apply to materials purchased by the Authority by virtue of Exemption Certificate No. 36-73-0234K. Illinois Retailers Occupation Tax, Use Tax, and Municipal Retailers’ Occupational Tax do not apply to materials or services purchased by the CTA by virtue of Chapter 70 Illinois Compiled Statutes Section 3605/33, as amended. These taxes must not be
included in any of the prices quoted in the Proposal. Illinois Tax Exemption Identification number for CTA is E9978-2987-07.

1.11 Opening of Proposals

Proposals will not be publicly opened. All Proposals and evaluations will be kept strictly confidential throughout the evaluation, negotiation, and selection process. Only members of the Evaluation Committee and other CTA officials, employees, and agents having a legitimate interest will be provided access to the Proposals and evaluations during this period.

1.12 Confidentiality of Proposals

The CTA is subject to Illinois’ Freedom of Information Act, 5 ILCS 140/1 et seq., which provides a process by which the public can access records in the CTA’s possession or control, including but not limited to each Proposal submitted to the CTA. For more information about the Freedom of Information Act and instructions on marking trade secret or other commercially confidential information within each Proposal submission see Volume 3, Attachment L for the Freedom of Information Declaration that must be included with the Price Proposal submission.

1.13 Acceptance of Proposals

The CTA reserves the right to reject any and all Proposals for sound business reasons, to undertake discussions with one or more Proposers, and to accept that Proposal or modified Proposal which, in its judgment, will be advantageous to the CTA, price and other evaluation criteria considered. The CTA reserves the right to consider any specific Proposal noncompetitive if it is conditional or not prepared in accordance with the instructions and requirements of this RFP.

The CTA reserves the right to waive any defects, or minor informalities or irregularities in any Proposal which the CTA in its sole discretion determines do not materially affect the Proposal or prejudice other Proposals.

1.14 Modification or Withdrawal of Proposals

A modification of a Proposal already received will be accepted by the Authority only if the modification is received prior to the Proposal Due Date, is specifically requested by the Authority, or is made with a requested BAFO. All modifications will be made in writing and executed and submitted in the same form and manner as the original Proposal.

A Proposer may withdraw a Proposal already received prior to the Proposal Due Date by submitting to the Authority, in the same manner as the original Proposal, a written request for withdrawal executed by the Proposer’s authorized representative. After the Proposal Due Date, a Proposal may be withdrawn only if the Authority fails to award the Contract within the Proposal validity period prescribed in “Validity of Proposals,” or any agreed-upon extension thereof. The withdrawal of a Proposal does not prejudice the right of a Proposer to submit another Proposal within the time set for receipt of Proposals.

1.15 Conditions, Exceptions, Reservations or Understandings

Proposers are cautioned to limit exceptions, conditions and limitations to the provisions of this RFP, as they may be determined to be so fundamental as to cause rejection of the Proposal for not responding to the requirements of the RFP. Proposers are also encouraged to submit questions regarding proposed exceptions during the question answer period.
Any and all Deviations must be explicitly, fully and separately stated in the Proposal by completing the Form for Proposal Deviation, setting forth at a minimum the specific reasons for each Deviation so that it can be fully considered and, if appropriate, evaluated by the Authority. All Deviations will be evaluated in accordance with the appropriate evaluation criteria and procedures and may result in the Proposer receiving a less favorable evaluation than without the Deviation.

The Form for Proposal Deviation will be included in the Technical package.

1.16 Availability of Funds

This procurement is subject to the availability of funding from financial assistance contracts between the Illinois Department of Transportation, Federal Transit Administration, Regional Transportation Authority and the Chicago Transit Authority. The CTA’s obligation hereunder is contingent upon the availability of appropriated funds from which payment for the Contract purposes can be made. No legal liability on the part of the CTA for any payment will arise until funds are made available to the Contracting Officer for this Contract and until the Contractor receives notice of such availability and approval, 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.

1.17 Buy America

The Contractor agrees to comply with 49 USC 5323(j) and 49 CFR 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 CFR 661.7. A general public interest waiver from the Buy America requirements applies to microprocessors, computers, microcomputers, software or other such devices, which are used solely for the purpose of processing or storing data. This general waiver does not extend to a product or device that merely contains a microprocessor or microcomputer and is not used solely for the purpose of processing or storing data.

Separate requirements for rolling stock are set out at 49 USC 5323(j)(2)(C), 49 CFR 661.11. Rolling stock must be assembled in the United States and have at least a 70 percent domestic content.

A Bidder or Proposer must submit to the Authority the appropriate Buy America Certification with all offers on FTA-funded contracts, except those subject to a general waiver. Proposals that are not accompanied by a properly completed Buy America certification are subject to the provisions of 49 CFR 661.13 and may be rejected as nonresponsive.

1.18 Authority Treatment of Proprietary/Confidential Information

Public access to records of Illinois public bodies is governed by the Illinois Freedom of Information Act, 5 ILCS 140/1 et seq. (“FOIA”). Pursuant to an exemption available under FOIA, the Chicago Transit Authority can exempt from disclosure in response to a valid FOIA request proprietary, privileged or confidential, trade secrets or commercial and financial information submitted to CTA in response to an RFP or during a Contract with CTA. Such proprietary, privileged or confidential, trade secrets or commercial and financial information must be specifically identified and marked as such by the Proposer at the time that it submits such information to the CTA. Blanket-type identification by designating whole pages or sections as containing proprietary, privileged or confidential, trade secrets, or commercial and financial information will not assure confidentiality. The specific proprietary privileged or confidential, trade
secrets or commercial and financial information must be clearly identified as such. The Proposer will be solely responsible for ensuring that proprietary, privileged or confidential, trade secrets or commercial or financial information bears appropriate notices relating to its confidential character and is so labeled as such at the time that the Proposer submits such information to CTA.

In the event the CTA has questions regarding a Proposer’s identification of proprietary, privileged or confidential, trade secrets or commercial or financial information, the CTA will contact the person identified in the notice provision by the Proposer unless another person is specifically designated by the Proposer. For more information about the Freedom of Information Act Notice and the Freedom of Information Declaration, see Volume 3, Attachment L.

1.19 Factory and site visits

The Authority reserves the right to conduct factory visits of the Proposer's facilities and/or the facilities of major sub-suppliers included in the Proposal.

SECTION 2: TECHNICAL PROPOSAL REQUIREMENTS

2.1 Proposal Format Requirements

Proposals will be submitted in four (4) separately sealed packages identified below. Each package will be marked as specified below and will contain all the Proposal documents for which the package is required to be marked and will include no other documents. These same requirements will apply to any best and final offers (BAFOs) that may be requested.

Proposers will submit two original (marked clearly as such) hard copies, and 7 USB Flash Drives, each containing a non-copy protected, read only format electronic PDF copy of the Proposal to the Authority. In case of any discrepancies, the original will be considered by the Authority in evaluating the Proposal, and the electronic version is provided for the Authority's administrative convenience only.

The hard-copy Proposals will be prepared double-sided on 8½ × 11 in. paper in at least 11-point font. The hard copies will be contained in three-ring binders, the contents of which are identified on the outside. Use of 11 × 17 in. foldout sheets for large tables, charts or diagrams is permissible but should be limited. Elaborate formatting is not necessary. Do not provide promotional or advertising information, unless this information is requested and/or is necessary to support the technical submittal.

The CTA recognizes that some of the information requested will be representative; however, the Proposer will provide such information that is as close to the bus being proposed as possible.

The Proposer will submit the Proposal in an organized manner. The use of appropriate binders/folder with tabs and references to separately bind and package items is desired. The following subsections organize the structure of the Proposer's response to the proposal. Failure to comply with the instructions included in this Section may disqualify a Proposal from consideration.

If the Proposer is a corporation, the president or vice-president must sign all copies of the Proposal. In the event that the Proposal is executed by someone other than the president or vice president, a certified copy of the section of the corporate by-laws or resolution of the corporation that permits the person to execute the offer for the corporation must be furnished with the Proposal.

If the Proposer is a partnership or a joint venture, all partners or participants in the joint venture must sign all copies of the Proposal unless one partner or joint venture participant has been
authorized to sign for the partnership or joint venture, in which case evidence of such authority, satisfactory to the Director, Purchasing, must be submitted with the Proposal. If the Proposer is a sole proprietor, the sole proprietor must sign all copies of the Proposal. A partnership, joint venture, or sole proprietor operating under an assumed name must be registered with the Illinois County in which the entity is located, as provided in the Assumed Business Name Act, 805 ILCS 405 et seq., as amended. Proposals will not be publicly opened.

2.2 Package 1: Technical Proposal Requirements

The Technical Proposal must include the following and in the order as shown:

**Cover Letter**

The cover letter must include the Proposer’s commitment to provide the services described in *Volume 1 - Bus Contract Terms* in accordance with the Contract Documents, acknowledge receipt of all Addenda and include the Company name and address, requisition number, the name, title, address, telephone number, email address and signature of a representative of the firm who is authorized to negotiate a contract with the CTA and/or to whom CTA questions may be directed regarding the Proposal.

A. **Bus Technical Requirements**

Provide a description of the technical approach to this proposal according to *Volume 1 - Bus Contract Terms* that should include, but not be limited to the following:

1) **Overall Requirements, Physical Size & Power Requirements (TS 5, 6, & 7)**

The Proposer shall provide the CTA with the following:
- A certified weight slip for the curb weight of each axle and a certified weight slip for the total curb weight of proposed vehicle.
- A proposed seating layout and floor plan.
- A written comprehensive maintenance and long-term rehab/replacement plan encompassing buses for their entire useful life.
- A fully dimensioned plan and elevation drawing of the proposed vehicle.
- A general description of vehicle structure with materials used and assembly methods, any charts and manuals included in the description shall be referenced and not included.
- Analyses and testing, such as a Finite Element Analysis report for structure, vibration/shaker test report, and other analyses of structure to demonstrate compliance to specification requirements, full Altoona test reports.

2) **Fuel Economy, Engine, Cooling System & Transmission (TS 8, 9, 10 & 11)**

The Proposer shall provide:
- Test results from the Altoona fuel economy tests or other applicable test procedures will be provided to the Authority.
- Complete description of the propulsion system.

3) **Structure & Chassis (TS 19 – 37)**

The Proposer shall provide:
- Manufacturer’s specifications and drawings of the front and rear axles.
- Description of the braking system, parking/emergency brakes, including design, components, certification, performance and maintenance requirements.
- Manufacturer's specifications and drawings of the suspension system including leveling valves, air bags and shock absorbers.
- Description of air system, including design calculations, layout of system and manufacturer's specifications.
- Technical information on the steering system and steering geometry, including drawings and description of components and operation.
- Description and drawings of hydraulic systems.
- General description of vehicle structure with materials used and assembly methods, any charts and manuals included in the description shall be referenced and not included.
- Analyses and testing, such as a Finite Element Analysis report for structure, vibration/shaker test report, and other analyses of structure to demonstrate compliance to specification requirements.
- Report on structural defects experienced with the Contractor's proposed vehicle. Report shall include description and explanation of failure, time frame, transit property location, and remedial measures taken on vehicles and to address subsequent production.

4) Electrical, Electronic & Data Communication Systems and Telematics (TS 38 – 43)

The Proposer shall provide:
- Description of electrical system and components.
- Description of multiplex system including number of modules and interface with vehicle CAN and AVM/AVAS system.
- Description of representative vehicle wiring schematics representing routing and support of electrical harnesses and lines, including ladder diagram and wiring diagrams for all electrical compartments.
- Description and layout of fire detection system.
- Installation and wiring layout of CTA special components including, radio, AVAS, camera, etc. and detailed description of the compartments for these special components.

5) Driver provisions, controls & instrumentation (TS 44 – 47)

The Proposer shall provide:
- Representative layout of driver's controls and instrument panels.
- Representative layout of driver's seat and area, including relative dimensions (through the range of adjustments) to pedals, steering column, driver's barrier, front and dash panels, etc.
- Detailed prints of driver's barrier.

6) Heating, Ventilation & Air Conditioning (TS 52 – 59)

The Proposer shall provide:
- Description of cooling/heating system components and their installation, including radiator and mounting, booster pumps, fan(s), electrical schematics, control, etc.
- A representative schematic of cooling system and piping.

7) Exterior Panels, Finishes & Exterior Lighting and Interior Panels & Finishes (TS 60 – 75)

The Proposer shall provide:
• Door designs description including manufacturer of operating equipment and door linkage/panels.
• Description of paint(s) used and application process (provide manufacturer's specification sheet).
• Description of front and rear bumper assembly and installation on vehicle.
• Report(s) on major fleet defects experienced with the Contractor's proposed vehicle. Report shall include description and explanation of failure, time frame, transit property location, and remedial measures taken on vehicles and to address subsequent production.
• Description of flooring and sub flooring including materials and installation (provide manufacturer's specification sheet).
  Submit an interior lighting plan.

8) Passenger Accommodations (TS 76 – 79)

The Proposer shall provide:
• Fully dimensioned passenger seating layout showing seating capacity, standing capacity, seat pitch, hip-to- knee clearances and foot room. Aisle dimensions and vertical stanchion locations are also to be shown.
• Layout showing wheelchair circulation, turning radii and clearances at the front vestibule area, through the front wheel wells and at the securement locations.
• Detailed print of wheelchair ramp system including ramp dimensions, description of operating mechanism, non-skid surface covering, trim, resulting gaps and level changes between ramp and floor with ramp deployed and stored position.

9) Signage and Communication (TS 80 - 89)

The Proposer shall provide:
• Detailed narrative on the communications architecture and control of the destination signs.
• Details and narrative on how route and message listing updates will be accomplished and destination sign programming.
• A camera drawing that identifies camera locations and field of view.

10) Vehicle Message Database & General Data Requirements (TS 43.4)

The Proposer shall provide:
• Submit draft DBC message list file for importation in to Vector CANalyzer software.
• Submit vehicle data management access plan.
• Submit acknowledgement that CTA owns the Data generated from the bus with a means to access the information (without a service subscription).

11) Training (TS 5.6)

The Proposer shall provide:
• A description of training modules, module lengths and schedule.
• A representative training module with test (electrical module with sample test is preferred) (bound and packaged separately).
• Information on training aides (Mock-ups) to be incorporated in the program and what aides the Proposer will retain and what ones will remain with CTA.
• Delineation of training programs provided by Proposer and those provided by Subcontractors (describe how subcontract training interfaces are handled).
• Qualifications and experience of trainers.
• A complete list of the maintenance and operator training videos with the number of videos for each design aspect and the length of time of each video.

12) **Service & Preventative Maintenance vehicle life cycle cost analysis (TS 5.4)**

The Proposer shall provide:

• Service:
  a. Location of service facility for CTA buses.
  b. Service support organization chart and expertise of personnel.
  c. Service support plan for CTA, including its length of time and staffing requirements.
  d. Retrofit campaign bulletin (sample).
  e. Representative service manual (bound and packaged separately).
  f. Warranty area support, organization and process for the CTA buses.
• Any analyses for component durability and life-cycle costs related to the bus being proposed.
• Cost analysis:
  a. Fuel
  b. Labor
  c. Parts
• Detailed PM schedule for the lifetime of the vehicle.

13) **Contract Submittal Table Completion (Volume 1, Bus Contract Terms, SP 2.3 Contract Deliverables)**

The Proposer shall provide:

• Clear Checklist of all ITP required submissions (ITP)
• Contract Deliverable Table 1 (**Volume 1, Bus Contract Terms, SP 2.3 – Contract Deliverables**)
• Contractor will provide the promise date for each item

14) **Support Plan (Prebuild Configuration and Build Period)**

The Proposer shall provide:

• A narrative / description of the level of support during the Prebuild Configuration and Build Period
• Proposed commissioning plan, Factory Acceptance Test list, and Site Acceptance Test documents

15) **Support Plan (During Warranty Period)**

The Proposer shall provide a narrative / description of the level of support during the Warranty Period

16) **Support Plan (Post Warranty Period)**

The Proposer shall provide a narrative / description of the level of support during the Post Warranty Period

17) **General Conditions**

The Proposer shall provide a detailed narrative on general conditions compliance.
18) Special Provisions & Federal Requirements (GC Section 2 & Section 3)

The Proposer shall provide:
- A detailed narrative on special provisions
- A detailed narrative on federal requirements.

19) Warranty Requirements (GC Section 5: Warranty Requirements)

Proposer shall provide a detailed narrative on warranty requirements.

20) Quality Assurance / Quality Control Program (GC Section 6: Quality Assurance)

The Proposer shall provide:
- Copy of Quality Assurance Program including the Quality Control Plan (QCP)
- Description of the expertise of Quality Assurance/Quality Control/Inspection Organization personnel.
- Most recent International Organization for Standardization (ISO) certification.
- Vehicle production line quality control checklist.

B. Project Schedule

Proposers shall demonstrate the schedule logic and how the Proposer will manage the schedule to ensure delivery and acceptance of the Buses by the Contract deadlines. Information provided must be in sufficient detail to show the relationship of the schedule to all aspects of the Specifications.

1) Number of days needed to deliver Pilot bus per the Bus Contract Terms (Number of Days from NTP)
2) Production schedule plan for the Pilot Bus listing- include Date of Delivery from NTP
3) Production schedule plan for the production buses - include Date of Delivery from NTP
4) A table that summarizes the numbers of the proposed vehicles delivered to transit agencies during the last three (3) years, comparing original contract schedule requirements and actual delivery results.
5) Production schedule plan for the Pilot Bus
6) Manufacturing production plan for the full CTA order.
7) Proposer’s contractual delivery schedule compliance commitments (including payments of liquidated damages over the last three (3) years).
8) Their order book, options (including buses proposed on this procurement) for the next two (2) years. The CTA recognizes and respects the proprietary nature of this request and recommends that the Proposer clearly label this document as such, if necessary

Each Proposer must submit the three following project schedules:

a) Overall Bus Configuration / Material Ordering Project Plan Schedule

- Pre Award Buy America Audit Proposed Date
- Provide complete project schedule for configuration / materials ordering of the pilot and production buses
- Bus Design Reviews
  Schedule must show three bus design review meetings:
o Pilot Bus design review
  o Production Bus design review
• Pilot Bus Schedule Requirements
  o The plan proposed must deliver (1) pilot bus to the CTA within 150 calendar days of NTP.

b) Pilot Bus Delivery Schedule
• Provide a more granular view of the bus delivery schedule including detailed production information.
• Include all milestone and design reviews.
• Include pilot bus delivery date.

C) Production Bus Delivery Schedule
• Provide a more granular view of the bus delivery schedule including detailed production information.
• Include all milestone and design reviews.
• Include 1st bus delivery date.
• Include final bus build date.

2.3 Package 2: Responsibility of Proposer

An award will only be made to a responsible Proposer that has been found by the Authority to be responsible both financially and technically and has the capability to perform the work of the Contract in accordance with the requirements of the Specifications and within the time specified.

The following are the requirements for qualifying responsible Proposers. All of these requirements must be met; therefore, they are not listed by any particular order of importance. Any Proposer that the Authority finds not to meet these requirements, and cannot be made to meet these requirements, may be determined by the Contract Officer not to be responsible and its Proposal rejected.

The Responsibility Package will consist of the three sections identified below. Each section shall be clearly identified and separated by tabs, clearly marked, followed by a Table of Contents and the requested information.

A. Resources

Proposer must demonstrate evidence that the Proposer has human and physical resources sufficient to perform the Contract as specified and assure delivery of all equipment within the time specified in the Contract, to include:

1) 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.

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

3) Any finding by the Authority that causes doubt as to the Proposer’s technical ability, productive capability, financial capability, or any of the other factors which determine
responsibility, which cannot be resolved affirmatively, shall require a determination of non-responsibility by the Authority.

B. Financial Responsibility

Proposers must demonstrate sufficient financial strength, resources and capability to finance the work to be performed and complete the Contract in a satisfactory manner. Information provided must address the following:

1) Provide a copy of the Proposer’s complete financial statements for the last five (5) years, prepared in accordance with the Generally Accepted Accounting Principles (GAAP) of the Proposer’s jurisdiction(s), and audited by an independent certified public accountant authorized to practice in the jurisdiction of either Chicago or the city of the Proposer. (Note: This document need not be included on the CD).

2) Provide at least two (2) bank credit references for Proposer including the name, position and current phone number for the bank representatives.

3) A description of all indebtedness, including the identification of creditors, judgments against the Proposer within the last five (5) years, repayment schedule, and significant characteristics.

4) Summary of pending litigation, (whether the Proposer is the plaintiff or defendant), arbitrations (whether the Proposer is the plaintiff or defendant), mediations, or other dispute resolution processes.

5) Evidence that the Proposer is licensed, bonded, and registered in compliance with ordinances, statutes, codes and regulations of the municipality in which the Work is to be performed.

6) Evidence that the Proposer is not in arrears or default to the Authority upon any debt or contract, or is not a defaulter, as surety or otherwise, upon any obligations to the Authority, or has not failed to perform faithfully on any previous Contract with the Authority.

C. Insurance and Bond Requirements

1) Demonstrate the ability to secure required bond(s) (Volume 3, Attachment B), as evidenced by a letter of commitment from an insurance underwriter, broker, and/or bank confirming that the Proposer can be bonded or secured for the required amounts.

2) Demonstrate the ability to obtain the required insurance with coverage values (Volume 3, Attachment B) that meet minimum requirements evidenced by a letter from an underwriter confirming that the Proposer can be insured for the required amount. Proposer must furnish any required performance bond, or insurance within fourteen (14) Days from notice of Contract award.

SECTION 3: PRICE PROPOSAL REQUIREMENTS AND U.S. EMPLOYMENT PLAN

3.1 Package 3: Price Proposal, Certifications, Forms, and Other Documents

A. Price Proposal

The Price Proposal must be submitted in the form included as Volume 3, Attachment A and all blanks must be filled in for the base and options as well as all spare parts as specified.
1) The Proposer shall, in accordance with the terms and conditions of the Contract Documents, deliver the number of buses for the price(s) as indicated in the Price Proposal, Attachment A.

2) All prices shall be firm/fixed prices for the duration of the Contract and to be quoted in United States Dollars.

3) Option pricing will be calculated as defined in Volume 1- Bus Contract Terms, SP 3- Options and Option Pricing.

4) Price evaluation will be based on the Grand Total Price (Base plus Options) and Add On Options as indicated on pages P-1 through P-7.

B. Certifications, Forms, and Other Documents

In addition to Volume 3, Attachment A, the Price Proposal package must also contain Volume 3 Price Proposal Forms Certifications, and Other Documents Attachments B - Y as listed below:

Attachment B - Insurance and Bond Requirements and Form of Performance Bond
Attachment C - Certification of Primary Participant Regarding Debarment
Attachment D - Certification of Lower Tier Participant Regarding Debarment
Attachment E - Lobbying Certification (Prime and Subcontractor)
Attachment F - Certification Regarding a Drug Free Workplace
Attachment G - Buy America Certification
Attachment H - Disclosure of Ownership and Interests Affidavit (Prime and Subcontractor)
Attachment I - Affidavit of Minimum Wage Payment
Attachment J - Affidavit of Prompt Payment
Attachment K - RFP Non-Disclosure Statement (Prime and Subcontractor)
Attachment L - FOIA Notice and Declaration
Attachment M - TVM Certification
Attachment N - Request for Pre-Offer Change or Approved Equal
Attachment O - Contractor’s Service and Parts Support Data
Attachment P - Form for Proposal Deviation
Attachment Q - Pre-Award Evaluation Data Form
Attachment R - Certification of Compliance with Bus Testing Requirements
Attachment S - Federal Motor Vehicle Safety Standards
Attachment T - Location of Principal Points of Engineering and Assembly
Attachment U - Vehicle Questionnaire
Attachment V - Vendor References Form
Attachment W - Table of Exceptions
Attachment X - Acknowledgement of Addenda
Attachment Y - Proposer’s Signature Page and CTA Acceptance Page

3.2 Signing of Proposal Forms

Proposals will include firm name (and, in the event that the Proposer is a joint venture, the names of the individual firms comprising the joint venture); business address; and the name, title, business address, telephone number, facsimile (fax) number and email address of the responsible individual(s) who may be contacted during the Proposal evaluation period for scheduling oral presentations and for receiving notices from the Authority. The Proposer will submit with its Proposal a copy of any joint venture agreement.
Proposals will be signed by those individual(s) authorized to bind the Proposer. The Proposer will submit evidence of the official’s authority to act for and bind the Proposer in all matters relating to the Proposal. In the event that the Proposer is a joint venture or consortium, a representative of each of the members of the joint venture or consortium will execute the Proposal. Each joint venture or consortium member is jointly and severally liable for the joint venture or consortium. If a Proposer is a Corporation, the President or Vice-President shall execute the two (2) original Proposals. The Corporation shall affix its seal to the two (2) Proposals that contain the original signatures. In the event that someone executes this Proposal other than the President or Vice-President, a certified copy of that section of the Corporate By-Laws or resolution of the Corporation, which permits the person to execute the offer for the Corporation, shall be furnished with the Proposal.

If a Proposer is a Limited Liability Company, the Manager or Managing Member of the Limited Liability Company shall execute two (2) original Proposals.

If a Proposer is a Partnership or Joint Venture, provide a copy of the signed Partnership or Joint Venture Agreement. All partners in the Joint Venture or partnership shall execute two (2) Proposals that contain the original signatures, unless one Partner or Joint Venturer partner has been authorized to sign for the Partnership or Joint Venture, in which case, evidence of such authority, satisfactory to the Contract Officer must be submitted with the Proposal.

If Proposer is a Sole Proprietor, the Proposer shall execute two (2) original Proposals.

Any business operating under an assumed name must file the required certificate in the Office of the County Clerk of the county where business will be transacted. If the certificate has been filed, the contract may be signed in the assumed name of the business. If the certificate has not been filed, the contract must be signed in the owner's name d/b/a the assumed name.

3.3 **Package 4: U.S. Employment Plan & Forms**

Proposers should submit the U.S Employment Plan, U.S. Employment Plan Certifications (as applicable), and U.S. Employment Plan – Jobs Labor Value Form provided in Volume 2 - U.S. Employment Plan and Forms.

**SECTION 4: EVALUATION PROCESS AND BASIS OF AWARD**

4.1 **Evaluation Criteria**

All Proposals will be evaluated by an Evaluation Committee and a Technical Committee. In reviewing and evaluating the Technical Proposal and Price Proposal, the CTA will consider the following evaluation criteria factors in descending order of importance:

1. Bus Technical Requirements (Section 2.2.A);
2. Project Schedule (Section 2.2.B);
3. U.S. Employment Plan (Volume 2); and
4. Price (Section 3.1).

4.2 **Evaluation of Competitive Proposals**

An evaluation committee, which will include officers, employees, and agents of the Authority, will be established and approved by CTA’s President. The Evaluation Committee will carry out the detailed evaluations. The competitive range is determined by the Vice President, Purchasing & Supply Chain, who makes the recommendation to the Chicago Transit Authority Board.
1) Detailed evaluation of Proposals and determination of Competitive Range

The Authority will carry out and document its evaluations in accordance with the criteria and procedures set forth in the Evaluation Criteria. Any Proposal deficiencies that may render a Proposal unacceptable will be documented. The Authority will make specific note of questions, issues, concerns and areas requiring clarification by Proposers and to be discussed in any meetings with Proposers that the Authority finds to be within the Competitive Range.

Rankings of the Proposals based on the evaluations will then be made for determining which Proposals are within the Competitive Range, or may reasonably be made to be within the Competitive Range.

The Authority reserves the right to refuse to accept any Proposal from any person, firm or corporation that is in arrears or is in default to the Authority upon any debt or contract, or that is a defaulter, as surety or otherwise, upon any obligations to the Authority, or had failed to perform faithfully any previous contract with the Authority.

2) Proposals not within the Competitive Range

Proposers of any Proposals that have been determined by the Authority as not in the Competitive Range, and that cannot be reasonably made to be within the Competitive Range, will be notified in accordance with the Authority’s policies.

3) Discussions with Proposers in the Competitive Range

The Proposers whose Proposals are found by the Authority to be within the Competitive Range, or that may be reasonably made to be within the Competitive Range, will be notified and any questions or requests for clarifications provided to them in writing. Each such Proposer may be invited for an interview and discussions with the Authority to discuss answers to written or oral questions, clarifications and any facet of its Proposal.

However, the CTA reserves the right to make an award to a Proposer whose proposal it judges to be most advantageous to the Chicago Transit Authority based upon the initial submittals, without conducting any written or oral discussions with any Proposers or soliciting a best and final offer (BAFO).

In the event that a Proposal that has been included in the Competitive Range contains conditions, exceptions, reservations or understandings to any Contract requirements as provided in the Form for Proposal Deviation, said conditions, exceptions, reservations or understandings may be negotiated during these meetings. However, the Authority will have the right to reject any and all such conditions and exceptions, and instruct the Proposer to amend its Proposal and remove said conditions and exceptions; and any Proposer failing to do so may cause the Authority to find such Proposal to be outside the Competitive Range.

No information, financial or otherwise, will be provided to any Proposer about any of the Proposals from other Proposers, to the extent permitted by applicable law. Proposers 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. Proposers will not be told of their rankings among the other Proposers prior to Contract award.
Proposers in the competitive range may be afforded the opportunity to bring a demonstration bus on to CTA property for review and inspection by CTA technical staff and the Evaluation Committee. If a demonstration bus is requested, all Proposers in the competitive range will be invited to provide a demonstration bus. Provision of such a demonstration vehicle will not be mandatory, however, the demonstration bus may have either a positive or negative impact upon a Proposer’s evaluation to the extent that the information gained during the review and inspection relates to any of the evaluation criteria stated in the RFP.

4) Proposal Revisions

CTA reserves the right to request additional Proposal revisions prior to requesting a BAFO, if any. These Proposals, if requested, will be evaluated by the same criteria as the initial Proposal.

5) Best and Final Offers (BAFO)

The Request for BAFO will include the following:

a) Notice that discussions and negotiations are concluded.

b) A complete listing of the conditions, exceptions, reservations or understandings that have been approved.

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.

e) Notice to Proposers that do not submit a notice of withdrawal or a BAFO that their immediately previous Proposal will be construed as their BAFO.

Any modification to the initial Proposal made by a Proposer in its BAFO will be identified in its BAFO. BAFOs will be evaluated by the Authority according to the same requirements and criteria as the initial Proposals. The Authority 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 criterion will again be arrayed by the Authority and considered according to the relative degrees of importance of the criteria defined in “Evaluation Criteria.”

6) Selection of Proposals

The Authority will choose the Proposal that it finds to be most advantageous to the Authority, based upon the evaluation criteria. The results of the evaluations and the selection of a Proposal for any award will be documented.

The Authority reserves the right to make an award to a Proposer whose Proposal it judges to be most advantageous to the Authority based upon the evaluation criteria, without conducting any written or oral discussions with any Proposers or solicitation of any BAFOs.
4.3 Basis of Award

This section describes the selection process for a potential award. The approach and procedures are those that are applicable to a competitive negotiation.

Any selection of a Proposal from a responsible Proposer shall be made by consideration of only the Proposal Evaluation Criteria & Process, as contained in Section 4 of the Instructions to Proposers.

The Authority reserves the right to make an award to one responsible Proposer whose offer best conforms to the requirements of this solicitation and without providing any Proposers an opportunity for oral presentations or negotiations. Proposals should, therefore be submitted initially with the most favored terms.

Discussions and/or negotiations may be carried out with Proposers found to be within the competitive range, after which Best and Final Offers (BAFO) may be requested.

The exercise of any or all Options(s) shall be at the sole discretion of the Authority and is subject to funding availability and will be subject to acceptable delivery schedules.
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SECTION 1: GENERAL CONDITIONS

GC 1. Definitions

The following are definitions of special terms used in this document:

Authority: Chicago Transit Authority; Transit Authority; Authority; CTA means Chicago Transit Authority, a Municipal Corporation created by the Metropolitan Transit Authority Act, approved April 12, 1945.

Authorized Signer: The person who is executing this Contract on behalf of the Contractor and who is authorized to bind the Contractor.

Best and Final Offer (BAFO): The last Proposal made by a Proposer. If a BAFO is not specifically requested by the Authority, or if the Proposer does not promptly respond to a request for a BAFO, then the most recent, current Proposal is the BAFO.

Class 1 Failure (physical safety): A failure that could lead directly to passenger or operator injury and represents a severe crash situation.

Class 2 Failure (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.

Competitive Range: The range of proposals that are identified as the most highly rated, unless the range is further reduced for purposes of efficiency.

Contract: The Proposal and its acceptance by the Authority as manifested by the Contract documents specified in “Section GC 13 Order of Precedence.”

Contracting Officer: The Vice President, Purchasing and Supply Chain or his/her designee.

Contractor: The successful Proposer who is awarded a Contract for providing all buses and equipment described in the Contract documents.

Days: Unless otherwise stated, “days” will mean calendar days.

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

Deviation: Variance from a requirement or specification that does not alter the basis of a contract or adversely affects its performance.

Due Date: The date and time by which Proposals must be received by the Authority as specified in “Request for Proposals.”

Extended Warranty: A warranty available for purchase above the standard warranty.

Fatigue Failure (Corrosion Fatigue): The mechanical degradation of a material under the joint action of corrosion and cyclic loading.

Major Components: Any component exceeding $1,000.00 in value during the expected life time of the bus.

Pass-Through Warranty: A warranty provided by the Contractor but administered directly with the component Supplier.

Proposal: A promise, if accepted, to deliver equipment and services according to the underlying solicitation of the Authority documented using the prescribed form in the solicitation, including any Proposal or BAFO.
**Proposer:** A legal entity that makes a Proposal.

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

**Solicitation:** An Authority’s request for proposals.

**Superior Warranty:** A warranty still in effect after all contractually required warranties have expired. The remaining warranty is administered directly between the sub-Supplier and the Authority.

**Supplier:** Any manufacturer, company or Authority providing units, components or subassemblies for inclusion in the bus that are installed by the Contractor. Supplier items will require qualification by type and acceptance tests in accordance with requirements defined in “Section 6: Quality Assurance.”

**Subcontractor:** Any manufacturer, company or Authority providing units, components or subassemblies for inclusion in the bus that are installed by a Subcontractor. Subcontractor items will require qualification by type and acceptance tests in accordance with requirements defined in “Section 6: Quality Assurance.”

**Vehicle:** For the purposes of this document, “vehicle” and “bus” are used synonymously.

**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.

**GC 2. Materials and Workmanship**

The Contractor will be responsible for all materials and workmanship in the manufacture of the bus and all accessories used, whether the same are manufactured by the Contractor or purchased from a Supplier. This provision excludes any equipment leased or supplied by the Authority, 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.

**GC 3. Conformance with Specifications and Drawings**

Materials furnished and Work performed by the Contractor will conform to the requirements of the Technical Specifications and other Contract documents. Notwithstanding the provision of drawings, technical specifications or other data by the Authority, the Contractor will 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. Items that are installed by the Authority will not be the responsibility of the Contractor unless they are included in this Contract.

Omissions from the Contract specifications, or the inaccurate description of details of Work that are manifestly necessary to carry out the intent of the Contract specifications, or that are customarily performed, will not relieve the Contractor from performing such omitted Work or inaccurately described details of the Work, and they will be performed as if fully and correctly set forth and described.

**GC 4. Inspection, Testing and Acceptance**

**GC 4.1 General**

The Authority’s Representative will at all times have access to the Work, the Contractor and, through the Contractor, its Suppliers. The Contractor and its Suppliers will furnish every reasonable facility for ascertaining that the materials and the workmanship are in accordance with the requirements of the Contract Documents. All Work done will be subject to the Authority Representative’s inspection and approval in accordance with the approved Work products developed as a result of the Contract Documents.

The pre-delivery tests and inspections will be performed at the Contractor’s plant; they will be performed in accordance with the procedures defined in “Section 6: Quality Assurance”; and they may be witnessed by the resident inspector.

When a bus passes these tests and inspections, the resident inspector will authorize release of the bus.
Within fifteen (15) business days after arrival at the designated point of delivery, the bus will undergo the Authority tests defined in “Post-Delivery Tests.” If the bus passes these tests or if the Authority does not notify the Contractor of non-acceptance within 15 business days after delivery, then acceptance of the bus by the Authority occurs on the 15th business day after delivery. If the bus fails these tests, it will not be accepted until the repair procedures defined in Special Provisions “Repairs after Non-Acceptance” have been carried out and the bus restested until it passes. Acceptance occurs earlier if the Authority notifies the Contractor of early acceptance or places the bus in revenue service.

**GC 4.2 Risk of Loss**
The Authority will assume risk of loss of the bus on delivery, as defined in Section SP 2.1, BUS DELIVERY. Prior to this delivery, the Contractor will have risk of loss of the bus, including any damages sustained during the delivery regardless of the status of title or any payments related to the bus. Drivers will keep a maintenance log en route, and it will be delivered to the Authority with the bus. If the bus is released back to the Contractor for any reason, then the Contractor will be held harmless.

**GC 5. Title and Warranty of Title**
Adequate documents for registering the bus in State of Illinois will be provided to the Authority not less than 30 business days before delivery to the Authority. Upon acceptance of each bus, the Contractor warrants that the title will pass to the Authority free and clear of all encumbrances.

**GC 6. Intellectual Property Warranty**
The Authority will advise the Contractor of any impending patent suit related to this Contract against the Authority and provide all information available. The Contractor will defend any suit or proceeding brought against the Authority based on a claim that any equipment, or any part thereof, furnished under this Contract constitutes an infringement of any patent, and the Contractor will pay all damages and costs awarded therein, excluding incidental and consequential damages against the Authority. In case said equipment, or any part thereof, is in such suit held to constitute infringement and use of said equipment or parts is enjoined, the Contractor will, at its own expense and at its option, either procure for the Authority the right to continue using said equipment or part, or replace same with non-infringing equipment, or modify it so it becomes non-infringing.
The Contractor’s obligations under this section are discharged and the Authority will hold the Contractor harmless with respect to the equipment or part if it was specified by the Authority and all requests for substitutes were rejected, and the Contractor advised the Authority under “Questions, Clarifications and Omissions” of a potential infringement, in which case the Contractor will be held harmless.

**GC 7. Data Rights**

**GC 7.1 Proprietary Rights/Rights in Data**
The term “subject data” used in this clause means recorded information, whether or not copyrighted, that is delivered or specified to be delivered under the Contract. It includes the proprietary rights of the following:

- Shop drawings and working drawings
- Technical data including manuals or instruction materials, computer or microprocessor software
- Patented materials, equipment, devices or processes
- License requirements

The Authority will protect proprietary information provided by the Contractor to the fullest extent of the law. The Contractor will grant a non-exclusive license to allow the Authority to utilize such information in order to maintain the vehicles. In the event that the Contractor no longer provides the information, the Authority has the right to reverse engineer patented parts and software.

The Authority reserves a royalty-free, non-exclusive and irrevocable license to reproduce, publish or otherwise use, and to authorize others to use, the following subject data for its purposes: (1) any subject data required to be developed and first produced in the performance of the Contract and specifically paid for as such under the Contract, whether or not a copyright has been obtained; and (2) any rights of copyright to which the Contractor, Subcontractor or Supplier purchases ownership for the purpose of performance of the Contract and specifically paid for as such under the Contract. The Contractor agrees to include the requirements of this clause, modified as necessary to identify the affected parties, in each subcontract and supply order placed under the Contract.
GC 7.2 Access to Onboard Operational Data

The Authority grants to the Contractor the right to inspect, examine, download, and otherwise obtain any information or data available from components provided by the Contractor, including, but not limited to, any electronic control modules or other data-collection devices, to the extent necessary to enable the Contractor to perform reliability maintenance analysis, corrective action and/or other engineering type Work for the bus. This right expressly excludes access to information or data collected on any equipment not provided and installed by the Contractor.

GC 8. Changes

GC 8.1 Contractor Changes

Any proposed change in this Contract will be submitted to the Authority for its prior approval. Oral change orders are not permitted. No change in this Contract will be made without the prior written approval of the Contracting Officer. The Contractor will 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 the Contracting Officer.

GC 8.2 Authority Changes

A. Right to Change Services.

The CTA may at any time or from time to time, order additions, deletions, or revisions to the Work. If the Contractor does not have written authorization from the CTA to proceed with Changed Work, then the Contractor will not be compensated for any Changed Work.

All Changed Work must be executed under applicable conditions of the Contract Documents. It is agreed by the Contractor that any change resulting in Changed Work will be paid for items as determined by the Director, Purchasing or as otherwise agreed to by the parties and set forth in the terms of a Change Order.

In the event of a decrease in the Work, the CTA will not pay for lost or anticipated profits resulting from partial or complete deletions of the Work and an equitable decrease of the Total Contract Price and Schedule will be made to reflect the terms of the Change Order as determined by the CTA.

B. Proposed Changes in Work.

The process for Changed Work is as follows. Bus Engineering will request the Contractor to submit a proposal for Changed Work. The Contractor will submit a proposal within sixty (60) calendar days after receipt of the Engineer’s request or such shorter time as the Engineer may set forth in the request for Changed Work.

In the alternative, if the Contractor chooses to propose Changed Work, the Contractor must submit notice of such request to the CTA for its prior written approval. The CTA may choose to request Contractor to submit a Proposal within a specified time period after receiving Contractor’s notice.

The Contractor’s proposal will set forth any changes to the Total Contract Price and Contract Time, in the opinion of the Contractor, to perform the Changed Work. The CTA may or may not choose to authorize the Contractor to perform the Changed Work as identified in the Proposal.

C. Proceed Orders and Change Orders.

Proceed Order - If the CTA orders Changed Work, and the Contractor and the CTA agree on an adjustment, if any, to the Total Contract Price, Contract Time, and/or Technical Specifications, the CTA will issue a Proceed Order. The Director, Purchasing’s agreement to an adjustment under this Section is subject to final approval as required by the CTA’s ordinances, regulations, and rules. The Director, Purchasing may issue a Proceed Order to direct the Contractor to proceed with the Changed Work for which the Contractor and the Director, Purchasing propose in writing an adjustment in price, time and/or Technical Specifications, if applicable. Proceed Orders will not entitle the Contractor to compensation or any other adjustment to the Technical Specifications until the Proceed Order is incorporated into a Change Order(s).
Change Order - The CTA may issue a Change Order as authorization for the Changed Work and/or for payment or time extension, or both. The CTA may also issue a Change Order to modify the terms of the Contract. A Change Order may include future Work to be performed under the Contract or Work performed in accordance with previously authorized Proceed Orders. The Contractor cannot be compensated for any Work authorized through a Proceed Order until a Change Order is executed.

Directive Order - If the CTA orders Changed Work, and the Contractor and the CTA have not agreed on an adjustment to the Total Contract Price, Contract Time, and/or Technical Specifications, the Director, Purchasing will issue a Directive Order directing Contractor to perform the Changed Work. The Director, Purchasing, may determine an adjustment to the Total Contract Price, Contract Time, and/or Technical Specifications, for the Changed Work. The decision of the Director, Purchasing, will be final and binding, subject only to SECTION GC 9.10, DISPUTES. The Contractor will perform the Changed Work as directed in the Directive Order. The Contractor’s refusal or failure to proceed promptly with the Changed Work as directed will constitute an event of default.

GC 9. Legal Clauses

GC 9.1 Indemnification

GC 9.1.1.
The Contractor will, to the extent permitted by law:(1) protect, indemnify and save the Authority and its 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 the Authority 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 intentional misconduct or negligent acts, errors or omissions of the Contractor in the performance of the Contract, including intentional misconduct, negligent acts, errors or omissions of its officers, employees, servants, Subcontractors and Suppliers; and (2) upon receipt of notice and if given authority, will settle at its own expense or undertake at its own expense the defense of any such suit, action or proceeding, including appeals, against the Authority and its officers, employees and agents, including consultants, relating to such injury, death, loss or damage.

GC 9.1.2.
Each party will promptly notify the other in writing of the notice or assertion of such claim, demand, lien, encumbrance, judgment, award, suit, action or other proceeding hereunder. The Contractor will have sole charge and direction of the defense of such suit, action or proceeding. The Authority will 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.

GC 9.1.3.
The Authority will 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 will be repaid all reasonable costs incurred in doing so. The Authority will have the right to be represented therein by advisory council of its own selection at its own expense.

GC 9.1.4.
The obligations of the Contractor under the above paragraph will not extend to circumstances where the injury, death or damages are caused solely by the negligent acts, errors or omissions of the Authority, its officers, employees, agents or consultants, including, without limitation, negligence in:(1) the preparation of the Contract documents, or (2) the giving of directions or instructions with respect to the requirements of the Contract by written order. The obligations of the Contractor will not extend to circumstances where the injury, death or damages are caused, in whole or in part, by the negligence of any third-party operator, not including an assignee or Subcontractor of the Contractor, subject to the right of contribution. In case of joint or concurrent negligence of the parties giving rise to a claim or loss against either one or both, each will have full rights of contribution from the other.
GC 9.2 Suspension of Work

GC 9.2.1.
The Authority may at any time and for any reason within its sole discretion issue a written order to the Contractor suspending, delaying or interrupting all or any part of the Work for a specified period of time.

GC 9.2.2.
The Contractor will comply immediately with any such written order and take all reasonable steps to minimize costs allocable to the Work covered by the suspension during the period of work stoppage. Contractor will continue the Work that is not included in the suspension and will continue such ancillary activities as are not suspended. The Contractor will resume performance of the suspended Work upon expiration of the notice of suspension, or upon direction from the Authority.

GC 9.2.3.
The Contractor will be allowed an equitable adjustment in the Contract price (excluding profit) and/or an extension of the Contract time, to the extent that cost or delays are shown by the Contractor to be directly attributable to any suspension. However, no adjustment will be made under this section for any suspension, delay or interruption due to the fault or negligence of the Contractor, or for which an equitable adjustment is provided for, or excluded under any other term or condition of the Contract. As soon as reasonably possible but no later than forty-five (45) calendar days, or any other period of time agreed to by the parties, after receipt of the written suspension of work notice, the Contractor will submit to the Contracting Officer a detailed price and schedule Proposal for the suspension, delay or interruption.

GC 9.3 Notice of Labor Dispute
Whenever the Contractor or Authority has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of the Contract, they will promptly give written notice thereof to the other party, including all relevant information.

In addition, the Contractor agrees to insert the substance of this clause in any subcontract in which a labor dispute may delay the timely performance of the Contract.

GC 9.4 Excusable Delays/Force Majeure
If the Contractor is delayed at any time during the progress of the Work by the neglect or failure of the Authority or by a cause as described below, then the time for completion and/or affected delivery date(s) will be extended by the Authority subject to the following cumulative conditions:

a. 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. Such cause may also include force majeure events such as any event or circumstance beyond the reasonable control of the Contractor, including but not limited to acts of God; earthquake, flood and any other natural disaster; civil disturbance; fires and explosions; war and other hostilities; or embargo;

b. The Contractor demonstrates that the completion of the Work and/or any affected deliveries will be actually and necessarily delayed;

c. The Contractor has taken measures to avoid and/or mitigate the delay by the exercise of all reasonable precautions, efforts and measures, whether before or after the occurrence of the cause of delay; and

d. The Contractor makes written request and provides other information to the Authority as described in GC 9.4.3.

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

GC 9.4.1.
None of the above will 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 SP 6.1, LIQUIDATED DAMAGES FOR LATE DELIVERY OF THE BUS for delays occurring prior to, or subsequent to the occurrence of an excusable delay.
GC 9.4.2. The Authority reserves the right to rescind or shorten any extension previously granted, if subsequently the Authority determines that any information provided by the 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, the Authority 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 that, although later found to have been erroneous, was submitted in good faith by the Contractor.

GC 9.4.3. No extension or adjustment of time will be granted unless: (1) written notice of the delay is filed with the Authority within fourteen (14) 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 the Authority within thirty (30) calendar days after the commencement of the delay. No such extension or adjustment will be deemed a waiver of the rights of either party under this Contract. The Authority will make its determination within thirty (30) calendar days after receipt of the application.

GC 9.5 Default and Termination

GC 9.5.1. Termination for Convenience

The CTA may terminate this Contract, in whole or in part, at any time. If the CTA decides to terminate the Contract under this Section, the Director, Purchasing, will send a written Notice of Termination for Convenience to the Contractor specifying the extent to which performance of Work under the Contract is terminated. Such Notice of Termination for Convenience will be effective on the date of receipt. The Contractor will then restrict its activities, and those of its Subcontractors, to winding down its work. No payment will be made for Work performed after the Notice of Termination for Convenience becomes effective, except for winding down activities specified in the termination notice and as provided in this Section.

a. Obligations of the Contractor Upon Termination for Convenience. After receipt of a Notice of Termination for Convenience, except as otherwise directed by the CTA, the Contractor must do the following:

i. Transfer title and deliver to the CTA in the manner, at the times, and to the extent directed by the CTA, parts, work in process, completed work, supplies and other material procured as a part of, or acquired in connection with the performance of, the Work terminated by the Notice of Termination for Convenience, as well as 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 the CTA;

ii. Use its best efforts to sell, in the manner, at the times, to the extent and at the price or prices directed or authorized by the CTA, property of the types referred to in Section 9.5.1(a)(i) above; provided, however, that the Contractor (1) will not be required to extend credit to any purchaser, and (2) may acquire any such property under the conditions prescribed by and at a price or prices approved by the CTA; provided, further, that the proceeds of any such transfer or disposition will be applied in reduction of any payments to be made by the CTA to the Contractor under the Contract or will otherwise be credited to the price or cost of the Work covered by the Contract or paid in such other manner as the CTA may direct;

iii. Complete performance of each part of the Work as will not have been terminated by the Notice of Termination for Convenience in accordance with the Contract;

iv. Take such action as may be necessary, or as the CTA may direct, for the protection and preservation of the property related to this Contract which is in the possession of the Contractor and in which the CTA has or may acquire an interest; and
v. Comply with all other requirements of the CTA as may be specified in the Notice of Termination for Convenience.

b. Termination Claim. After receipt of a Notice of Termination for Convenience, the Contractor will submit to the Authority its termination claim, in accordance with Section GC 9.9, in the form and with certification prescribed by the Authority.

c. Agreement As to Amount to be Paid. Subject to Section 9.5.1(b), the Contractor and the CTA may agree upon the whole or part of the amount or amounts to be paid to the Contractor by reason of the total or partial termination of Work for convenience pursuant to this Article, which amount or amounts will not exceed the portion of the total cost of the work identified in the accepted Notices-to-Proceed completed by the Contractor immediately prior to the Notice of Termination for Convenience, adjusted to account for defective work not remedied as reduced by the amount of payments otherwise made. The Contract will be amended accordingly, and the Contractor will be paid the agreed amount. Nothing in Section 9.5.1(d) prescribing the amount to be paid to the Contractor in the event of failure of the Contractor and the CTA to agree upon amount to be paid to the Contractor by reason of the termination of Work pursuant to this Section will be deemed to limit, restrict, or otherwise determine or affect the amount or amounts which may be agreed upon to be paid to the Contractor pursuant to this Section 9.5.1(c).

d. Determination As to Amount to be Paid. In the event of failure of the Contractor and the CTA to agree, as provided in Section 9.5.1(c), upon the whole amount to be paid the Contractor by reason of the termination of Work for convenience pursuant to this Section, the CTA will pay the Contractor the amounts determined by the CTA as follows, but without duplication of any amounts agreed upon in accordance with Section 9.5.1(c), with respect to Work performed prior to the effective date of the Notice of Termination for Convenience, the total (without duplication of any items) of:

i. The portion of the total cost of the work identified in the Notices-to-Proceed immediately prior to the Notice of Termination for Convenience, adjusted to account for defective work not remedied;

ii. The cost of settling and paying claims arising out of the termination of Work under subcontracts or orders, exclusive of the amounts paid or payable on account of supplies or materials delivered or services furnished by the Subcontractor prior to the effective date of the Notice of Termination for Convenience of Work under the Contract, which amounts will be included in the cost on account of which payment is made under 9.5.1(d)(i) above;

iii. The reasonable cost of the preservation and protection of property incurred pursuant to 9.5.1(a)(iv) and any other reasonable cost incidental to termination of Work under the Contract, including expenses incidental to the determination of the amount due to the Contractor as the result of the termination of Work under the Contract.

iv. In no event will the CTA be responsible for unabsorbed or underabsorbed overhead as part of termination claims under this Subsection.

e. Cap on Amount to be Paid. The total sum to be paid to the Contractor under Section 9.5.1(d)(i), will not exceed the total cost of the work identified in the accepted Notices-to-Proceed, as reduced by the amount of payments otherwise made. Except for normal spoilage, and except to the extent that the CTA will have otherwise expressly assumed the risk of loss, there will be excluded from the amounts payable to the Contractor under 9.5.1(d)(i), the fair value, as determined by the CTA, of property which is destroyed, lost, stolen, or damaged so as to become undeliverable to the CTA, or to a buyer pursuant to 9.5.1(a)(ii).

f. Deductions from Amount to be Paid. In arriving at the amount due the Contractor under this Article, there will be deducted, (i) any claim which the CTA may have against the Contractor in connection with the Contract including but not limited to a credit for defective work and (ii) the agreed price for, or the proceeds of sale of, materials, supplies or other things acquired by the Contractor or sold, pursuant to the provisions of this Article, and not otherwise recovered by or credited to the CTA.
g. Partial Termination. If the termination hereunder is partial, prior to the settlement of the terminated portion of this Contract, the Contractor may file with the CTA a request in writing for an adjustment of the price or prices specified in the Contract relating to the continued portion of the Contract (the portion not terminated by the Notice of Termination for Convenience), and such adjustment as may be agreed upon will be made in such price or prices.

h. Payments on Account of Termination Payment. The CTA may from time to time, under such terms and conditions as it may prescribe and in its sole discretion, make partial payments on accounts against cost incurred by the Contractor in connection with the terminated portion of the Contract whenever in the opinion of the CTA the aggregate of such payments will be within the amount to which the Contractor will be entitled hereunder. If the total of such payments is in excess of the amount finally agreed or determined to be due under this Article, without limitation, such excess will be payable by the Contractor to the CTA upon demand.

i. Preservation of Records. Unless otherwise provided for in the Contract or by applicable statute, the Contractor, from the effective date of termination and for a period of three (3) years after final settlement under the Contract, will preserve and make available to the CTA at all reasonable times at the office of the Contractor but without direct charge to the CTA, all its books, records, documents, electronic data, and other evidence bearing on the costs and expenses of the Contractor under the Contract and relating to the work terminated hereunder, or to the extent approved by the CTA, microfilm, microfiche, or other authentic reproductions thereof.

j. Flow Through to Subcontractors. The Contractor will insert in all subcontracts that the Subcontractor will stop Work on the date of and to the extent specified in a Notice of Termination for Convenience from the CTA and will require that any tier Subcontractors insert the same provision in any tier subcontracts. The Contractor will communicate, immediately upon receipt thereof, any Notice of Termination for Convenience issued by the CTA to the affected Subcontractors of any tier.

k. No Other Payments; No Damages. Under no circumstances is the Contractor entitled to anticipatory, unearned profits or consequential damages as a result of a termination or partial termination under this Section. The payment to the Contractor determined in accordance with this Section constitutes its exclusive remedy for a termination hereunder.

l. No Waiver. Anything contained in the Contract to the contrary notwithstanding, a termination under this Section 9.5 will not waive any right or claim to damages that the CTA may have and the CTA may pursue any cause of action that it may have under the Contract.

**GC 9.5.2. Termination for Default**

**GC 9.5.2.1. Notice of Default and Termination**

If the Contractor fails to perform any of its obligations under the Contract, the Director, Purchasing at his or her sole discretion may notify the Contractor in writing that the Contractor is in default. The notice may allow a cure period of up to fourteen (14) days. If the default cannot be cured within the cure period, and the Contractor requests additional time to cure, the Director, Purchasing may extend the cure period in writing. If the Contractor fails to cure within the cure period (or if extended, the extended cure period), the Director, Purchasing may terminate the Contract by sending a notice of termination for default. Termination for default will be effective upon Contractor’s receipt of the written notice of termination. The Director’s, Purchasing declaration of termination will be final.

**GC 9.5.2.2. CTA’s Remedies Upon Default**

Upon notice of default, the CTA may invoke any or all of the following remedies, in addition to any other remedies available under the Contract, at law or in equity, or otherwise:

a. The right to stop or setoff payment to the Contractor.
b. The right to terminate the Contract.

c. The right of money damages, including but not limited to, all expert witness or other consultant fees, court costs, and reasonable attorneys' fees that the CTA may incur in connection with any claim, suit, or action based upon, related to, or arising from, directly or indirectly, an event of default.

d. The right to deem the Contractor non-responsible in future contracts to be awarded by the CTA.

**GC 9.5.2.3. CTA’s Remedies Upon Termination**

Upon notice of termination, the CTA may invoke any or all of the following remedies, in addition to the remedies available upon notice of default:

a. The CTA may complete the Work, or any part of it, either directly or through others.

b. The CTA, either directly or through another contractor, may use the Contractor’s Subcontractors, material and equipment to complete the Work. Upon the CTA’s notification to the Contractor that it intends to invoke this remedy, any and all rights that the Contractor may have in or under its Subcontracts will be assigned to the CTA. The sole obligation accepted by the CTA under such Subcontracts will be to pay for Work satisfactorily performed after the date of the assignment. In the event a conditional assignment has not been executed, the Contractor will promptly execute, or cause to be executed, any assignment, agreement, or other document that may be required by the CTA for compliance with this provision. For any subcontract so assigned and accepted by the CTA, the Contractor will remain liable to the Subcontractors for any payment already invoiced to and paid by the CTA, and for any claim, suit, or cause of action based on or the result of any error, omission, negligence, fraud, willful or intentionally tortious conduct, or any other act or omission, or breach of contract by the Contractor, its officers, employees, agents, and other Subcontractors, arising prior to the date of assignment to the CTA, when such claim, suit, or cause of action has not been discharged, disposed of, or otherwise resolved as of that date. The Contractor will include these requirements in its Subcontracts, and hereby irrevocably grants the CTA a power of attorney to give effect to this provision.

c. The CTA may hire a new contractor to complete the Work.

d. The Contractor will be liable for all costs incurred by the CTA because of the termination, including the cost of completing the Work. If the cost of completing the Work exceeds the aggregate Lump Sum Price, the Contractor will be liable for the excess cost and will pay such sum immediately upon demand. In the event of termination, all costs and charges incurred by the CTA, together with the cost of completing the Work, will be deducted from any moneys due or which may become due to the Contractor.

e. The right to call upon the surety to complete the Work in accordance with the terms of this Contract and the performance bonds.

f. The right to setoff against any payments due or to become due to the Contractor under any other contract that the Contractor or any affiliate thereof may have with the CTA.

**GC 9.5.2.4. Court Determination**

If the Contract is terminated by the CTA, for default, and it is subsequently determined by a court that such termination was not justified, such termination will be deemed a termination for convenience, effective as of the date the Contractor received the original notice of termination for default, and the provisions applicable to termination for convenience will apply.
GC 9.6 Compliance with Laws and Regulations
The Contractor will at all times comply with all applicable laws, regulations, policies, procedures and directives (together, the “Law”), including without limitation, FTA regulations, policies, procedures and directives, including those listed directly or by reference in the agreement between the Authority and FTA that funds any part of this Contract, as they may be amended or promulgated from time to time during the term of this Contract. Contractor’s failure to so comply will constitute a material breach of this Contract.

GC 9.7 Changes of Law
Changes of Law that are enacted after the Proposal due date may result in price changes. If a price adjustment is indicated, either upward or downward, it will be negotiated between the Authority and the Contractor, and the final Contract price will be adjusted upward or downward to reflect such changes in Law. Such price adjustment may be audited, where required.

GC 9.8 Governing Law and Choice of Forum
The Contractor hereby irrevocably submits to the original jurisdiction of those State or Federal courts located within the County of Cook, State of Illinois, with regard to any controversy arising out of, relating to, or in any way concerning the execution or performance of this Contract. The Contractor agrees that service of process on the Contractor may be made, at the option of the Authority, either by registered or certified mail addressed to the applicable office as provided for in this Contract, by registered or certified mail addressed to the office actually maintained by the Contractor, or by personal delivery on any officer, director, or managing or general agent of the Contractor. This Contract will be governed in accordance with the laws of the State of Illinois, without regard to choice of law principles.

GC 9.9 Claims
GC 9.9.1. Notice of Intent to Claim
The Contractor will give to the Authority a written Notice of Intent to Claim within fifteen (15) calendar days after the parties have been unable to negotiate a pending change related to any act or event for which it intends to seek adjustment in the Contract Price, Contract Time, terms or schedule. The notice will set forth the basis of the Claim and an estimate of any costs and time impacts involved.

The written Notice of Intent to Claim will set forth the following:

1. The reasons the Contractor believes additional compensation and/or allowance of additional time may be due;
2. The nature of the costs involved or time needed;
3. The Contractor’s plan for mitigating such cost and delay; and
4. The Contractor’s best estimate of the amount of potential claim and time extension, and basic facts supporting the amount and time claimed.

GC 9.9.2. Claim Submittal
The Contractor will submit its Claim within 30 calendar days after submitting the Notice of Intent to Claim. The following must be provided with the Claim:

1. Detailed factual statement of the Claim, with all necessary facts, events, locations and affected Work.
2. Date of the event giving rise to the Claim; if there are continuing or multiple events, provide all dates necessary to support the Claim.
3. Names of all persons who made any statements with respect to, or are knowledgeable of the facts and events giving rise to the Claim.
4. Specific provisions of the Contract supporting the Claim, with a statement of supporting rationale.
5. Identification of all documents including meeting minutes, transcriptions of oral communications, photographs, videos, tapes and other evidence supporting the Claim.
6. Detailed analysis of a request for an extension of item.
7. Detailed breakdown of request for additional compensation.

Failure to submit sufficient detail to permit the Authority to conduct a review of the Claim may result in rejection of the Claim. Each Claim the Contractor submits for an adjustment that is related to a delay for any cause will include the following:
8. A time impact analysis and a revised schedule demonstrating how the delay is incorporated into the schedule; and
9. Alternative proposal(s) and a revised schedule that demonstrate how the delay will be eliminated or mitigated.

The Contractor will maintain cost records of all Work, which is the basis of any Claim, in the same manner as is required for Changed Work in GC 8, Changes.

**GC 9.9.3. Claims Process**

Within 30 calendar days after the receipt of the Claim, the Authority will either render a decision, provide an estimated date when a decision will be made, or request that the Contractor submit additional information and details to establish the facts and contentions involved in the Claim.

If the Authority does not make a decision within 30 days after it receives all information required to evaluate the Claim, or within any extended period mutually agreed to in writing by the parties, the Claim will be deemed rejected by the Authority, and the Contractor will be notified in writing.

If the Contractor fails to comply with any provision of this Article in the time and manner specified, it will waive any relief that might otherwise be due with respect to such Claim.

The Authority may at its discretion, unilaterally or in agreement with the Contractor, make payments or grant extensions of time on any part of a Claim it determines to have been substantiated to its satisfaction. If the Contractor agrees to a final payment or extension of time related to a certain, described portion of its Claim, such agreements will constitute an unconditional release of the Authority from any further obligations related to that described portion of the Claim.

If the Authority finds the Claim to have merit, in whole or in part, then the Authority and Contractor will negotiate the terms of a Change Order in the Work in compliance with GC 8, Changes. If the Contractor and the Authority are unable to reach agreement on a Change Order, then the Authority may issue a unilateral Change Order. The unilateral Change Order will constitute a final decision by the Authority.

If any Claim or portion thereof remains in dispute following a final decision by the Authority, then the Contractor may pursue further resolution through GC 9.10, Disputes.

Pending final resolution of a Claim, the Contractor will proceed diligently with the performance of its obligations under the Contract in accordance with the written directions of the Authority.

**GC 9.9.4. No Claims After Final Payment**

In no event will any claims be made after Final Payment. Failure by the Contractor to submit claims in a timely manner will result in a waiver by the Contractor as to such claims.

**GC 9.10 Disputes**

Any dispute concerning a question of fact arising under the Contract Documents that is not resolved by an agreement between the CTA and the Contractor will be decided by the Director of Purchasing. The Director of Purchasing will reduce the decision to writing and send a copy of it by certified mail, return receipt requested, to the Contractor.

The decision of the Director of Purchasing will be final and binding on the Contractor unless, within thirty (30) days after receipt of a copy of a decision, the Contractor sends by certified mail, return receipt requested, a written appeal to the CTA’s Vice President, Purchasing and Warehousing. In connection with such an appeal, the Contractor will have an opportunity to be heard and to offer evidence in support of its appeal. The decision of the Vice President, Purchasing and Warehousing will be final and binding on the Contractor unless the Contractor files an action to challenge the decision in a court of competent jurisdiction in Chicago, Illinois and the court determines the decision to be arbitrary and capricious or obtained by fraud. If the Contractor does not commence such an action for judicial review within 60 days after the Contractor receives a copy of the decision of the Vice President, Purchasing and Warehousing, the Contractor waives all right to seek judicial review. Nothing in this Section GC 9.10 relieves the Contractor from diligently proceeding with the Work under the Contract, as directed by the CTA.
GC 9.11 Maintenance of Records; Access by Authority; Right to Audit Records

In accordance with 49 CFR § 18.36(o), 49 CFR § 19.48(d) and 49 USC § 5325(a), provided that the Authority is the FTA recipient or a sub-grantee of the FTA recipient, the Contractor agrees to provide the Authority, FTA, the Comptroller General of the United States, the Secretary of the U.S. Department of Transportation, the State of Illinois or any of their duly authorized representatives, including but not limited to CTA’s Inspector General and Auditors access to any books, documents, papers and records of the Contractor that 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.

1. In the event of a sole-source Contract, single Proposal, single responsive Proposal, or competitive negotiated procurement, the Contractor will maintain and the Contracting Officer, the U.S. Department of Transportation (if applicable) or the representatives thereof will 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 will be made available for the purpose of evaluating the accuracy, completeness and currency of the cost or pricing data. The right of examination will 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 properly reflect all direct and indirect costs anticipated for the performance of the Contract.

2. For Contract modifications or change orders, the Contracting Officer, the U.S. Department of Transportation, if applicable, or their representatives will 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 will be made available for the purpose of evaluating the accuracy, completeness and currency of the cost or pricing data.

The right of examination will 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 the Authority will be entitled to any reductions in the price that would result from the application of accurate, complete or up-to-date data.

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

GC 9.12 Confidential Information

Public access to records of Illinois public bodies is governed by the Illinois Freedom of Information Act, 5 ILCS 140/1 et seq. (“FOIA”) Except as otherwise required by law, the Authority will exempt from disclosure proprietary, privileged or confidential, trade secrets or commercial and financial information submitted or disclosed to the Authority during the Contract period. Any such proprietary information, trade secrets or confidential commercial and financial information that a Contractor believes should be exempted from disclosure will be specifically identified and marked as such. Blanket-type identification by designating whole pages or sections as containing proprietary information, trade secrets or confidential commercial and financial information will not ensure confidentiality.

The Proposer will be solely responsible for ensuring that proprietary, privileged or confidential, trade secrets or commercial or financial information bears appropriate notices relating to its confidential character and is so labeled as such at the time that the Proposer submits such information to CTA. In the event the CTA has questions regarding a Proposer’s identification of proprietary, privileged or confidential, trade secrets or commercial or financial information, the CTA will contact the person identified in the notice provision by the Proposer unless another person is specifically designated by the Proposer.
During the performance of the Work under the Contract, it may be necessary for either party (the “Discloser”) to make confidential information available to the other party (the “Recipient”). The Recipient agrees to use all such information solely for the performance of the Work under the Contract and to hold all such information in confidence and not to disclose same to any third party without the prior written consent of the Discloser, except where required to do so under law. Likewise, the Recipient agrees that all information developed in connection with the Work under the Contract will be used solely for the performance of the Work under the Contract, and will be held in confidence and not disclosed to any third party without the prior written consent of the Discloser.

This Confidentiality section will survive the termination or expiration of the Contract.

**GC 9.13 Conflicts of Interest, Gratuities**

The Contractor is prohibited from engaging in any practice that may be considered as a conflict of interest under existing Authority policies and/or state law, and to refrain from participating in any gifts, favors or other forms of compensation that may be viewed as a gratuity in accordance with existing policies and laws.

The Contractor will take all reasonable measures to preclude the existence or development of an organizational conflict of interest in connection with Work performed under the Contract. An organizational conflict of interest occurs when, due to other activities, relationships or contracts, a firm or person is unable, or potentially unable, to render impartial assistance or advice to the Authority; a firm or person’s objectivity in performing the Contract Work is or might be impaired; or a firm or person has an unfair competitive advantage in proposing for award of a Contract as a result of information gained in performance of the Contract.

1. No Board member, officer or employee of the Authority or other unit of local government, who exercises any functions or responsibilities in connection with the carrying out of the Work or the carrying out of the Work to which this Contract pertains, may have any personal interest, direct or indirect, in this Contract or the proceeds thereof.

2. In accordance with 41 USC § 22, the Contractor agrees that no member of or Delegate to the Congress of the United States, or the Illinois General Assembly and no members of the Chicago Transit Board or Authority employees, may be admitted to any share or part of this Contract or to any private financial interest, profit, or benefit arising here from.

3. The Contractor covenants that it, its officers, directors and employees, and the officers, directors, and employees of such of its members if a joint venture, and subcontractors presently have no interest and must not acquire any interest, direct or indirect, in the Work to which this Contract pertains, which would conflict in any manner or degree with the performance of the Work hereunder. The Contractor further covenants that in the performance of this Contract, no person having any such interest must be employed by the Contractor.

4. The Contractor is prohibited from performing any work or services for the Authority under this contract that conflict with work or services that the Contractor performs under any other contract with the Authority. Such conflicts include, but are not limited to, design work for the Project under another contract, supervision or management for the Project under another contract, and review or audit work for the Project under another contract. The restrictions in this paragraph are applicable to all subcontractors. The Contractor has sole responsibility for compliance with this provision. Any violation of this provision is a material breach of the Contract, which is cause for termination.

**GC 9.14 General Nondiscrimination Clause**

In connection with the performance of Work provided for under this Contract, the Contractor agrees that it will not, on the grounds of race, religious creed, color, national origin, ancestry, physical disability, medical condition, marital status, sex, sexual orientation or age, discriminate or permit discrimination against any person or group of people in any manner prohibited by federal, state or local laws.
GC 9.15 Amendment and Waiver

GC 9.15.1. Amendment
Any modification or amendment of any provisions of any of the Contract documents will be effective only if in writing, signed by authorized representatives of both the Authority and Contractor, and specifically referencing this Contract.

GC 9.15.2. Waiver
In the event that either party elects to waive its remedies for any breach by the other party of any covenant, term or condition of this Contract, such waiver will not limit the waiving party's remedies for any succeeding breach of that or of any other term, covenant or condition of this Contract.

GC 9.16 Remedies Not Exclusive
The rights and remedies of the Authority provided herein will not be exclusive and are in addition to any other rights and remedies provided by law or under the Contract.

GC 9.17 Counterparts
This Contract may be executed in any number of counterparts. All such counterparts will be deemed to constitute one and the same instrument, and each of said counterparts will be deemed an original thereof.

GC 9.18 Severability
Whenever possible, each provision of the Contract will be interpreted in a manner as to be effective and valid under applicable law. However, if any provision, or part of any provision, should be prohibited or invalid under applicable law, then such provision, or part of such provision, will be ineffective to the extent of such prohibition or invalidity without invalidating the remainder of such provision or the remaining provisions of the Contract.

GC 9.19 Third-Party Beneficiaries
No provisions of the Contract will in any way inure to the benefit of any third party, including the public at large, so as to constitute such person a third-party beneficiary of the Contract or of any one or more of the terms and conditions of the Contract or otherwise give rise to any cause of action in any person not a party to the Contract, except as expressly provided elsewhere in the Contract.

The parties agree that this Contract is solely for the benefit of the parties and nothing herein is intended to create any third party beneficiary rights for subcontractors or other third parties.

GC 9.20 Assignment of Contract
Neither party will assign or subcontract its rights or obligations under the Contract without prior written permission of the other party, and no such assignment or subcontract will be effective until approved in writing by the other party.
A. This Contract is binding upon the Parties’ respective successors and permitted assignees.
B. The Contractor may not assign this Contract in whole or in part without the written approval of the Contracting Officer. In no case will such written approval relieve the Contractor from its obligations or change the terms of the Contract.
C. The Chicago Transit Authority agrees that it will only assign this Contract to a person or entity whose creditworthiness is the same as or better than Chicago Transit Authority’s as of the effective date of this Contract.

GC 9.21 Independent Parties
The Contractor is an independent contractor with respect to the performance of all Work hereunder, retaining control over the detail of its own operations, and the Contractor will not be considered the agent, employee, partner, fiduciary or trustee of the Authority.

GC 9.22 Survival
The following sections will survive the nominal expiration or discharge of other Contract obligations, and the Authority may obtain any remedy under law, Contract or equity to enforce the obligations of the Contractor that survive the manufacturing, warranty and final payment periods:
• “Intellectual Property Warranty”
• “Data Rights”
• “Access to Records”
• “Indemnification”
• “Governing Law and Choice of Forum”
• “Disputes”
• “Confidential Information”
• “Parts Availability Guarantee”
• “Training”

GC 10. Authority-Specific Provisions

GC 10.1 CTA Ethics Ordinance
The Contractor must comply with the CTA's Ethics Ordinance posted on CTA's website at https://www.transitchicago.com/assets/1/6/ethics_code_2011_withappendix.pdf, the provisions of which are hereby incorporated into this Contract. The Contractor agrees that, any Contract negotiated, entered into, or performed in violation of the Ethics Ordinance must be void as to the CTA.

GC 10.2 Illinois Human Rights Act
During the performance of this Contract, the Contractor agrees as follows:

1. That it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, marital status, national origin or ancestry, age, physical or mental handicap unrelated to ability, or an unfavorable discharge from military service; and further that it will examine all job classifications to determine if minority persons or women are underutilized and will take appropriate affirmative action to rectify any such underutilization.

2. That it will submit reports as required by the Department's Rules and Regulations, furnish all relevant information as may from time to time be requested by the Department or the contracting Chicago Transit Authority, and in all respects comply with the Illinois Human Rights Act and the Department's Rules and regulations.

3. That it will permit access to all relevant books, records, accounts and work sites by personnel of the contracting Chicago Transit Authority and the Department for purposes of investigation to ascertain compliance with the Illinois Human Rights Act and the Department's Rules and Regulations.

4. That it will include verbatim or by reference the provisions of this clause in every subcontract it awards under which any portion of the contract obligations are undertaken or assumed, so that such provisions will be binding upon such subcontractor. In the same manner as with other provisions of this contract, the contractor will be liable for compliance with applicable provisions of this clause by such subcontractors; and further it will promptly notify the contracting Chicago Transit Authority and the Department in the event any subcontractor fails or refuse to comply therewith. In addition, the contractor will not utilize any subcontractor declared by the Illinois Human Rights Commission to be ineligible for contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations.

GC 10.3 Prompt Payment To Subcontractors
The Contractor is required to pay all Subcontractors for all work that the Subcontractor has satisfactorily completed, no later than 14 calendar days after the Contractor has received payment from CTA. All of the Contractor's contracts with its Subcontractors must state that the Subcontractor will receive payment within 14 calendar days of the date that the Contractor has received payment from CTA.

In addition, all Retainage amounts must be paid by the Contractor to the Subcontractor no later than 14 calendar days after the Subcontractor has, in the opinion of the Chief Transit Officer, satisfactorily completed its portion of the Work. All of the Contractor's contracts with its Subcontractors must state that the Subcontractor will receive payment of
Retainage within 14 calendar days of the date that the Subcontractor has, in the opinion of the Chief Transit Officer, satisfactorily completed its portion of the Work.

A delay in or postponement of payment to the Subcontractor requires good cause and prior written approval of the Director, Purchasing. The Contractor is required to include, in each subcontract, a clause requiring the use of appropriate arbitration mechanisms to resolve all payment disputes.

CTA will not pay the Contractor for work performed unless and until the Contractor ensures that the Subcontractors have been promptly paid for the work they have performed under all previous payment requests, as evidenced by the filing with CTA of lien waivers, canceled checks (if requested), and the Contractor’s sworn statement that it has complied with the prompt payment requirements. Prime Contractors must submit a prompt payment affidavit, (form to be provided by CTA) which identifies each subcontractor (both DBE and non-DBE) and the date and amount of the last payment to such subcontractor, with every payment request filed with CTA, except for the first payment request, on every contract with CTA.

Failure to comply with these prompt payment requirements is a breach of the Contract which may lead to any remedies permitted under law, including, but not limited to, Contractor debarment. In addition, Contractor’s failure to promptly pay its Subcontractors is subject to the provisions of 50 ILCS 505/9.

GC 10.4 Obligation To Comply With The Inspector General Ordinance
The Contractor agrees to comply with all of the requirements of CTA’s Ordinance No. 99-173, as it may be amended from time to time, the provisions of which are incorporated into this Contract to the same force and effect as if set forth in full herein. As required by Ordinance No. 99-173, as amended, the Contractor agrees to cooperate fully and expeditiously with the CTA’s Inspector General in all investigations or audits. This obligation applies to all officers, directors, agents, partners, employees, and Subcontractors of the Contractor.

GC 11. Excluded Parties List And Debarred Contractors
Contractor agrees to check the list of suspended and debarred contractors maintained by the CTA and the City of Chicago and the Federal Excluded Parties List System (collectively the “EPLS”), and to require its Subcontractors to check the EPLS, prior to subcontracting any of the services or products purchased under this Contract. Contractor agrees, and will require its Subcontractors to agree, that any “person” as defined in 49 CFR 29.985 who is excluded pursuant to 49 CFR Part 29 or pursuant to the list of suspended and debarred contractors posted on CTA’s website or the City of Chicago’s website will not provide any products or services under this Contract.

GC 12. Minimum Wage Ordinance
Contractor and its Subcontractors must comply with Section 1.10 of the Authority’s Procurement Policy & Procedures (“Minimum Wage Policy”) and any regulations promulgated in pursuit thereof, to provide for a fair and adequate minimum wage to be paid to certain employees of certain Authority contractors and subcontractors. The minimum wage that must be paid pursuant to the Minimum Wage Policy is set forth in the CTA Minimum Wage Regulations, available at: https://www.transitchicago.com/procurement/regulations-and-policies/ (“Minimum Wage”).

Contractor and its Subcontractors must cooperate in any investigation by the Authority regarding compliance with the Minimum Wage Policy. Failure of the Contractor or any of its Subcontractors to comply with the Minimum Wage Policy or to cooperate in such an investigation is grounds for the Authority declaring the Contractor in default of this Contract and exercising such remedies as the Authority deems appropriate. Contractor must include this provision in all subcontracts and cause its Subcontractors to comply with its requirements.

If this Contract includes any provisions (including, but not limited to, Davis-Bacon Act or Illinois Prevailing Wage Act) requiring payment of higher wages than required by the Minimum Wage Policy, then the Contractor and its subcontractors shall pay the higher wages required by such provisions.

Contractor and its Subcontractors are advised that other minimum wage requirements, such as the City of Chicago Minimum Wage Ordinance and the Illinois Minimum Wage Law may establish a higher minimum wage than the Authority’s Minimum Wage Ordinance. Contractor and its Subcontractors must pay its covered employees the higher of
any applicable minimum wage requirements. Failure to comply with these requirements may result in the Authority finding the Contractor in default or non-responsible in future procurements.

**GC 13. Order of Precedence**

In case of any conflict or inconsistency that cannot otherwise be resolved, the governing order of precedence of the Contract Documents is as follows:

1. Executed Change Orders and Amendments
2. Section 1 General Conditions
3. Section 3 Federal Requirements
4. Section 2 Special Provisions
5. Section 5 Warranty Requirements
6. Section 6 Quality Assurance
7. Section 4 Technical Specifications
8. Contractor’s Price Proposal and DBE Schedules C & D
9. Contractor’s Technical Proposal
10. Completed Forms and Certifications
11. Insurance and Bond Requirements
12. Insurance Certifications and Bonds
13. Request for Proposal

Any executed Change Order or Amendment will be a part of the Contract and will take precedence over any other part of the Contract, wherever they conflict therewith. A Change Order more recently executed will take precedence over any prior Change Order wherever it conflicts therewith.
SECTION 2: SPECIAL PROVISIONS

SP 1. Inspection, Tests and Repairs

SP 1.1 Pilot Bus
The Contractor will produce one pilot vehicle for each type of vehicle with respect to the base order. This vehicle will be one of the ultimate quantity of the base vehicle order. The pilot vehicle will demonstrate that the vehicles fully meet all requirements of the Contract. The pilot vehicle will be produced and delivered to the Authority for a minimum of sixty (60) days prior to initiation of any production activities for the remaining vehicles unless otherwise authorized in writing by the Authority. In the event that noncompliance is identified, the Authority will to the extent practicable notify the Contractor of said noncompliance. No later than seven (7) days after the end of the 60-day test, the Authority will issue a written report to the Contractor that advises the Contractor of any noncompliance issues and/or any proposed modifications or changes required on the remaining vehicles.

In the event that the pilot vehicle does not initially comply with all performance criteria contained in the Technical Specifications, the Authority will have the right to retain a portion of any progress payment that may have been established for the pilot vehicle. The amount to be withheld will be based on the lack of compliance and may equal up to the entire progress payment amount for the pilot vehicle. This amount will be withheld until compliance is demonstrated. In the event that the compliance is subsequently determined to be impossible to achieve, the Authority may require all or a portion of the progress payment for the pilot vehicle to be forfeited for the noncompliance.

SP 1.2 Configuration and Performance Approval
In order to assess the Contractor’s compliance with the Technical Specifications, the Authority and the Contractor will, at the Pre-Production Meeting, jointly develop a configuration and performance review document for review of the pilot vehicle. This document will include appropriate performance standards for each test that is being required, and the document will become part of the official record of the Pre-Production Meeting.

SP 1.3 First Article Inspection – Production
The purpose of a first article inspection is to confirm that any components, systems, subsystems, major assemblies, subassemblies, products, parts, apparatuses, articles and other materials comply with the Technical Specifications and other Contract documents.

Where required by the Contract documents or requested by the Authority, the Contractor will cause first article inspections to be conducted. A first article inspection may include both a physical configuration inspection and a functional demonstration. First article inspections will be conducted at the Contractor or Subcontractor’s facility. The Contractor will furnish to the Authority prior to each first article inspection a written inspection and demonstration plan for each item for review. The Authority’s inspectors will attend each first article inspection unless the Authority provides a written waiver of its right to attend any such inspection. The results of each first article inspection will be documented by the Contractor in a format deemed acceptable by the Authority, and all documents relating to the inspection will be forwarded to the Authority.

SP 1.4 Post-Delivery Tests
The Authority will conduct acceptance tests on each delivered bus. These tests will be completed within fifteen (15) business days after bus delivery and will 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 the Authority. The post-delivery tests will include visual inspection and bus operations. No post-delivery test will 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. The Authority will record details of all Defects on the appropriate test forms and will notify the Contractor of acceptance or non-acceptance of each bus according to “Inspection, Testing and Acceptance” after completion of the tests. The Defects detected during these tests will be repaired according to the procedures defined in Section SP 1.5, REPAIRS AFTER NON ACCEPTANCE.

The Warranty period for each Vehicle furnished under this Contract will commence upon the Authority entering the Vehicle into revenue service.
SP 1.5 Repairs after Non-Acceptance

The Contractor, or its designated representative, will perform the repairs after non-acceptance. If the Contractor fails or refuses to begin the repairs within five (5) calendar days, then the Work may be done by the Authority’s personnel with reimbursement by the Contractor.

SP 1.6 Repair Performance

SP 1.6.1 Repairs by Contractor

After non-acceptance of the bus, the Contractor must begin Work within five (5) business days after receiving notification from the Authority of failure of acceptance tests. The Authority will make the bus available to complete repairs timely with the Contractor repair schedule.

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

SP 1.6.2 Repairs by the Authority

Unless otherwise indicated, the Authority will not take responsibility to correct Defects, except as set forth in SP 1.5.

1. **Parts used.** If the Authority performs the repairs after non-acceptance of the bus, it will 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. Reports of all repairs covered by this procedure will be submitted by the Authority to the Contractor for reimbursement or replacement of parts monthly, or at a period to be mutually agreed upon. The Contractor will provide forms for these reports.

2. **Contractor-supplied parts.** If the Contractor supplies parts for repairs being performed by the Authority after non-acceptance of the bus, then these parts will be shipped prepaid to the Authority.

3. **Return of defective components.** The Contractor may request that parts covered by this provision be returned to the manufacturing plant. The total costs for this action will be paid by the Contractor.

4. **Reimbursement for labor.** The Authority will be reimbursed by the Contractor for labor. The amount will be the amount determined by the Authority for a qualified mechanic at CTA’s most current straight time wage rate, which is $142.54 for the year 2018, which includes fringe benefits and overhead adjusted for the Authority’s most recently published rate in effect at the time the Work is performed, plus the cost of towing in the bus, if such action was necessary. These wage and fringe benefits rates will not exceed the rates in effect in the Authority’s service garage at the time the Defect correction is made.

5. **Reimbursement for parts.** The Authority will be reimbursed by the Contractor for defective parts that must be replaced to correct the Defect. The reimbursement will include taxes where applicable and fourteen and one-half (14.5) percent handling costs.

SP 1.7 Conditional Acceptance

Written acknowledgement by the Authority that it has determined, after vehicle inspection and testing, that a vehicle is suitable for revenue service but requires corrective action to meet all requirements of the Contract.

Acceptance of a vehicle will be deemed to have occurred when the vehicle has successfully met all requirements of Inspection, Testing and Acceptance, and upon written notification of final acceptance of vehicles or conditional acceptance of vehicles, by the Contracting Officer. Title to each vehicle will pass to the Authority when the Contracting Officer issues the signed Final Acceptance of Vehicles or Conditional Acceptance of Vehicles.

At the sole discretion of the Contracting Officer, vehicles may be conditionally accepted. Conditionally accepted vehicles will be made available to the Authority for revenue service until the Contractor executes corrective action, the timing of which will be coordinated with the Contracting Officer. Conditional acceptance of a vehicle for service does not relieve Contractor of the obligation to make all corrections necessary for vehicle compliance with the Contract. Title will pass to the Authority upon conditional acceptance.

The Contractor will complete acceptance testing within 15 Days after delivery of a vehicle.
SP 2. Deliveries

SP 2.1 Bus Delivery

Delivery of buses will be determined by signed receipt of the Authority’s designated agent(s) (Contract Officer or designee) at the following point(s) of delivery and may be preceded by a cursory inspection of the bus:

Chicago Transit Authority
South Shops
7801 South Vincennes Avenue
Chicago Illinois 60620
☎ 1.773.874.7100

SP 2.2 Delivery Schedule

The Contractor will deliver buses in accordance with the Delivery Schedule attached hereto and incorporated by the agreed upon Deliver Schedule submission as part of the BAFO submission and hereinafter will be defined as the “Delivery Schedule”. The Delivery Schedule will address the delivery of the base quantity of fifty buses (inclusive of the (1) pilot bus) order and the remainder the option buses’ delivery will be determined by the parties as a deliverable prior to option execution.

Pilot bus(es) will be delivered within one hundred fifty (150) calendar days following "Notice to Proceed." Production buses will be delivered at a rate not to exceed 2 buses per day or 10 buses per week, unless a higher delivery rate is authorized in writing by the CTA. Hours of bus delivery will be 7:00 a.m. to 2:00 p.m., Monday through Friday, excluding CTA holidays.

The Contractor with the Authority will have a design review at the following periods:

- Pilot Pre-build Bus design review: No less than thirty (30) days prior to the beginning of pilot bus manufacture
- Pilot Bus design review (1) month after final pilot bus delivery
- Final Pre-Build Design Review at within 14 calendar days of the expiration of the sixty (60) days pilot bus evaluation period and prior to beginning production on the non-pilot buses.

SP 2.3 Contract Deliverables

Contract deliverables associated with this Contract are set forth in the table below, along with other pertinent information. Contract deliverables will be submitted in accordance with “Section 4: Technical Specifications.” Due dates shown note the last acceptable date for receipt of Contract deliverables. The Authority will consider early receipt of Contract deliverables on a case-by-case basis. The reference section designates the appropriate specification section(s) where the requirement is referenced.

**TABLE 1**

**Contract Deliverables**

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Authority Action</th>
<th>Reference Section</th>
<th>Due Date</th>
<th>Format</th>
<th>Quantity Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Copy of Manufacturers’ formal</td>
<td>Review</td>
<td>QA 1</td>
<td>Pre-award site visit</td>
<td>Hardcopy Electronic Media</td>
<td>4 1</td>
</tr>
<tr>
<td>Quality Assurance Program</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Insurance certificates</td>
<td>Approval</td>
<td>SP 9</td>
<td>Before Work commences</td>
<td>Hardcopy</td>
<td>1</td>
</tr>
<tr>
<td>4. Contact information for technical support</td>
<td>Approval</td>
<td>N/A</td>
<td>30 days after Notice to Proceed</td>
<td>Electronic Media</td>
<td>1</td>
</tr>
<tr>
<td>5. Engineering support</td>
<td>Review</td>
<td>N/A</td>
<td>During Pre-Production Meeting</td>
<td>Contracts</td>
<td>1</td>
</tr>
<tr>
<td>6. Crashworthiness</td>
<td>Review</td>
<td>TS 22.2</td>
<td>Pre-award audit</td>
<td>Certificate</td>
<td>1</td>
</tr>
</tbody>
</table>
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Contract Deliverables

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>Performance bond</td>
<td>Review</td>
<td>SP 5.2</td>
<td>14 days from notice of Contract award</td>
<td>Hardcopy</td>
<td>1</td>
</tr>
<tr>
<td>Pre-Production Meeting minutes</td>
<td>Approval</td>
<td>N/A</td>
<td>30 days after each meeting</td>
<td>Hardcopy</td>
<td>2 originals</td>
</tr>
<tr>
<td>Engine Emissions Certificate—NOx levels</td>
<td>Review</td>
<td>TS 18</td>
<td>Prior to completion of pilot bus</td>
<td>Hardcopy</td>
<td>1</td>
</tr>
<tr>
<td>Flooring certificate (Certificate/copy of purchase order)</td>
<td>Review</td>
<td>TS 73.8</td>
<td>First Pre-Production Meeting</td>
<td>Hardcopy, Electronic</td>
<td>1</td>
</tr>
<tr>
<td>Interior features – fire-resistance certificates</td>
<td>Review</td>
<td>TS 73</td>
<td>Prior to pilot bus completion</td>
<td>Certificates</td>
<td>1</td>
</tr>
<tr>
<td>QA purchasing certifications acknowledging receipt of applicable specification</td>
<td>Review</td>
<td>Section 6 QA</td>
<td>30 days following first Pre-Production Meeting</td>
<td>Hardcopy</td>
<td>1 per major Supplier</td>
</tr>
<tr>
<td>Draft Bus OEM &amp; subsystem preventative maintenance manuals (Review period of 90 days from date of receipt)</td>
<td>Approval</td>
<td>TS 5.4</td>
<td>With pilot bus</td>
<td>Hardcopy, Electronic</td>
<td>2</td>
</tr>
<tr>
<td>Draft diagnostic procedures manuals (Review period of 90 days from date of receipt)</td>
<td>Approval</td>
<td>SP 7.2</td>
<td>With pilot bus</td>
<td>Hardcopy, Electronic</td>
<td>2</td>
</tr>
<tr>
<td>Draft Bus OEM &amp; subsystems parts manuals including cross reference listing for parts and components (Review period of 90 days from date of receipt)</td>
<td>Approval</td>
<td>TS 5.16</td>
<td>With pilot bus</td>
<td>Hardcopy, Electronic</td>
<td>2</td>
</tr>
<tr>
<td>Draft Bus OEM &amp; subsystems parts &amp; repair manuals List (Review period of 90 days from date of receipt)</td>
<td>Approval</td>
<td>TS 5.16</td>
<td>With pilot bus</td>
<td>Hardcopy, Electronic</td>
<td>2</td>
</tr>
<tr>
<td>Draft operators’ manuals (Review period of 90 days from date of receipt)</td>
<td>Approval</td>
<td>SP 7.2</td>
<td>With pilot bus</td>
<td>Hardcopy, Electronic</td>
<td>2</td>
</tr>
<tr>
<td>Bus Plan of elevation (Dimensions)</td>
<td>Review</td>
<td>TS 6</td>
<td>With pilot bus</td>
<td>Hardcopy, Electronic</td>
<td>1</td>
</tr>
<tr>
<td>Material samples</td>
<td>Review</td>
<td>TS 60.1</td>
<td>By conclusion of Pre-Production Meetings</td>
<td>as required</td>
<td></td>
</tr>
<tr>
<td>Undercoating system program</td>
<td>Approval</td>
<td>N/A</td>
<td>First Pre-Production Meeting</td>
<td>Hardcopy, Electronic</td>
<td>1</td>
</tr>
<tr>
<td>Interior security camera layout</td>
<td>Approval</td>
<td>TS 83.1</td>
<td>Prior to pilot bus completion</td>
<td>Copies of interior views</td>
<td>1 each</td>
</tr>
<tr>
<td>Resolution of issues “subject to Authority approval”</td>
<td>Approval</td>
<td>N/A</td>
<td>Prior to production</td>
<td>Hardcopy</td>
<td>1</td>
</tr>
<tr>
<td>Deliverable</td>
<td>Authority Action</td>
<td>Reference Section</td>
<td>Due Date</td>
<td>Format</td>
<td>Quantity Due</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>------------------</td>
<td>--------------------</td>
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<td>---------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Current price list for parts</td>
<td>Review</td>
<td>N/A</td>
<td>90 days after Authority written approval of draft parts manual</td>
<td>Hardcopy, Electronic Media</td>
<td>1</td>
</tr>
<tr>
<td>Electrical, hydraulic and pneumatic schematics</td>
<td>Review</td>
<td>TS 5.16</td>
<td>30 days prior to production</td>
<td>Hardcopy, Electronic Media</td>
<td>6</td>
</tr>
<tr>
<td>Recommended spare parts list, including bill of materials</td>
<td>Review</td>
<td>TS 90.14</td>
<td>60 days prior to shipment of first bus</td>
<td>Hardcopy, Electronic Media</td>
<td>1</td>
</tr>
<tr>
<td>Part number index, including original supplier name &amp; part number</td>
<td>Approval</td>
<td>TS 5.16</td>
<td>60 days prior to shipment of first bus</td>
<td>Hardcopy, Electronic Media</td>
<td>1</td>
</tr>
<tr>
<td>In-process drawings</td>
<td>Review</td>
<td></td>
<td>30 days prior to production</td>
<td>Scale drawings</td>
<td>1</td>
</tr>
<tr>
<td>Paint, Decal, Striping layout</td>
<td>Approval</td>
<td>TS 69</td>
<td>Prior to production</td>
<td>Hardcopy, Electronic Media</td>
<td>4</td>
</tr>
<tr>
<td>Special tools, diagnostic equipment, software, cables and connectors</td>
<td>Approval</td>
<td>TS 85</td>
<td>Prior to 1st bus delivery</td>
<td>As required</td>
<td>Varies</td>
</tr>
<tr>
<td>List of serialized units installed on each bus</td>
<td>Review</td>
<td>WR 1.1.8</td>
<td>With each delivered bus</td>
<td>Electronic media</td>
<td>1 per bus</td>
</tr>
<tr>
<td>QA manufacturing certificate</td>
<td>Review</td>
<td>Section 6 QA</td>
<td>With each delivered bus</td>
<td>Hardcopy</td>
<td>1 per bus</td>
</tr>
<tr>
<td>Pre-Delivery Bus Documentation Package</td>
<td>Review</td>
<td>QA</td>
<td>With each delivered bus</td>
<td>Hardcopy</td>
<td>1 per bus</td>
</tr>
<tr>
<td>Motor Vehicle Pollution Requirements Certificate</td>
<td>Review</td>
<td></td>
<td>With each delivered bus</td>
<td>Hardcopy</td>
<td>1 per bus</td>
</tr>
<tr>
<td>Driver’s log and incident report</td>
<td>Review</td>
<td></td>
<td>With each bus delivery if drive-away service is used</td>
<td>Hardcopy</td>
<td>1 per bus</td>
</tr>
<tr>
<td>Title documentation</td>
<td>Review</td>
<td>GC 5</td>
<td>30 days prior to bus delivery</td>
<td>Hardcopy</td>
<td>1 per bus</td>
</tr>
<tr>
<td>Final Bus OEM &amp; subsystems preventative maintenance manuals</td>
<td>Approval</td>
<td>SP 7.2</td>
<td>90 days after Authority written approval</td>
<td>Hardcopy, Electronic Media</td>
<td>6</td>
</tr>
<tr>
<td>Final Bus OEM &amp; subsystems diagnostic procedures manuals</td>
<td>Approval</td>
<td>SP 7.2</td>
<td>90 days after Authority written approval</td>
<td>Hardcopy, Electronic Media</td>
<td>6</td>
</tr>
<tr>
<td>Final operators’ manuals</td>
<td>Approval</td>
<td>SP 7.2</td>
<td>90 days after Authority written approval</td>
<td>Hardcopy, Electronic Media</td>
<td>6</td>
</tr>
<tr>
<td>Technical review of electronic functionality</td>
<td>Approval</td>
<td>TS 40</td>
<td>Prior to production</td>
<td>Hardcopy</td>
<td>1</td>
</tr>
</tbody>
</table>
 TABLE 1
Contract Deliverables

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Authority Action</th>
<th>Reference Section</th>
<th>Due Date</th>
<th>Format</th>
<th>Quantity Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compartment door keys</td>
<td>Approval</td>
<td>N/A</td>
<td>With each bus</td>
<td>As required</td>
<td>1 set per bus</td>
</tr>
<tr>
<td>Capital Spares</td>
<td>Review</td>
<td>N/A</td>
<td>Delivered with 1st production bus</td>
<td>As required</td>
<td>Varies</td>
</tr>
<tr>
<td>As-built drawings</td>
<td>Review</td>
<td>N/A</td>
<td>Within 60 days after final bus delivery</td>
<td>Hardcopy</td>
<td>1</td>
</tr>
<tr>
<td>Training instructor information, Training curriculum</td>
<td>Approval</td>
<td>TS 5.6</td>
<td>See TS 5.6 Training</td>
<td>Varies</td>
<td></td>
</tr>
<tr>
<td>As-built drawings</td>
<td>Review</td>
<td>N/A</td>
<td>With each bus</td>
<td>Hardcopy</td>
<td>1</td>
</tr>
<tr>
<td>Comprehensive maintenance and long-term rehab/replacement plan</td>
<td>Review</td>
<td>TS 5.4</td>
<td>Prior to pilot bus completion</td>
<td>Hardcopy</td>
<td>4</td>
</tr>
<tr>
<td>Training Aids (Mock ups)</td>
<td>Review</td>
<td>TS 5.6</td>
<td>With the pilot bus delivery</td>
<td>Varies</td>
<td></td>
</tr>
<tr>
<td>Detailed Production Schedule</td>
<td>Review</td>
<td>QA 4</td>
<td>90 days prior to production</td>
<td>Electronic Media</td>
<td>1</td>
</tr>
</tbody>
</table>

SP 3. Options and Option Pricing

The Contractor hereby grants the Authority options (“Options”) to purchase up to and including five hundred (500) additional vehicles (“Option Vehicles”). The Options will be valid for a period of five years from the effective date of the Contract. There will be no minimum order quantity for any permissible assignee and the number of multiple options is unlimited until the Authority has ordered up to and including 500 vehicles. Subject to the Authority’s right to order modifications, the Option Vehicles will have the same specifications as the vehicles purchased under this Contract. The Authority may exercise the Options by written notice to the Contractor (“Notice of Exercise of Option”) at any time on or before five years following the effective date of the Contract (“Option Date”).

The price of the Option Vehicles will be the unit price of the base order vehicles, (“Base Order Price”) adjusted by multiplying the base order price by the following fraction:

\[
\text{Latest Published Preliminary Index Number Prior to Notice of Exercise of Option} / \text{Index Number on Effective Date of the Contract}
\]

The Index will be the Producer Price Index for Truck and Bus Bodies, Series No. 1413, published by the United States Department of Labor, Bureau of Labor Statistics, or if such Index is no longer in use, then such replacement that is most comparable to the Index as may be designated by the Bureau of Labor Statistics, or as agreed by the parties.

Within thirty (30) days after delivery of the Notice of Exercise of Option to the Contractor, the Contractor will submit a proposed delivery schedule. Along with the proposed delivery schedule, the Contractor will provide the Authority with access to its production schedule for the purpose of the parties verifying available production capacity. The production schedule will include a reasonable time for mobilization and for coordinating with other vehicle orders, and it will be based upon a production rate at least equal to the production rate actually realized with respect to the base order vehicles.
If the parties are unable to agree on a production schedule, then the maximum term for the production of the Option Vehicles will not exceed a total of 12 months after the date of Notice to Proceed with Option Vehicle production. The Authority or any permissible assignee may issue a Notice to Proceed at any time after the Contractor submits its proposed delivery schedule. The Contractor will not commence production of the Option Vehicles prior to issuance of the Notice to Proceed by the Authority or any permissible assignee of the Authority for the Option Vehicles incorporating the agreed production delivery schedule or the 12-month maximum term.

Except as otherwise specifically provided in this Contract, all other terms of the Contract will apply to the Option Vehicles.

SP 4. Intentionally Omitted

SP 5. Payment
The Authority will pay and the Contractor will 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, equipment and material required; overhead; expenses; storage and shipping; risks and obligations; taxes (as applicable); fees and profit; and any unforeseen costs.

SP 5.1 Payment Terms
All payments will be made as provided herein, less any amount to be withheld as provided below and less any amounts for liquidated damages accrued under this Contract.

The Chicago Transit Authority will make progress payments to the Contractor for buses in accordance with the performance milestones set forth below.

Title to material included in any progress payment request will pass to the Chicago Transit Authority upon payment by the Chicago Transit Authority. Said title will be free of all encumbrances. However, such transfer of title will not relieve the Contractor of its responsibility for the furnishing, installation, fabrication or inclusion of said materials as a deliverable element of buses procured in accordance with the requirements of the Contract.

Progress payment requests will be accompanied by a certification, or affidavit, signed by the Contractor’s officer certifying that the Work covered by the progress payment requested has been completed. The Authority reserves the rights of inspection and audit to verify said progress as provided in “Maintenance of Records; Access by Authority; Right to Audit Records.”

A. For buses the performance milestones and payment limits will be as follows

1. Milestone 1: Fifty-percent (50%) of the unit price(s) for each bus as itemized in the price schedule in accordance with the requirements. Condition: Said Bus(es) is (are) “DRIVEABLE” within the Contractor’s manufacturing plant and has all major sub-components (e.g. engine, front and rear axles, drive train & other such systems, if any) and verified by CTA’s Inspector(s) and within thirty (30) calendar days thereafter of receipt of an acceptable invoice and manufacturer issues a “Certificate of Origin”.

2. Milestone 2: Thirty-percent (30%) of the unit price for each bus as itemized in the price schedule. Condition: CTA’s inspector(s) have approved shipment of said Bus(es) from the Contractor’s final manufacturing facility and within thirty (30) calendar days thereafter of receipt of an acceptable invoice.

3. Milestone 3: Fifteen-percent (15%) of the unit price for each bus as itemized in the price schedule. Condition: Bus(es) is (are) delivered and accepted for placement into revenue service and all Contract deliverables, as applicable have been completed and within thirty (30) calendar days of receipt of an acceptable invoice.
In the event that a bus is suitable for revenue services but fails to meet all requirements for acceptance, the Authority may, at its exclusive option "Conditionally Accept" a bus, and place it into revenue service, pending receipt of Contractor furnished materials and/or labor necessary to effectuate corrective action for acceptance. For a Conditionally Accepted bus, the CTA may withhold an amount equal to twice the estimated costs for parts and labor necessary to effectuate corrective action, until the Contractor completes such corrective action.

4. Milestone 4: Three percent (3%) of the unit price for each bus as itemized in the price schedule:

   Delivery & acceptance of all manuals, training (unless mutually agreed to be completed later than one (1) year after delivery) and other documentation required under the Contract. Rectification of any deficiencies, if any found during the acceptance of the bus(es). Contractor provisions of any and all certifications as required by law and/or regulations. Completion of post-delivery audits required under the Contract. Environmental performance and other performance criteria which will be evaluated during the first year of service of the Order.

   The balance of the total Contract price plus any moneys withheld and within thirty (30) calendar days of receipt of an acceptable invoice. The balance of the total Contract price plus any moneys withheld and within thirty (30) calendar days of receipt of an acceptable invoice.

5. Milestone 5: A final payment of two percent (2%) of the unit price for each bus as itemized in the price schedule, plus any moneys withheld as follows: Rectification of Contract performance requirements, if not met, (e.g., brake life, suspension adjustment, & maintainability of components). In addition, other performance criteria including environmental performance which will be evaluated and/or as mutually agreed between parties.

   The balance of the total Contract price plus any moneys withheld and within thirty (30) calendar days of receipt of an acceptable invoice. The balance of the total Contract price plus any moneys withheld and within thirty (30) calendar days of receipt of an acceptable invoice.

B. The Chicago Transit Authority will make payments for spare parts and/or equipment at the unit prices itemized in the price schedule upon the delivery and acceptance of said spare parts and/or equipment and within thirty (30) calendar days of receipt of a proper invoice. Title for spare parts and/or equipment will transfer to the Chicago Transit Authority upon payment. Said title will be free of all encumbrances. Any equipment that requires installation and/or training will not be considered accepted until all delivery, installation and training have been completed.

**SP 5.2 Performance Guarantee**

The Contractor will furnish, at its own expense, performance bond in accordance with the requirements set forth in the Insurance and Bond Requirements – Attachment C. The bond shall cover all of the Contractor’s obligations under the Contract including for the warranty and will remain in force until said obligations have been fulfilled.

**SP 5.3 Payment of Taxes**

Unless otherwise provided in this Contract, the Contractor will pay all federal, state and local taxes, and duties applicable to and assessable against any Work, goods, services, processes and operations incidental to or involved in the Contract, including but not limited to retail sales and use, transportation, export, import, business and special taxes. The Contractor is responsible for ascertaining and paying the taxes when due. The total Contract price will include compensation for all taxes the Contractor is required to pay by laws in effect on the Proposal Due Date. At the present time, the Authority asserts that the Authority is exempt from any taxes applicable to this Contract. The Contractor will maintain auditable records, subject to the Authority reviews, confirming that tax payments are current at all times. Some Federal Excise Taxes do not apply to materials purchased by the Authority by virtue its status as a unit of local government and municipal corporation. Illinois Retailers Occupation Tax, Use Tax, and Municipal Retailers’ Occupational Tax do not apply to materials or services purchased by the CTA by virtue of Chapter 70 Illinois Compiled Statutes Section 3605/33, as amended. These taxes must not be included in any payment requests. Illinois Tax Exemption Identification number is E9978-2987-07.
SP 6. Liquidated Damages

SP 6.1 Liquidated Damages for Late Delivery of the Bus

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 deliver the buses within the time specified in “Delivery Schedule” as defined in the BAFO, except for any excusable delays as provided in “Excusable Delays/Force Majeure” or any extension thereof, the Authority 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 to the Authority will be fixed at $296.87 per calendar day per bus not delivered in substantially good condition as inspected by the Authority 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 the Authority and further authorizes the Authority to deduct the amount of the damages from money due the Contractor under the Contract, computed as aforesaid. If the money due the Contractor is insufficient or no money is due the Contractor, then the Contractor will pay the Authority the difference or the entire amount, whichever may be the case, within thirty (30) days after receipt of a written demand by the Contracting Officer.

The payment of aforesaid fixed, agreed and liquidated damages will 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 the Authority arising at any time from the failure of the Contractor to fulfill the obligations referenced in this clause in a timely manner.

SP 7. Service and Parts

SP 7.1 Contractor Service and Parts Support

The Contractor will state on the form Contractor Service and Parts Support Data the representatives responsible for assisting the Authority, as well as the location of the nearest distribution center, which will furnish a complete supply of parts and components for the repair and maintenance of the buses to be supplied. The Contractor also will state below, or by separate attachment, its policy on transportation charges for parts other than those covered by warranty.

SP 7.2 Documentation

The Contractor will provide an electronic copy and 10 printed current maintenance manual(s) to include preventative maintenance procedures, diagnostic procedures or troubleshooting guides and major component service manuals, an electronic copy and 10 printed current parts manual(s) including a cross-reference listing for parts and components for the bus to be provided, and an electronic copy and up to 400 printed standard operator’s manual(s) as part of this Contract. The Contractor also will exert its best efforts to keep maintenance manuals, operator’s manuals and parts books up to date for a period of fifteen (15) years. The supplied manuals will incorporate all equipment ordered on the buses covered by this procurement. In instances where copyright restrictions or other considerations prevent the Contractor from incorporating major components information into the bus parts and service manuals, separate manual sets as published by the subcomponent Supplier will be provided.

SP 7.3 Parts Availability Guarantee

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 fifteen (15) years after the date of acceptance. Parts will be interchangeable with the original equipment and will be manufactured in accordance with the quality assurance provisions of this Contract. Prices will not exceed the Contractor’s then-current published catalog prices.

The Contractor will provide the Authority, within two (2) business days of the Authority’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 information requested by the Authority.

For any Major Components manufactured outside the continental United States, the contractor will provide a local certified/qualified service center that can perform the rebuild service, or a local distributor that can procure rebuilt/refurbished components. If the contractor does not have a local service center or distributor, then the contractor will train and certify the Chicago transit authority internal work force. Contractor will provide a
procurable list of all parts, kits or special tools needed to perform such work.

For Major components made locally in the United States, or any parts sourced or manufactured outside of the continental United States, the Contractor will provide a continental United States based warehouse with adequate stocking levels to replace 5% of the contracted fleet within 14 calendar days.

Note: If Authority exercises eighteen (18) Year option (TS 90.11 18 Year Design Life), the support will extend to eighteen (18) years instead of fifteen (15) years listed above.

Where the Contractor fails to honor this parts guarantee or parts ordered by the Authority are not received within thirty (30) days of the agreed upon delivery date, then the Contractor will provide to the Authority, within five (5) business days of the Authority’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 the Authority. The Contractor’s design and manufacturing documentation provided to the Authority will be for its sole use in regard to the buses procured under this Contract and for no other purpose.

SP 7.4 Authority-Furnished Property

In the event that equipment or other goods or materials are specified in the Technical Specifications to be furnished by the Authority to the Contractor for incorporation in the Work, the following provisions will apply:

The Authority will furnish the equipment, goods or materials in a timely manner so as not to delay Contract delivery or performance dates. If Authority-furnished property is received in a condition not suitable for the intended use, then the Contractor will promptly notify the Authority, detailing the facts, and at the Authority’s expense repair, modify, return or take such other action as directed by the Authority. The parties may conduct a joint inspection of the property before the Contractor takes possession to document its condition.

The Authority retains title to all Authority-furnished property. Upon receipt of the Authority-furnished property, the Contractor assumes the charge and care of the property and bears the risk of loss or damage due to action of the elements or from any other cause. The Contractor will provide appropriate protection for all such property during the progress of the Work. Should any Authority-furnished equipment or materials be damaged, such property will be repaired or replaced at the Contractor’s expense to the satisfaction of the Authority. No extension of time will be allowed for repair or replacement of such damaged items. Should the Contractor not repair or replace such damaged items, the Authority will have the right to take corrective measures itself and deduct the cost from any sums owed to the Contractor.

Warranty administration and enforcement for Authority-furnished equipment are the responsibility of the Authority, unless the parties agree to transfer warranty responsibility to the Contractor.

SP 8. Federal Motor Vehicle Safety Standards (FMVSS)

The Contractor will submit:
1. one (1) manufacturer’s FMVSS self-certification (Federal Motor Vehicles Safety Standards) that the vehicle complies with relevant FMVSS

OR

2. Manufacturer’s certified statement that the contracted buses will not be subject to FMVSS regulations.

SP 9. Insurance

The Contractor will maintain in effect during the term of this Contract, including any warranty period, at its own expense, in accordance with the requirements set forth in Volume 3, Attachment C Insurance and Bond Requirements.

All Contractor’s policies will contain an endorsement naming the Authority as an additional insured and providing that written notice will be given to Authority location at least thirty (30) days prior to termination, cancellation or material reduction of coverage in the policy; provided, however, that such notice may be given on ten (10) days’ advance notice if the termination is due to nonpayment of premium.
SP 10. Software Escrow Account

Upon execution of the Contract, the Contractor will provide the Authority a list of all OEM software comprising proprietary works (“Proprietary Software”) for all major vehicle subsystems. From time to time and only upon request, information contained within the listed software may be made available to the Authority through the OEM of the vehicle subsystem. The Contractor and OEM are not obligated to provide copies of source code as this is proprietary intellectual property; however, the Contractor is obligated to assist the Authority with any technical assistance for the duration of the life of the vehicle. It is the Authority’s prerogative to evaluate the long-term viability of the Contractor and its Subcontractors and Suppliers based upon the criteria set forth in “Qualification Requirements.”

SP 11. Diagnostic Software/Tools

Contractor will provide at no cost to the authority seven (7) complete sets of transferable software/licenses/tools valid for fifteen (15) years, Diagnostic software/licenses/tools will cover all diagnostic software needed to conduct maintenance services, or diagnose fault, or performance data for the complete bus and its sub-systems.

SP 12. Financing Options

The Authority reserves the right to utilize whatever financing options may be available to it in the procurement of the vehicles to be delivered under the Contract. These options could include, but are not limited to, cross-border leasing, certificates of participation, capital leasing, etc. The use of any of these or other financing methods may require the submission of additional information by the Contractor, the presence of the Contractor at meetings, the execution by the Contractor of various documents in connection with such financing and other reasonable forms of cooperation and assistance. By responding to this RFP, Proposer agrees to provide support in the event the Authority uses any of the financing options available to it and to fully cooperate in the implementation of such options for the Authority’s benefit at no additional cost to the Authority.
SECTION 3: FEDERAL REQUIREMENTS

FR 1. Access to Records
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 Authority, 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).

The following access to records requirements apply to this Contract:

FR 1.1 Local Governments
In accordance with 49 CFR 18.36(i), the Contractor agrees to provide the Authority, 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 that are directly pertinent to this Contract for the purposes of making audits, examinations, excerpts and transcriptions. Contractor also agrees, pursuant to 49 CFR 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 USC 5302(a)1, which is receiving federal financial assistance through the programs described at 49 USC 5307, 5309 or 5311.

FR 1.2 State Governments
In accordance with 49 CFR 633.17, the Contractor agrees to provide the Authority, 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 USC 5302(a)1, which is receiving federal financial assistance through the programs described at 49 USC 5307, 5309 or 5311. By definition, a major capital project excludes contracts of less than the simplified acquisition threshold currently set at $100,000.

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.

FR 2. Federal Funding, Incorporation of FTA Terms and Federal Changes
The preceding provisions include, in part, certain standard terms and conditions required by the Department of Transportation, whether or not expressly set forth in the preceding Contract provisions. All contractual provisions required by DOT, as set forth in FTA Circular 4220.1F or its successors are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms will be deemed to control in the event of a conflict with other provisions contained in this agreement. The Contractor will not perform any act, fail to perform any act or refuse to comply with any Authority requests that would cause the Authority to be in violation of the FTA terms and conditions.

The Contractor will 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 Authority 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 will constitute a material breach of this Contract.

FR 3. Federal Energy Conservation Requirements
The Contractor agrees to comply with mandatory standards and policies relating to energy efficiency that are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act.

FR 4. Civil Rights Requirements
The following requirements apply to the underlying Contract:
1. **Nondiscrimination:** In accordance with Title VI of the Civil Rights Act, as amended, 42 USC § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 USC § 6102, section 202 of the Americans with Disabilities Act of 1990, 42 USC § 12132, and Federal transit law at 49 USC § 5332, the Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, sexual orientation, gender identity, 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 USC § 2000e, and Federal transit laws at 49 USC § 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 CFR 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 USC § 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, sexual orientation, gender identity, or age. Such action will 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 USC §§ 623 and Federal transit law at 49 USC § 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 USC § 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 CFR 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.

**FR 5. No Government Obligation to Third Parties**

1. The Authority 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 will not be subject to any obligations or liabilities to the Authority, 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 will not be modified, except to identify the Subcontractor who will be subject to its provisions.
FR 6. Program Fraud and False or Fraudulent Statements or Related Acts

1. The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 USC §§ 3801 et seq. and U.S. DOT regulations, “Program Fraud Civil Remedies,” 49 CFR 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 it 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 USC § 5307, the government reserves the right to impose the penalties of 18 USC § 1001 and 49 USC § 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 will not be modified, except to identify the Subcontractor who will be subject to the provisions.

FR 7. Suspension and Debarment

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

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

FR 8. Disadvantaged Business Enterprise (DBE)

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.

The Contractor will maintain compliance with “DBE Approval Certification” throughout the period of Contract performance.

The Contractor will not discriminate on the basis of race, color, national origin or sex in the performance of this Contract. The Contractor will 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 the Authority deems appropriate. Each subcontract the Contractor signs with a Subcontractor must include the assurance in this paragraph (see 49 CFR 26.13(b)).

FR 9. Prompt Payment to Subcontractors

Pursuant to 49 Code of Federal Regulations (CFR) Part 26, the Contractor will pay each Subcontractor under this Contract for satisfactory performance of its Contract no later than thirty days (30) days after receipt of each Progress Payment received from Authority. The Contractor will pay to each Subcontractor all amounts it has retained from payments under the Subcontract within thirty (30) days after the Subcontractor’s work is satisfactorily completed. Any delay of payment beyond the thirty (30) day time limit will be only for good cause, and only upon the prior written approval of Authority.

Failure by the Contractor to comply with this requirement will be construed to be a breach of contract and may result in sanctions as specified in this Contract.
FR 10. Clean Water Requirements
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 USC 1251 et seq. The Contractor agrees to report each violation to the Authority and understands and agrees that the Authority 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.

FR 11. Clean Air Requirements
1. The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 USC §§ 7401 et seq. The Contractor agrees to report each violation to the Authority and understands and agrees that the Authority 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.
3. In addition the Contractor agrees to comply with the following regulations: EPA regulations, “Control of Air Pollution from Mobile Sources,” 40 CFR Part 85; EPA regulations, Control of Air Pollution from New and In-Use Motor Vehicles and New and In-Use Motor Vehicle Engines, 40 CFR Part 86.

FR 12. Compliance with Federal Lobbying Policy
Contractors who apply or bid for an award of $100,000 or more will 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 Authority, a member of Congress, an 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 USC 1352. Each tier will 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 USC 1352. Such disclosures are forwarded from tier to tier up to the recipient.

FR 13. Buy America
The Contractor agrees to comply with 49 USC 5323(j) and 49 CFR 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 CFR 661.7. A general public interest waiver from the Buy America requirements applies to microprocessors, computers, microcomputers, software or other such devices, which are used solely for the purpose of processing or storing data. This general waiver does not extend to a product or device that merely contains a microprocessor or microcomputer and is not used solely for the purpose of processing or storing data.

Separate requirements for rolling stock are set out at 49 USC 5323(j)(2)(C), 49 CFR 661.11. Rolling stock must be assembled in the United States and have at least a 70 percent domestic content.

A Bidder or Proposer must submit to the Authority the appropriate Buy America Certification with all offers on FTA-funded contracts, except those subject to a general waiver. Proposals that are not accompanied by a properly completed Buy America certification are subject to the provisions of 49 CFR 661.13 and may be rejected as nonresponsive.

FR 14. Testing of New Bus Models
The Contractor agrees to comply with 49 USC A 5323(c) and FTA’s implementing regulation at 49 CFR Part 665 and will perform the following:

1. A manufacturer of a new bus model or a bus produced with a major change in components or configuration will 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 will 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 will 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 will provide the name and address of the recipient of such a vehicle and the details of that vehicle's configuration and major components.

**FR 15. Pre-Award and Post-Delivery Audits**
The Contractor agrees to comply with 49 USC § 5323(l) and FTA's implementing regulation at 49 CFR Part 663 and to submit the following certifications:

1. **Buy America requirements:** The Contractor will complete and submit a declaration certifying either compliance or noncompliance with Buy America. If the recommended Bidder/Proposer certifies compliance with Buy America, it will submit documentation that 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 will submit evidence that it will be capable of meeting the bid specifications.

3. **Federal Motor Vehicle Safety Standards (FMVSS):** The Contractor will submit (1) manufacturer's FMVSS self-certification, Federal Motor Vehicle Safety Standards, that the vehicle complies with relevant FMVSS or (2) manufacturer's certified statement that the contracted buses will not be subject to FMVSS regulations.

**FR 16. Cargo Preference**
The Contractor agrees to the following:

- To use privately owned U.S.-flag commercial vessels to ship at least fifty (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 U.S.-flag commercial vessels;
- To furnish within twenty (20) business days following the date of loading for shipments originating within the United States or within thirty (30) business days following the date of leading for shipments originating outside the United States, a legible copy of a rated, “on-board” commercial ocean bill of lading in English for each shipment of cargo described in the preceding paragraph to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590 and to the FTA recipient (through the Contractor in the case of a Subcontractor’s bill-of-lading);
- 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.

**FR 17. Fly America**
The Contractor agrees to comply with 49 USC 40118 (the “Fly America” Act) in accordance with the General Services Administration's regulations at 41 CFR Part 301-10, which provide that recipients and sub recipients of federal funds and their contractors are required to use U.S. flag air carriers for U.S. government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. The Contractor will submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a U.S.-flag air carrier was not available or why it was necessary to use a foreign air carrier and will, in any event, provide a certificate of compliance with the Fly America requirements. The Contractor agrees to include the requirements of this section in all subcontracts that may involve international air transportation.
FR 18. Policies For Selected Contracts
Contractor will comply with the subsections of this Section FR and to include these requirements, except "Contract Work Hours and Safety Standards Act" (Section FR 19), in all subcontracts exceeding $100,000 in value of every tier. Contractor will include "Contract Work Hours and Safety Standards Act" (Section FR 19) in all subcontracts exceeding $2,500 in value not including subcontracts for the purchase of supplies or materials or articles ordinarily available on the open market.

FR 19. Contract Work Hours and Safety Standards Act
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 will require or permit any such laborer or mechanic in any work week in which he or she is employed on such Work to work in excess of 40 hours in such work week 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 40 hours in such workweek.

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 therefore will be liable for the unpaid wages. In addition, such Contractor and Subcontractor will be liable to the United States for liquidated damages. Such liquidated damages will 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 work week of 40 hours without payment of the overtime wages required by the clause set forth in paragraph 1 of this section.

Withholding for unpaid wages and liquidated damages: The Authority will 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 monies 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.

Subcontracts: The Contractor or Subcontractor will 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 will be responsible for compliance by any Subcontractor or lower-tier Subcontractor with the clauses set forth in paragraphs 1 through 4 of this section.

FR 20. ADA Access
The Contractor and any of its Subsuppliers under this Contract agree to comply with all applicable requirements of the Americans with Disabilities Act of 1990 (ADA), 42 USC §§ 12101 et seq.; Section 504 of the Rehabilitation Act of 1973, as amended, 29 USC § 794; 49 USC § 5301(d); and the following regulations and any amendments thereto:

1. DOT regulations, “Transportation Services for Individuals with Disabilities (ADA),” 49 CFR Part 37;
2. DOT regulations, “Nondiscrimination on the Basis of Handicap in Programs and Activities Receiving or Benefiting from Federal Financial Assistance,” 49 CFR Part 27;
5. DOJ regulations, “Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities,” 28 CFR Part 36;
10. U.S. ATBCB regulations, “Electronic and Information Technology Accessibility Standards,” 36 CFR Part 1194; and
11. Any implementing requirements FTA may issue.

FR 21. Privacy Act
The Contractor and its subcontractors at every tier 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 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 Contract.

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.

FR 22. Drug & Alcohol Testing
In accordance with 49 U.S.C. §5331 and FTA’s implementing Regulations at 49 CFR Parts 653 & 654, respectively, the site(s) for the performance of the work done by the Contractor in connection with the work under this Contract ensures the Contractor’s compliance with all drug and alcohol policy, testing program and reporting requirements set forth in 49 CFR Parts 40, 653 & 654 when performing a function as defined in 49 CFR 653.7. See Certification Regarding a Drug Free Workplace under Section 9, CER8.9.

FR 23. Interest of Members Of, Or Delegates To, Congress
No member of, or delegate to, the Congress of the United States will be admitted to any share or part of this Contract or to any benefit arising therefrom. (41 U.S.C. § 22.)

FR 24. Fuel Economy
In accordance with FTA Circular 4220.1F, Contractor will deliver buses that comply with EPA regulations, —Fuel Economy of Motor Vehicles, 40 CFR Part 600.
SECTION 4: TECHNICAL SPECIFICATIONS

GENERAL

TS 1. Scope

Technical specifications define requirements for heavy-duty 40 ft. clean diesel transit bus which, by the selection of specifically identified alternative configurations, may be used for both suburban express service and general service on urban arterial streets. Buses will have a minimum expected life of fifteen (15) years or 600,000 miles, whichever comes first, and are intended for the widest possible spectrum of passengers, including children, adults, the elderly and people with disabilities.

TS 2. Definitions

Alternative: An alternative specification condition to the default bus configuration. The Authority may define alternatives to the default configuration to satisfy local operating requirements. Alternatives for the default configuration will be clearly identified.

Ambient Temperature: The temperature of the surrounding air. For testing purposes, ambient temperature must be between 16 °C (50 °F) and 38 °C (100 °F).

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.

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.

Battery Compartment: Low-voltage energy storage, i.e. 12/24 VDC batteries.

Battery Management System (BMS): Monitors energy, as well as temperature, cell or module voltages, and total pack voltage. The BMS adjusts the control strategy algorithms to maintain the batteries at uniform state of charge and optimal temperatures.

Braking Resistor: Device that converts electrical energy into heat, typically used as a retarder to supplement or replace the regenerative braking.

BFMS (Bus Fuel Management System): CTA’s system for tracking fueling & mileage events

Burst Pressure: The highest pressure reached in a container during a burst test.

Capacity (fuel container): The water volume of a container in gallons (liters).

Cells: Individual components (i.e., battery or capacitor cells).

Code: A legal requirement.

Corrosion-Resistant: Rated at minimum 1000 hours of salt spray according to ASTM B117

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

dBA: Decibels with reference to 0.0002 microbar as measured on the “A” scale.

DC to DC Converter: A module that converts a source of direct current from one voltage level to another.
Default Configuration Bus: The bus described if no alternatives are selected. Signing, colors, the destination sign reading list and other information must be provided by the Authority.

Defueling: The process of removing fuel from a tank.

Defueling Port. Device that allows for vehicle defueling, or the point at which this occurs

Destroyed: Physically made permanently unusable.

Discrete Signal: A signal that 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.

DPF: Diesel particulate filter.

Driver's Eye Range: The 95th-percentile ellipse defined in SAE Recommended Practice J941, except that the height of the ellipse will be determined from the seat at its reference height.

Fuel Line: The pipe, tubing or hose on a vehicle, including all related fittings, through which fuel passes.

Fusible Material: A metal, alloy or other material capable of being melted by heat.

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.

Fireproof: Materials that will not burn or melt at temperatures less than 2000 °F.

Free 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 sq. ft. will be allocated for the feet of each seated passenger protruding into the standee area.

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.

Gross Load: 180 lbs for every designed passenger seating position, for the driver, and for each 1.5 sq. ft. of free floor space.

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

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

Hose: Flexible line.

Labeled: Equipment or materials to which has been attached a label, symbol or other identifying mark of an organization, which is acceptable to the authority having jurisdiction and concerned with product evaluation, which maintains periodic inspection of production labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Leakage: Release of contents through a defect or a crack. See Rupture.

Line: All tubes, flexible and hard, that carry fluids.

Liner: Inner gas-tight container or gas container to which the overwrap is applied.

Local Regulations: Regulations below the state level.
Low-Floor Bus: A bus that, 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.

Low Voltage (LV): Voltage that is less than 60V DC or 30V AC.

Lower Explosive Limit: The lowest concentration of gas where, given an ignition source, combustion is possible.

Maximum Service Temperature: The maximum temperature to which a container/cylinder will be subjected in normal service.

Metallic Hose: A hose whose strength depends primarily on the strength of its metallic parts; it can have metallic liners or covers, or both.

Module: An assembly of individual components

Operating Pressure: The standard level of pressure that a gaseous fuel system or cylinder operates under.

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.

Pipe: Nonflexible line.

Power: The rate at which energy is transferred or used. Work or energy divided by time.

Power Density: The power output of a device per unit of volume.

Real-Time Clock (RTC): Computer clock that keeps track of the current time.

Retarder: Device used to augment or replace some of the functions of primary friction based braking systems of the bus.

Rupture: Sudden and unstable damage propagation in the structural components of the container resulting in a loss of contents. See Leakage.

Seated Load: 180 lbs for every designed passenger seating position and for the driver.

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

Serial Data Signals: 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 prearranged 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.

Service Pressure: The settled pressure at a uniform gas temperature of 21 °C (70 °F) and full gas content. It is the pressure for which the equipment has been constructed, under normal conditions. Also referred to as the nominal service pressure or working pressure.

Settled Pressure: The gas pressure when a given settled temperature, usually 21 °C (70 °F), is reached.

Settled Temperature: The uniform gas temperature after any change in temperature caused by filling has dissipated.

Special Tools: Tools not normally stocked by the Authority.

Specification: A particular or detailed statement, account or listing of the various elements, materials, dimensions, etc. involved in the manufacturing and construction of a product.
**Standard:** A firm guideline from a consensus group.

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

**Stress Loops:** The “pigtails” commonly used to absorb flexing in piping.

**Structure:** The basic body, including floor deck material and installation, load-bearing external panels, structural components, axle mounting provisions and suspension beams and attachment points.

**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. A “common wheelchair” is such a device that does not exceed 30 in. in width and 48 in. in length measured 2 in. above the ground, and does not weigh more than 600 lbs when occupied.

**TS 3. Referenced Publications**
The documents or portions thereof referenced within this specification will 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 APTA issuance of this specification. The Contractor is responsible for complying with current referenced documents.

**TS 4. Legal Requirements**
The Contractor will comply with all applicable federal, state and local regulations. These will include but not be limited to ADA, as well as state and local accessibility, safety and security requirements. Local regulations are defined as those below the state level.

Buses will meet all applicable FMVSS regulations and will accommodate all applicable FMCSR regulations in effect at the location of the Authority and the date of manufacture.

In the event of any conflict between the requirements of these specifications and any applicable legal requirement, the legal requirement will prevail. Technical requirements that exceed the legal requirements are not considered to conflict.

**TS 5. Overall Requirements**
The Contractor will ensure that the application and installation of major bus subsystems and systems are compliant with all such subcomponent vendors’ requirements and recommendations. Contractor and Authority will identify subcomponent vendors that will submit installation/application approval documents with the completion of a pilot or lead bus. Components used in the vehicle will be of heavy-duty design and proven in transit service.

**TS 5.1 Weight**
It will be a design goal to construct each bus as light in weight as possible without degradation of safety, appearance, comfort, traction or performance.

Buses at a capacity load will not exceed the tire factor limits, brake test criteria or structural design criteria. If Bus is top heavy, the manufacturer will provide design feature to reduce swaying of the bus.

The Contractor will submit a certified weight slip for the curb weight of each axle and a certified weight slip for the total curb weight of each bus upon delivery.

**TS 5.2 Capacity**
The vehicle will be designed to carry the gross vehicle weight, which will not exceed the bus GVWR.

The GVWR of the bus and tires will allow a minimum of full seated and standee loads and 1 driver calculated for the governed speed of the bus in regular service.

As part of proposal, the Contractor will provide the Authority with a proposed seating layout and floor plan. The floor plan will include calculated seated and standing passenger capacities, final layout and plan to be finalized during the pre-build meeting.
**TS 5.3 Vehicle Service Life**
The minimum useful design life of the bus in transit service will be at least 15 years or 600,000 miles. It will be capable of operating at least 40,000 miles per year, including the 15th year.

**TS 5.4 Maintenance and Inspection**
Scheduled maintenance tasks for buses will be related and will be in accordance with the manufacturer’s recommended preventive maintenance schedule (along with routine daily service performed during the servicing). The overall PM schedule for buses will be based upon a minimum of a 6,000-mile interval and/or multiples of same.

The manufacturer is responsible for providing a written comprehensive maintenance and long-term rehab/replacement plan encompassing buses for their entire useful life. The plan should include times (in hours) to complete the jobs, any modification to the written comprehensive maintenance and long-term rehab/replacement plan will have to be discussed and agreed to in advance with the Authority, any increase in maintenance cost due to agreed-upon changes will be the responsibility of the Contractor; provided however that, if a modification is imposed by an applicable law or regulation, then the Contractor and the Authority will split the difference in maintenance cost equally.

Test ports or connectors, as required, will be provided for commonly checked functions on the bus, such as hydraulic, pneumatic, cooling, temperature, voltage, current and state of charge (SOC).

The Contractor will give prime consideration to the routine problems of maintaining the vehicle. All vehicle components and systems, both mechanical and electrical, which will require periodic physical work or inspection processes, will be installed so that a minimum of time is consumed in gaining access to the critical repair areas. It will not be necessary to disassemble portions of the coach structure, panels, subsystem, components and/or equipment including but not limited to seats and flooring under seats in order to gain access to these areas. Each coach will be designed to facilitate the disassembly, reassembly, servicing or maintenance, using tools and equipment that are normally available as standard commercial items.

Requirements for the use of unique specialized tools will be minimized. The body and structure of the coach will be designed for ease of maintenance and repair. Individual panels or other equipment that may be damaged in normal service will be repairable or replaceable. Ease of repair will be related to the vulnerability of the item to damage in service.

For maintenance and service, access to the roof of the bus will be limited to no more than 2 times per year. Contractor will provide definitive timeframes for any maintenance activity. For example, the Contractor will not state, “6,000 miles or as much as necessary.”

The Contractor will provide a list of all special tools and pricing for maintaining this equipment as a supplement to the Pricing Schedule.

**NOTE:** Tools such as compartment door keys, bellows gauges and other tools that are required for daily maintenance and inspections will not be included in the special tool list and will be furnished for each coach.

The Contractor will provide the following below list of information for each build cycle of production vehicles.

1. **Service Information/Data**
   a. Location of service facility for CTA buses.
   b. Service support organization chart and expertise of personnel.
   c. Service support plan for CTA, including its length of time and staffing requirements.
   d. Retrofit campaign bulletin (sample).
   e. Representative service manual (bound and packaged separately).
   f. Warranty area support, organization and process for the CTA buses.

2. **Any analyses for component durability and life-cycle costs related to the bus being proposed.**
   a. Cost analysis
   b. Fuel
   c. Labor
   d. Parts

3. **Detailed PM schedule for the lifetime of the vehicle.**
**TS 5.5 Interchangeability**

Unless otherwise agreed, all units and components procured under this Contract, whether provided by Suppliers or manufactured by the Contractor, will be duplicates in design, manufacture and installation to ensure interchangeability among buses in each order group in this procurement. This interchangeability will extend to the individual components as well as to their locations in the buses. These components will include, but are not limited to, passenger window hardware, interior trim, lamps, lamp lenses and seat assemblies. Components with non-identical functions will not be, or appear to be, interchangeable.

Any one component or unit used in the construction of these buses will be an exact duplicate in design, manufacture and assembly for each bus in each order group in this Contract. Contractor will identify and secure approval for any changes in components or unit construction provided within a Contract.

In the event that the Contractor is unable to comply with the interchangeability requirement, the Contractor must notify the Authority and obtain the Authority’s prior written approval, including any changes in pricing.

Authority will review proposed product changes on a case-by-case basis and will have the right to require extended warranties to ensure that product changes perform at least as well as the originally supplied products. Contractor will provide information on info to the agency within 30 days of a supercession occurring. This info will include reason for supercession (e.g. quality related, supplier change) and provide the agency info on disposition of parts in the Authority’s supply chain. Additionally, the contractor must update manuals with any product changes on a quarterly basis. The manual will have a revision history to allow the agency to understand what changes occurred from one revision to the next.

**TS 5.6 Training**

**General Overview**

All courses will be completed within a mutually agreed to time by the agency and the contractor’s training departments. (Note: Authority typically prefers training within 0700 hrs and 1400 hrs) All courses of instruction and manuals will be presented in the English language.

Courses will have a length commensurate with material required for in-depth presentation. Class will be scheduled on a 40 hour work week basis, 8 hours per day, 5 work days per week. The agency’s holidays will be observed. The recommended class size will consist of ten (10) students. The agency and the contractor will agree to the training schedule at least (30) thirty days prior to the start of each respective course. Each class will be conducted at the agencies facility (e.g. bus garage) located in Chicago, Illinois. The location will be agreed to during the scheduling of the training.

The Contractor will submit to the Authority, for approval, a training plan. The plan must include, but not be limited, the following:

1. Outline (e.g. List of courses, their duration, training aids utilized, available mock-ups, etc.)
2. Proposed Schedule based on delivery of buses
   Note: Training will be schedule to ensure minimal delay between bus delivery and revenue service.
3. Student qualifications prerequisites. For the purpose of course development and presentation, vendors should assume all CTA students are high school graduates (or equivalent), and that maintenance personnel will possess the ability to use basic hand tools and electronic test equipment.
4. Contractor Instructor qualifications: A description of instructor qualifications, a resume, curriculum vitae, or other description of instructional qualifications must be submitted to agency as part of the training plan. The contractor instructor will have a thorough knowledge of the subject equipment, an understanding of the adult learning process, and demonstrated experience in vocational instruction.

The Authority will conduct training material reviews during the development, implementation and at the conclusion of the training for accuracy. This process will be repeated for each contract vehicle group/option/retrofit upgrade or enhancement.

Course curriculum will include formal and informal instruction, mock-ups, models, manuals, diagrams and parts catalogs. The Contractor will assume no knowledge of the features of the buses on the part of the agency’s personnel and will design the program to bring the level of knowledge to one which is fully adequate for the objective. The Contractor may assume that the instructors have the skills pertinent to their crafts.
This program will be considered a “Train-the-Trainer” (Three-T) and of a quality and depth sufficient to qualify the agency’s to the highest level of knowledge, use, theory, diagnosis, repair and servicing of the systems and system equipment and components that are utilized in the contract vehicle.

The Contractor will supervise all classes. Audio-visual methods of instruction (movies, power point presentations with synchronized sound, etc.) are required, but there will be a competent individual present to answer questions on the material presented. At the conclusion of the classroom instruction the Contractor will furnish to the CTA a complete set of accurate and up-to-date lesson plans. The Contractor may utilize or contract for manufacturer specific training. When this occurs, the vehicle contractor will provide the agency, as part of its contract/agreement with the manufacturer instructor, a copy of all materials that will be presented by the manufacturer instructor. This material may include, but not be limited to services manuals, power point presentations, internet site access, digital media, video, troubleshooting programs, etc.

Maintenance training will be tailored specifically to agency’s vehicles, systems, components, sub-components and equipment, and be designed to develop the knowledge and skills required to maintain all item(s) delivered under the contract. Maintenance training will be subdivided into the following levels:
1. Theory of operation of the system and its major components;
2. System(s) configuration, system- to system interface and vehicle interface;
3. Preventative maintenance, consisting of written procedures and schedules for the periodic maintenance of all equipment;
4. Written and validated inspection procedures and a system–level troubleshooting guide (to the lowest field replaceable unit);
5. Detailed theory of operation to module, board, and/or device level;
6. Component level troubleshooting and component replacement;
7. Testing and alignment procedures of repaired units;
8. Overhaul/Rebuild of components;
9. Final written tests and/or practical tests for each area instructed as deemed necessary.
10. Complete list of tools require to troubleshoot and maintain the systems.
11. Information on access, removal, dismantling a system.

The curriculum will be designed to train the Instructors so that they are proficient in the operation, diagnosis, repair and maintenance of the advanced design bus, to the extent that they may provide the instruction and training of the agency’s maintenance personnel not involved in the manufacturers training course.

The Maintenance Training will provide System and Subsystem maintenance for the Authority’s Instructors at the CTA’s facilities. System and Subsystem Maintenance Training will include but not be limited to:
1. Body
2. Door Systems
3. Ramp
4. Front and rear axles
5. Brakes, ABS, ATC and Pneumatic systems
6. Cooling system
7. Electrical system
8. Steering and suspension
9. HVAC and auxiliary coolant heaters and special equipment to include wheelchair ramps, electronic destination signs, etc.

The Authority will supply a reasonable amount of assistance in the movement of equipment, apparatus, etc., within its own property and it will furnish suitable furniture (desks, tables, lecterns, etc.). When instruction in subsequent courses is conducted after the arrival of the buses on CTA's property, the CTA will, if requested, facilitate visits to a bus for the instruction.

**Bus Maintenance Training**

The Contractor will provide (75) seventy-five days [600 hours] of bus maintenance training. The bus maintenance training will not expire and will be scheduled at the Authority's discretion.

- Following this Maintenance Training, the Contractor instructor will act as an observer in classes that are taught by the instructor to maintenance field mechanics and personnel.
Bus Operator Instructor Training
The Contractor will provide (3) days of Bus Operator Instructor training.

Training Aids
The Contractor also will provide visual and other teaching aids (such as manuals, slide presentations and literature) for use by the Authority’s own training staff, which become the property of the Authority. All training materials, tools, and software must be provided at or before the time of training. All Training materials will be provided an Authority-approved electronic media (e.g. pdf, ppt, etc). The Authority will have the right to record the training sessions. All of this material will be the property of the CTA and will be accompanied by a release from copyright infringement when said material is used specifically for the training of CTA maintenance personnel. Suitable protective covers will be provided for each audio-visual and master reproducible.

There will be provided an adequate supply of high quality, professionally prepared material on paper, as well as digital media, and other training aids as may be necessary to impart the essential knowledge to the personnel involved and leave them with authoritative and up-to-date reference material. The education program will be designed to include steps to determine the proficiency of all students.

Training aids for maintenance training classes will consist of but not limited to the following:

1. Operation manuals, maintenance manuals, preventive maintenance manuals, service manuals and inspection cards.
2. Multimedia presentations including 3-D illustrations; This media will illustrate subassemblies showing component locations, component cutaways, schematics, and wiring diagrams. Clear and concise graphics depicting hydraulic, pneumatic, and air conditioning systems will include direction of flow for particular medium as shown by animation.
3. Glossaries and definitions for all components used in schematics and wiring diagrams incorporated in training pass-out materials.
4. SCORM compliant and compatible with CTA’s Oracle Learning Management (OLM) System, computer based training modules appropriate for refresher training.
5. Troubleshooting and systems diagnostics on digital media
6. Functional Mock-ups of Components (e.g. ramps, doors, etc.)

The working of other significant components will be illustrated with diagrams, cutaway views, etc., displayed with sufficient scale and clarity to permit all to see clearly. Wiring diagrams, when used as training aids and reference material, will be divided to facilitate comprehension. There will be single-line functional diagrams of systems and schematic diagrams of each component in the systems. Where parts are identified by initials or reference numbers, there will be a legend to permit precise identification on the same sheet. (All training aids will be up-to-date and precisely reflect the systems and subsystems on the buses delivered under this contract.)

All training materials, to include schematics, diagrams, mock-ups, (to include models actual "training units" such as Electrical PLC Training boards, Air System Training Boards, etc.), cutaways, and lesson plans will become the property of the CTA at the completion of the training programs. The Contractor will be responsible for the condition of these materials for the duration of the training program, and will replace all damaged materials unless the damage resulted from neglect by the CTA. Lesson plans will be updated as required during the course instruction.

Training aids will include actual samples of manually operable devices and working samples of devices, the functions of which can be displayed without dismantling the device. Training aids will be at minimum the following components / subsystems such as:

1. Front and Rear Door mock-up with controllers
2. Brake, ABS/ATC, pneumatic system training board
3. Multiplex/PLC control system training board
4. Digital manometer
5. Front/rear axle assemblies
6. front/rear axle service tool sets
7. HVAC service tools
8. Any other specialty tools and/or items mutually agreed to.

The mock-ups will reflect the system used and will satisfy the requirements for the entire bus order. The mock-up boards are intended as training aids and will be accurately representative of the corresponding systems on the bus
and will contain actual functioning components/programs as used on the bus. These mock-up boards and engine, as well as any and all required training aids will become the property of the Authority. Test points will be incorporated on all simulated panels together with all hardware necessary for maintenance operations. CTA may elect to substitute a mock up(s) for a credit towards other mock up(s) or training hours up to the value of the mock up(s) (quotes shall be submitted to validate value of mock up system credit).

Technical/Service Representatives
The Contractor will, at its own expense, have one or more competent technical service representatives available on request to assist the Authority 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 the provisions of “Warranty Requirements.”

TS 5.7 Operating Environment
The bus will be designed to operate in the service area of the Authority. The bus will achieve normal operation in ambient temperature ranges of -21°F to 110°F, at relative humidity between 5 percent and 100 percent, and at altitudes up to 3000 ft above sea level. Degradation of performance due to atmospheric conditions will be minimized at temperatures below -21 °F, above 110 °F or at altitudes above 3000 ft. Altitude requirements above 3000 ft will need separate discussions with the engine manufacturer to ensure that performance requirements are not compromised. Speed, gradeability and acceleration performance requirements will be met at, or corrected to, 77 °F, 29.31 in. Hg, dry air per SAEJ1995. Note: -21°F corresponds to the 10th Percentile Minimum Temperature from Illinois “North 40º latitude” from ASTM D975-15.

TS 5.8 Noise
Interior Noise
The combination of inner and outer panels and any material used between them will provide sufficient sound insulation so that a sound source with a level of 80 dBA measured at the outside skin of the bus will have a sound level of 65 dBA or less at any point inside the bus. These conditions will prevail with all openings, including doors and windows, closed and with the propulsion/drive system and accessories switched off.

The bus-generated noise level experienced by a passenger at any seat location in the bus will not exceed 75 dBA. The driver area will not experience a noise level of more than 70 dBA. Measurements of interior noise levels will be taken in accordance with SAE J2805. An exception will be made for the turntable area, which will be considered a separate environment.

Exterior Noise
Airborne noise generated by the bus and measured from either side will not exceed 80 dBA under full-power acceleration when operated at 0 to 35 mph at curb weight. The maximum noise level generated by the bus pulling away from a stop at full power will not exceed 83 dBA. The bus-generated noise at curb idle will not exceed 65 dBA. If the noise contains an audible discrete frequency, a penalty of 5 dBA will be added to the sound level measured. The Contractor will comply with the exterior noise requirements defined in local laws and ordinances identified by the Authority and SAE J566.

Transient Noise
The bus builder will minimize all transient noises generated by the bus and/or by accessories. These efforts will include the application of mufflers on exhaust air ports for the kneeling valve, dryer and brake exhaust. Accessories include (but are not limited to) kneeling valve, kneeling alarm, air dryer purge system, HVAC unit, and brake application and release, etc.

TS 5.9 Fire Safety
The bus will be designed and manufactured in accordance with all applicable fire safety and smoke emission regulations.

A minimum of four (4) fire protection sensors will be installed in the engine compartment, under all horizontal bulkheads, above and downwind of the major heat sources, and in areas likely to be wetted by leaking flammable fluids.

Additional sensors will be located in other potentially critical areas. The sensors will detect over-temperature in the critical areas and will activate the fire alarm bell and warning light in the driver's compartment. The sensors will return to normal setting and deactivate alarms when the temperature returns to normal. Sensors will be UL listed or Factory Mutual
approved for fire detection. Activation of the fire detectors will, after a 30 second delay, automatically shut off the master battery switch. The fire sensor manufacturer will review and approve in writing that the locations are appropriate both in static and running powertrain conditions, fire protection sensors will be normally closed so that even in the event of an open circuit it will trigger a fire alarm.

The passenger, engine and low voltage battery compartments will be separated by a bulkhead(s) that will, by incorporation of fireproof materials in its construction, be a firewall. This firewall will preclude or retard propagation of an engine, low voltage battery compartment fire into the passenger compartment and will be in accordance with the Recommended Fire Safety Practices defined in FTA Docket 90, dated October 20, 1993. Only necessary openings will be allowed in the firewall, and these will be fireproofed. Any passageways for the climate control system air will be separated from the engine compartment by fireproof material.

Piping through the bulkhead will have copper, brass, or fireproof fittings sealed at the firewall 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 firewall.

Engine access panels in the firewall will be fabricated of fireproof material and secured with fireproof fasteners. These panels, their fasteners, and the firewall will be constructed and reinforced to minimize warping of the panels during a fire that will compromise the integrity of the firewall.

Materials
All materials used in the construction of the passenger compartment of the bus will be in accordance with the Recommended Fire Safety Practices defined in FTA Docket 90-A, dated Oct. 20, 1993. Materials entirely enclosed from the passenger compartment, such as insulation within the sidewalls and sub-floor, need not comply. In addition, smaller components and items, such as seat grab rails, switch knobs, small light lenses, door seals, window seals, steering wheel, steering column and escape hatches will be exempt from this requirement.

**TS 5.10 Fire Suppression**
No fire suppression system required.

**TS 5.11 Respect for the Environment**
In the design and manufacture of the bus, the Contractor will make every effort to reduce the amount of potentially hazardous waste. In accordance with Section 6002 of the Resource Conservation and Recovery Act, the Contractor will use, whenever possible and allowed by the specifications, recycled materials in the manufacture of the bus.

**TS 5.12 Elderly and disabled Passengers**
The contractor will comply with all applicable Federal requirements defined in the Americans with Disabilities Act, 49 CFR Part 38, and all state and local regulations regarding mobility-impaired persons. Local regulations are defined as those below the state level.

**TS 5.13 Failure Mode and Effects Analysis (FMEA)/PHA (Preliminary Hazard Analysis)**
The Contractor will conduct a complete Failure Mode and Effects Analysis (FMEA) on all safety related systems of the bus. The analysis will conform to generally accepted industry standards (SAE J1739, DOT-FTA-MA-26-5005-00-01/DOT-VNTSC-FTA-00-01, or equivalent) and be the product of a person or persons with demonstrated expertise in FMEA analysis. At a minimum these systems would include:

- Braking and all air related components
- Steering system
- Passenger door operation
- Electrical
- Fire Detection
- ADA components (ramp, tie-downs, etc.)

The Contractor will notify the Authority at the Pre-Production meeting of the schedule and details of these reports. Complete reports will be provided to the Authority.

The Contractor will be responsible for addressing any issues in the Authority’s Preliminary Hazard Analysis (PHA).
TS 5.14 Configuration Audit
The first completed bus will be subjected to a full configuration audit by the Authority to assure compliance with these specifications.

TS 5.15 Evaluation In Service
Upon acceptance of the buses into revenue service, an evaluation will be done during the pilot bus evaluation. Upon conclusion of this evaluation, a review will be conducted with the Authority and the Contractor to decide on necessary corrective actions. The Authority and the Contractor will agree on any modification needed to meet the requirements of the contract; the Contractor agrees that such modifications will be done both retroactively to the first bus delivered and on all units to be delivered per the schedule and will be at no cost to the Authority.

TS 5.15.1 Reliability Evaluation
Reliability evaluation will consist of running the buses in passenger service and evaluating defects. There will be no routine maintenance required in less than the 6,000 mile standard inspection interval, with the exception of return air filters during air conditioning season.

Failures that are beyond the manufacturer’s ability to control (i.e., flat tires or accidents that are not the result of mechanical failure) will not be used to evaluate the bus’s performance.

TS 5.15.2 Excessive Maintenance
Throughout the test and evaluation period, regardless of mileage accumulated, any requirement for excessive maintenance will be noted and addressed by the contractor. Excessive maintenance is any maintenance beyond the maintenance now performed at the 6,000-mile interval inspections, by the agency.

TS 5.16 Manuals
Service, Troubleshooting, and Parts manuals will be written and illustrated for use by average automotive technicians. All documents will be subject to review and approval by the Authority prior to final acceptance. Drawings coinciding with the completion of the buses, the Contractor will supply the agency a hard copy set of the production shop floor drawings of the bus. These drawings will be used to conduct the Configuration Audit.

Prior to production the manufacturer will furnish complete electrical schematics for the bus. Reproducible wiring schematics in hard copy as well as in PDF format will be provided with quantities as specified in the Contract Terms and Conditions.

Final drawings representing any changes made during the production cycle will be provided in PDF or DXF format 120 days after the delivery date of the final production bus.

Drawings will minimally include the:
- Entire structure of the bus
- Interior body with dimensions
- Exterior body with dimensions
- Floor
- Transmission mounts, Traction motor and/or gearbox mounts
- Glazing and frames
- Battery tubs and supporting structure
- Passenger assists layout
- Seat placement and dimensions
- Passenger door and window dimensions
- Wiring schematics and drawings
- Wiring harnesses and cables drawings
- Plumbing schematics (pneumatic/hydraulic) and drawings
- Suspension
- Any specialized brackets or mounts
- Battery tray
• Paint Scheme
• Interior decal placement
• Exterior decal placement
• Destination Signs drawings and schematics
• Frame Drainage Plan
• FSS installation and routing
• ADA device installation

Drawings will be in a format easily readable (e.g.: PDF). If the drawing format requires special software to read, the contractor will supply the software at no cost to the Authority.

**Integration with Documoto**
All Manuals will be capable of integration with CTA’s Vehicle Integrated Parts Catalog (IPC) and Operations and Maintenance (O&M) documentation system, Digabit Documoto. The bus manufacturer will coordinate with CTA and Digabit Documoto to establish procedures for documentation upload and will pay any and all associated upload fees.

**DIMENSIONS**
**TS 6. Physical Size**
With exceptions such as exterior mirrors, marker and signal lights, bumpers, fender skirts, washers, wipers, ad frames, cameras, object detection systems, bicycle racks, feelers and rub rails, the bus will have the following overall dimensions as shown in Figure 1 at static conditions and design height.

**Figure 1. Transit Bus Exterior Dimensions**

**TS 6.1 Bus Length**
For ease of use, the following tolerances will be allowable for each given bus length. Bus length is determined as the measurement from bumper to bumper.

- **40 ft bus**: 39 ft to 41 ft.
- 60 ft (articulated) bus: 59 to 62 ft

**TS 6.2 Bus Width**
**Transit Coach**
Body width will be 102 in. (+0, -1 in.). Body width including mirrors will be less than 125 in.

**TS 6.3 Bus Height**
Maximum overall height will be 134 in., including all rigid, roof-mounted items such as A/C, exhaust, fuel system and cover, etc.

**TS 6.4 Step Height**
**Transit Coach**
The step height will not exceed 16.5 in. at either doorway without kneeling and will not exceed 15.5 in. at the step. A maximum of two steps are allowed to accommodate a raised aisle floor in the rear of the bus.

**TS 6.5 Underbody Clearance**
The bus will maintain the minimum clearance dimensions as defined and shown in Figure 2 of SAE Standard J689, regardless of load up to the gross vehicle weight rating.

**TS 6.6 Ramp Clearances**
The approach angle is the angle measured between a line tangent to the front tire static loaded radius arc and the initial point of structural interference forward of the front tire to the ground.

The departure angle is the angle measured between a line tangent to the rear tire static loaded radius arc and the initial point of structural interference rearward of the rear tire to the ground.

The breakover angle is the angle measured between two lines tangent to the front and rear tire static loaded radius and intersecting at a point on the underside of the vehicle that defines the largest ramp over which the vehicle can roll.

The manufacturer will provide a presentation of a digital model of the bus showing that the bus as designed meets the Approach, Breakover and Departure angles as called out above. The dimensions are to be validated on the pilot bus.

**TABLE 2**

<table>
<thead>
<tr>
<th>Angle</th>
<th>40 foot</th>
<th>60 foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach</td>
<td>9 degrees (min.)</td>
<td>9 degrees (min.)</td>
</tr>
<tr>
<td>Front break over</td>
<td>8 degrees (min.)</td>
<td>10.2 degrees (min.)</td>
</tr>
<tr>
<td>Rear break over (articulated only)</td>
<td>n/a</td>
<td>8.7 degrees (min.)</td>
</tr>
<tr>
<td>Departure</td>
<td>9 degrees (min.)</td>
<td>9 degrees (min.)</td>
</tr>
</tbody>
</table>

**TS 6.7 Ground Clearance**
Ground clearance will be no less than 10 in., (8 in. at jacking pad) except within the axle zone and wheel area.
Axle zone clearance, which is the projected area between tires and wheels on the same axial centerline, will be no less than 5.6 in. Wheel area clearance will be no less than 8 in. for parts fixed to the bus body and 6 in. for parts that move vertically with the axles.

**FIGURE 2**
Transit Bus Minimum Road Clearance
TS 6.8 Floor Height
Transit Coach
Height of the step above the street will be no more than 16 in. measured at the centerline of the front and rear doorway. All floor measurements will be with the bus at the design running height and on a level surface and with the standard installed tires. A maximum of two steps are allowed to accommodate a raised aisle floor in the rear of the bus. The floor may be inclined along the longitudinal axis of the bus, and the incline will not exceed 3.5 degrees off the horizontal except locally at the doors where 2 degree slope toward the door is allowed. All floor measurements will be with the bus at the design running height and on a level surface and with the standard installed tires.

TS 6.9 Interior Headroom
Headroom above the aisle and at the centerline of the aisle seats will be no less than 78 in. in the forward half of the bus tapering to no less than 74 in. forward of the rear settee. At the centerline of the window seats, headroom will be no lower than 65 in., except for parcel racks and reading lights, if specified. Headroom at the back of the rear bench seat may be reduced to a minimum of 56 in., but it will increase to the ceiling height at the front of the seat cushion. In any area of the bus directly over the head of a seated passenger and positioned where a passenger entering or leaving the seat is prone to strike his or her head, padding will be provided on the overhead paneling.

TS 6.10 Aisle Width
The minimum clear aisle width between pairs of transverse seats with all attached hardware will be at least 22 in.

The aisle width between the front wheelhouses will be at least 35.5 in., and the entire area between the front wheelhouses will be available for passengers and mobility aid devices.

VEHICLE PERFORMANCE
TS 7. Power Requirements
The system will be sized to provide sufficient power to enable the bus to meet the defined acceleration, top speed, route, mileage, GVWR and gradeability requirements, while operating all accessories. This should be verified using actual road test results and/or computerized vehicle performance data.

The loss of power to the bus will not cause the driver to lose control of the bus or to lose steering or braking. The bus will be able to be safely brought to a controlled stop.
**TS 7.1 Top Speed**
The bus will be capable of achieving a top speed of 55 mph on a straight, level road at GVWR with all accessories operating. The bus will be capable of safely maintaining the vehicle speed according to the recommendations by the tire manufacturer.

**NOTE:** Values are assumed to be sustained. Manufacturer will supply Authority with data if there is a variance between peak performance and sustained vehicle performance.

**TS 7.2 Gradeability**
Gradeability requirements will be met on grades with a dry commercial asphalt or concrete pavement at GVWR with all accessories operating. The propulsion system will enable the bus to achieve and maintain a speed of 40 mph on a 2½ percent ascending grade and 15 mph on a 10 percent ascending grade continuous.

**NOTE:** Values are assumed to be sustained. Manufacturer will supply Authority with data if there is a variance between peak performance and sustained vehicle performance.

**TS 7.3 Acceleration/Brake Performance**
The acceleration will meet the requirements below and will be sufficiently gradual and smooth to prevent throwing standing passengers off-balance. Acceleration measurement will commence when the accelerator is depressed.

**TABLE 3**
Maximum Start Acceleration Times on a Level Surface

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Maximum time (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>30</td>
<td>18</td>
</tr>
<tr>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>Top speed</td>
<td></td>
</tr>
</tbody>
</table>

1. Vehicle weight = GVWR

The Brake Performance will meet all USDOT & federal regulations.

**TS 7.4 Operating Range**
The operating range of the coach will be designed to meet the operating profile as stated in the “Design Operating Profile” section.

The operating range of the coach when run on the Altoona Test cycle will be at least 350 mi (560 km) or 20 hrs with full fuel capacity.

**TS 8. Fuel Economy/Range (Design Operating Profile)**
Test results from the Altoona fuel economy tests or other applicable test procedures will be provided to the Authority. Results will include vehicle configuration and test environment information. Fuel economy data will be provided for each design operating profile. The design operating profile is assumed to be defined by the Altoona fuel duty cycle. The fleet average for these buses will achieve a minimum of approximately 3.75 miles per gallon evaluated after one year operating in normal service.
POWERPLANT
TS 9. Engine

TS 9.1 Engine (Diesel)
Propulsion System Description
The engine will comply with applicable local, state, and/or federal emissions and useful life requirements. Components of the fuel management and/or control system will have a design life of not less than 300,000 miles without replacement or major service. The lifetime estimate is based on the design operating profile.

Electronic Controls
The electronic controls will be compatible with multiplex wiring systems, capable of receiving inputs from the throttle, shift selector and engine. Communication between the electronically controlled vehicle systems will be made using the SAE J1939 Recommended Practice communication link. Electronic controls will be compatible with either 12 or 24 volt systems, and compensate for changing conditions such as variations in vehicle weight and engine power. A nominal brake pedal application of 15 to 20 psi will be required by the operator to engage forward or reverse range from the neutral position.

Propulsion System Service
The propulsion system will be arranged so that accessibility for all routine maintenance is assured. No special tools, other than dollies and hoists, will be required to remove the propulsion system or any subsystems. The exhaust system, air cleaner, air compressor, starter, alternator, radiator, all engine accessories, and any other component requiring service or replacement will be easily removable. Contractor will provide all specialty tools and diagnostic equipment required for maintaining the Propulsion System in accordance with Special Tools List.

Engine Controls
The engine will be equipped with an electronically controlled management system, compatible with either 12- or 24-volt power distribution. The engine control system will be capable of transmitting and receiving electronic inputs and data from other drivetrain components and broadcasting that data to other vehicle systems. Communication between electronic drivetrain components and other vehicle systems will be made using the SAE J1939 Recommended Practice communication link. The engine's electronic management system will monitor operating conditions and provide instantaneous adjustments to optimize both engine and bus performance. The system will be programmable to allow optimization of programmable features.

The engine starting system will be protected by an interlock that prevents its engagement when the engine is running. Special equipment or procedures may be employed to start the bus 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 will be of the type recommended by the engine manufacturer and approved by the authority. The integration of all systems on the vehicle relative to engine idle speed will be the responsibility of the vehicle manufacturer to meet the requirements of the transit property.

The engine control system will protect the engine against progressive damage. The system will monitor conditions critical for safe operation and automatically derate power and/or speed and initiate engine shutdown as needed.

The engine will have on-board diagnostic capabilities that will be able to monitor vital functions, store 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, will be provided in the operator's area and inside the engine compartment. The diagnostic reader device connector ports for the engine, transmission and ABS will be located in close proximity to each other and will be accessible through the same access panel in both the driver's and the engine compartment area. The on-board diagnostic system will inform the operator via visual and/or audible alarms when out-of-parameter conditions exist for vital engine functions.

The engine on-board diagnostic system will have capabilities for storing and processing data and provide detailed information/reports on various aspects of fleet usage. The information will be retrievable via an IBM-compatible PC. Automatic shutdown will only occur when parameters established for the functions below are exceeded:
• Coolant Temperature
• Oil Pressure
• Oil Temperature

A control will be available to the operator, to allow temporary override (30-45 seconds) of the engine protection/shutdown system if engine power is required to move the bus in emergency conditions.

The engine and major electrical loads will be programmed to automatically shutdown if left in an idle condition for 15 minutes. Shutdown will be accomplished through the bus multiplex system to prevent excessive electrical draw. However, if started from the rear of the bus, automatic shutdown will be bypassed to allow for bus to be used as cooling or heating stations.

Other optional program features/parameters, such as recording number of brake applications, hard deceleration, etc., will be finalized with the engine manufacturer during pre-production. The engine diagnostics, as well as the output from these optional program features stated will be communicated through the vehicle electronics communication system to allow interface with the Automatic Vehicle Monitoring System.

The engine will be equipped with an operator-controlled fast idle device. The fast idle control will be a two-way toggle mounted on the dash or side console and will activate only with the transmission in neutral and the parking brake applied.

The OEM will assure that the bus structure can successfully accept the installation of the propulsion system and be operated on the stated duty-cycle for a period of 15 years without a structural failure. The engine will be rated for the GVWR or greater.

**TS 10. Cooling Systems**

The capacity of the cooling system will be of sufficient size to maintain all engine and transmission fluids and engine intake air at safe, continuous operating temperatures during the most severe operations possible and in accordance with engine and transmission manufacturers' cooling system requirements. The system will be able to maintain the design component temperatures under all operating conditions for the design life of the vehicle in the service area and environment of the agency.

The Contractor will provide evidence that the cooling system selected has the capability to handle peak heat rejection with a partially clogged radiator at maximum ambient temperature plus heat reflected off the pavement. The Contractor will submit an analysis verifying cooling system capabilities. The entire cooling system will be equipped with an electronic detection device to indicate overheating on the driver's control pane.

The cooling system in its new condition will have an ambient capacity of at least 110°F with water as coolant and sea level operation. The fan control system will be designed with a fail-safe mode of "fan on." The cooling system will meet the requirements stated in the operating environment. Coolant temperature gauges are required in rear engine compartment. Air intakes will be properly positioned and configured to minimize the intake of water, road dust, and debris and will be adequately filtered.

Component temperature sensors may be used for monitoring/control, or for component/system protection. If equipped and serviceable, component temperature sensors will be easily accessible. Under typical failure modes or out of limit conditions, component temperature sensors will not disable the bus unless there is an immediate risk of hazardous fault propagation. In the event that a component temperature sensor must disable the bus, then the component/system must comply with the Automatic Propulsion System Protection/Shutdown Override Feature requirement of TS 9.1. Cooling system fans will be of durable corrosion-resistant construction, bolted on and designed so a mechanic can gain access to. The cooling fan and mounting bracket will be designed to withstand thermal fatigue and vibration associated with the installed configuration.

**TS 10.1 Engine Cooling**

The engine will be cooled by a water-based, pressure type, cooling system that does not permit boiling or coolant loss during the operations described above. Engine thermostats will be easily accessible for replacement. Shutoff valves will allow filter replacement without coolant loss. Valves will permit complete shutoff of lines for the heating and defroster units, and water booster pumps. The water boost pump will be a magnetically coupled, brushless design. All low points in
the water-based cooling system will be equipped with drain cocks. Air vent valves will be fitted at high points in the cooling system unless it can be demonstrated that the system is self-purging.

A hot, running level sight glass or tube to determine satisfactory engine coolant level will be provided and will be accessible by opening one of the engine compartment's access doors. A spring-loaded, push button type valve to safely release pressure or vacuum in the cooling system will be provided with both it and the water filler no more than 60 inches above the ground and both will be accessible through the same access door.

The radiator and charge air cooler will be of durable corrosion-resistant construction with bolted-on removable tanks.

The radiator cores, fins and tubes will be E-coated for corrosion protection. The radiator will be designed so that a mechanic can gain access to a substantial portion of the side facing the engine for the purpose of cleaning the radiator in five minutes or less.

Radiators with a fin density greater than 10 fins per inch, and louvered/slit designs, are more susceptible to clogging and deteriorating cooling performance over time and will not be used. The radiator and charge air cooler will be designed to withstand thermal fatigue and vibration associated with the installed configuration. Cooling system will be sized and designed to maintain fluids at a safe continuous operating temperature during the worst operating conditions with a fifty percent (50%) blockage of front of radiator.

No heat producing components or climate control system components will be mounted between the engine cooling air intake aperture and the radiator.

The engine hydraulic cooler will be independent of the radiator/CAC assembly.

The engine cooling system will 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.

The cooling fans will be electrically driven and temperature controlled, allowing the engine to reach operating temperature quickly. The temperature-controlled fan will not be driven when the coolant temperature falls below the minimum level recommended by the engine manufacturer. Control of the fans will be via an electronic control unit which will also be able to broadcast out-of-parameter conditions through the SAE J1939 communication link. A screen guard must be installed on electric motor fans per SAE J1308

A means of determining satisfactory component coolant level will be provided. A spring-loaded, push-button type valve or lever will be provided to safely release pressure or vacuum in the cooling system with both it and the water filler no more than ±60 in. above the ground. Both will be accessible through the same access door.

The cooling fan will be temperature controlled, allowing the engine to reach operating temperature quickly

The lower edge of the radiator and charge air cooler core(s) will be mounted at a height no less than 3 ft above street level to minimize core fouling caused by dirt, debris, leaves, etc. Contractor's should inform the Authority if this deviates from their standard location of radiator and charge air cooler.

**TS 10.2 Transmission Cooling**

The transmission will be cooled by a dedicated heat exchanger sized to maintain operating fluid within the transmission manufacturer's recommended parameters of flow, pressure and temperature. The transmission cooling system will be matched to retarder and engine cooling systems to ensure that all operating fluids remain within recommended temperature limits established by each component manufacturer. The engine cooling system should provide coolant bypass flow to the transmission cooling system with the engine thermostats closed.
**TS 10.3 Charge Air Cooling**
The charge air cooling system, also referred to as after-coolers or inter-coolers, will provide maximum air intake temperature reduction with minimal pressure loss. The charge air radiator will be sized and positioned to meet component manufacturer’s requirements. The charge air radiator will not be stacked ahead of or behind the engine radiator and will be positioned as close to the engine as possible unless integrated with the radiator. Air ducting and fittings will be protected against heat sources and will be configured to minimize restrictions and maintain sealing integrity.

**TS 10.4 Quick Oil Change**
The Engine oil system shall include a removable quick oil change interface hose kit that is installed by the OEM and all required brackets for mounting the quick oil change hosing and vacuum pump interfaces. The quick oil change kit shall be easily removable with standard tools. The hose kit shall be substantially similar to the list below. The hose kit includes but is not limited to the following:

<table>
<thead>
<tr>
<th>Parts:</th>
<th>CTA Lot#:</th>
<th>Qty:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kit: ISL Quick Oil</td>
<td>1588014</td>
<td>As Req’d</td>
</tr>
<tr>
<td>Kit: ISM Quick Oil</td>
<td>1588015</td>
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</tr>
<tr>
<td>Washer</td>
<td>1120052</td>
<td>2</td>
</tr>
<tr>
<td>P-clamp</td>
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<td>2</td>
</tr>
<tr>
<td>Bolt</td>
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<tr>
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<tr>
<td>Lock washer</td>
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</tr>
<tr>
<td>Flat washer</td>
<td>1120054</td>
<td>1</td>
</tr>
</tbody>
</table>

Examples of existing connections to Oil Pans on current CTA buses.

ISM

ISL

Examples of Vacuum Pump interface.

ISL

ISM
TS 11. Transmission/Electric Shift Selection

The transmission will be multiple speed, automatic shift with torque converter, retarder and electronic controls. Gross input power, gross input torque and rated input speed will be compatible with the engine. The transmission will be designed to operate for not less than 300,000 miles on the design operating profile without replacement or major service. The transmission should be easily removable without disturbing the propulsion system and accessible for service.

The electronically controlled transmission will 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 will contain built-in protection software to guard against severe damage. The on-board diagnostic system will trigger a visual alarm to the driver when the electronic control unit detects a malfunction.

An electronic transmission fluid level monitoring and protection system will be provided. This system will allow a mechanic to accurately determine fluid levels during checking or oil change and will be in addition to the manual dipstick. This system will also provide protection against any damage resulting from improper fluid level condition.

The electronic controls will be capable of transmitting and receiving electronic inputs and data from other drivetrain components and of broadcasting that data to other vehicle systems. Communication between electronic drivetrain components and other vehicle systems will be made using the communications networks. Electronic controls will be compatible with either 12 or 24 V power distribution, provide consistent shift quality, and compensate for changing conditions, such as variations in vehicle weight and engine power. At a minimum, drivetrain components consisting of the engine, transmission, retarder, ASR, and anti-lock braking systems will be powered by a dedicated and isolated ignition supply voltage to ensure data communication among components exists when the vehicle ignition is switched to the “on” position.

A brake pedal application of 15 to 20 psi will be required by the driver to engage forward or reverse range from the neutral position to prevent sudden acceleration of the bus from a parked position.

The transmission/electric drive will be equipped with a "Neutral Bus Stop" (NBS) feature to help reduce heat generation. With the NBS, the transmission will shift to Neutral and the brake interlocks will be engaged to hold the vehicle in place each time the bus comes to a stop. The transmission/electric drive will shift back in gear and the interlocks will disengage once the brake pedal is released and the accelerator is depressed, and the bus will accelerate smoothly.

**TS 11.1 Automatic Neutral Function with Manual Re-Engagement**

The transmission will automatically shift to neutral whenever the door brake interlock is applied or the parking brake is pulled for more than 5 min. The driver will be required to first disengage the parking brake and then apply the service brake to re-engage a forward or reverse range.
The Authority can service with sumps. All fillers will be fitted with magnetic-type drain plugs or magnets in pan. Remote Mount Filters Should be utilized so that all fluid fill locations will be properly labeled to help ensure that correct fluid is added. All fillers will be easily accessible with standard funnels, pour spouts and automatic dispensing equipment. All lubricant will be arranged for ease of access and maintenance. The Contractor will list all special tools, fixtures or facility requirements recommended for servicing. All fillers will be easily accessible with standard funnels, pour spouts and automatic dispensing equipment.

**TS 11.2 Hill Holder**
A vehicle hill holder function will be integrated with an automatic or reduced engine load state function to prevent inadvertent vehicle movement while the transmission is not in forward range. With the hill holder feature, the transmission will shift to Neutral and the brake interlocks will be engaged to hold the vehicle in place each time the bus comes to a stop. The transmission will shift back in gear and the interlocks will disengage once the brake pedal is released and the accelerator is depressed, and the bus will accelerate smoothly.

**TS 11.3 Final Drive**
The bus will be driven by a single heavy-duty axle at the rear with a load rating sufficient for the bus loaded to GVWR. Transfer of gear noise to the bus interior will be minimized. The drive axle will 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 will be magnetic type, external hex head. If a planetary gear design is employed, the oil level in the planetary gears will be easily checked through the plug or sight gauge. The drive shaft will be guarded to prevent it from striking the floor of the coach or the ground in the event of a tube or universal joint failure.

**TS 11.4 Jerk**
The rate of change of acceleration measured at the centerline, floor level of the bus will be minimized throughout the acceleration, deceleration range and regeneration and will be no greater than 0.3 g/sec. for a duration of a quarter-second or more.

**TS 12. Retarder**
The transmission will be equipped with a retarder braking designed to extend brake lining service life. The application of the retarder braking will result in a smooth blending of retarder braking and service brake functions without exceeding jerk requirements. Brake lights will illuminate when the retarder braking is activated.

The retarder will become partially engaged (approximately 114 to 113 of its total application, with a resulting deceleration of no greater than 0.03 g) when the throttle is completely released (e.g., zero throttle). Maximum retarder will be achieved when brake pedal is depressed prior to engagement of service brakes with a maximum resulting deceleration of approximately 0.14g. The resulting decelerations specified include the effects of engine braking.

**TS 13. Mounting**
All powerplant mounting will be mechanically isolated to minimize transfer of vibration to the body structure and provide a minimum clearance of 0.75 in. Mounts will control the movement of the powerplant so as not to affect performance of belt-driven accessories or cause strain in piping and wiring connections to the powerplant. Motor mount material will withstand the severe conditions of operation, including extreme temperatures and effect of lubrication fluids and will not require maintenance/replacement for 300,000 miles.

**TS 13.1 Service**
All systems requiring routine maintenance will be arranged for ease of access and maintenance. The Contractor will list all special tools, fixtures or facility requirements recommended for servicing. All fillers will be easily accessible with standard funnels, pour spouts and automatic dispensing equipment.

The propulsion system will be arranged for ease of access and maintenance. The Contractor will list all special tools, fixtures or facility requirements recommended for servicing. The muffler, exhaust system, air cleaner, air compressor, starter, alternator, radiator, all accessories and any other component requiring service or replacement will be easily removable and independent of the engine and transmission removal. An engine oil pressure gauge and coolant temperature gauge will be provided in the engine compartment. These gauges will be easily read during service and mounted in an area where they will not be damaged during minor or major repairs.

Propulsion system oil and the radiator filler caps will be hinged to the filler neck and closed with spring pressure or positive locks to prevent leakage. All fluid fill locations will be properly labeled to help ensure that correct fluid is added. All fillers will be easily accessible with standard funnels, pour spouts and automatic dispensing equipment. All lubricant sumps will be fitted with magnetic-type drain plugs or magnets in pan. Remote Mount Filters Should be utilized so that the Authority can service without the usage of a pit.
The propulsion system, transmission, and hydraulic reservoir will each incorporate a unique lubricant fill fitting to prevent cross-contamination of lubricant types. Fitting types will be approved by the Authority.

**TS 13.2 Unique Fluid (Lubricant) Fillers**
The engine, transmission, diesel exhaust fluid (DEF) and hydraulic reservoir will each incorporate a unique fill fitting to prevent cross-contamination. Fitting types will be specified by the Authority. The engine and transmission will be equipped with sufficient heavy-duty fuel and oil filters for efficient operation and to protect the engine and transmission between scheduled filter changes. All filters will be easily accessible and the filter bases will be plumbed to ensure correct reinstallation. Filters should be remote mounted if possible so that they could be replaced from the ground level.

**TS 13.3 Oil Pressure and Coolant Temperature Display**
Propulsion oil pressure and coolant temperature gauges required in engine compartment.

**TS 13.4 Engine Air Cleaner**
An air cleaner with a dry filter element and an electronic air filter restriction indicator will be provided. The location of the air intake system will be designed to minimize the entry of dust and debris and to maximize the life of the air filter. The engine air duct will be designed to minimize the entry of water into the air intake system. Drainage provisions will be included to allow any water/moisture to drain prior to entry into air filter.

**TS 13.5 Accessories**
Accessories will be mounted for quick removal and repair. Accessory drive systems will operate without adjustment for at least 50,000 miles on the design operating profile. These accessories will be driven at speeds sufficient to assure adequate system performance during extended periods of idle operation and low speed portion of the design operating profile. Belt guards will be provided as required for safety and will be sturdy in design and installation and readily removable.

**TS 14. Hydraulic Systems**
Hydraulic system service tasks will be minimized and scheduled no more frequently than those of other major coach systems. All elements of the hydraulic system will be easily accessible for service or unit replacement. Critical points in the hydraulic system will be fitted with service ports so that portable diagnostic equipment may be connected or sensors for an off-board diagnostic system permanently attached to monitor system operation when applicable. A tamper-proof priority system will prevent the loss of power steering during operation of the bus if other devices are also powered by the hydraulic system.

The hydraulic system will operate within the allowable temperature range as specified by the lubricant manufacturer.

Sensors in the main hydraulic system, excluding those in the power steering system, will indicate on the driver’s on-board diagnostic panel conditions of low hydraulic fluid level.

**TS 14.1 Fluid Lines**
All lines will be rigidly supported to prevent chafing damage, Fatigue Failures, degradation and tension strain. Lines should be sufficiently flexible to minimize mechanical loads on the components. Lines passing through a panel, frame or bulkhead will be protected by grommets (or similar devices) that fit snugly to both the line and the perimeter of the hole that the line passes through to prevent chafing and wear. Pipes and fluid hoses will not be bundled with or used to support electrical wire harnesses.

Lines will be as short as practicable and will be routed or shielded so that failure of a line will not allow the contents to spray or drain onto any component operable above the auto-ignition temperature of the fluid.
All hoses, pipes, lines and fittings will be specified and installed per the manufacturer’s recommendations. Flexible hoses and fluid lines will not touch one another, or any part of the bus.

All flexible lines will be as short as practicable, no greater than 6 feet in length, unless demonstrated inappropriate for a given application, and will be routed or shielded to deter spraying or draining onto any component operable above the auto-ignition temperature of the line’s contents in case of line failure.
**TS 14.2 Fittings and Clamps**

All clamps will maintain a constant tension at all times, expanding and contracting with the line in response to temperature changes and aging of the line material. The lines will be designed for use in the environment where they are installed (for example, high-temperature resistant in the engine compartment, resistant to road salts near the road surface, and so on).

Compression fittings will be standardized to prevent the intermixing of components. Compression fitting components from more than one manufacturer will not be mixed, even if the components are known to be interchangeable.

**TS 14.3 Charge Air Piping**

Charge air piping and fittings will be designed to minimize air restrictions and leaks. Piping will be as short as possible, and the number of bends will be minimized. Bend radii will be maximized to meet the pressure drop and temperature rise requirements of the propulsion system manufacturer. The cross section of all charge air piping will not be less than the cross section of the intake manifold inlet. Any changes in pipe diameter will be gradual to ensure a smooth passage of air and to minimize restrictions. Piping will be routed away from heat sources as practicable and shielded as required to meet the temperature rise requirements of the engine manufacturer.

Charge air piping will be constructed of stainless steel, aluminized steel, anodized aluminum or painted steel rated at minimum 1000 hours of salt spray according to ASTM B117, except between the air filter and turbocharger inlet, where piping may be constructed of flexible heat-resistant material. Connections between all charge air piping sections will be sealed with a short section of reinforced hose and secured with stainless steel constant tension clamps that provide a complete 360 degree seal.

**TS 15. Radiator**

The radiator and/or heat exchanger will be a heavy-duty metal unit, preferably constructed with a copper core. It is preferred to be of the tube type with bolted on upper and lower tanks and with no solder-to-coolant contact. The radiator will be accessible for cleaning. Any radiator will be easily removable from the bus. Aluminum brazed/soldered radiator and/or heat exchanger may be used for low-temperature coolant systems only.

Radiator piping will be stainless steel, brass tubing or painted steel rated at 1000 hours of salt spray according to ASTM B117. Where practicable, hoses will be eliminated. Necessary hoses will be impervious to all bus fluids. All hoses will be secured with stainless steel clamps that provide a complete 360 degree seal. The clamps will maintain a constant tension at all times, expanding and contracting with the hose in response to temperature changes and aging of the hose material.

**TS 16. Fluid Transfer Lines**

All systems requiring lubrication will meet or exceed component manufacturer's recommendation for installation, operation and maintenance. The lines will be designed and intended for use in the environment where they are installed (for example, high-temperature resistant in the engine compartment, resistant to road salts near the road surface and so on). Lines within the engine compartment will be composed of steel tubing where practicable, except in locations where flexible lines are required.

Hydraulic lines of the same size and with the same fittings as those on other piping systems of the bus, but not interchangeable, will be tagged or marked for use on the hydraulic system only.

Flexible hoses will have standard SAE or JIC brass or steel, swivel, end fittings and will be in conformance with SAE Standards.

**TS 17. Fuel**

**TS 17.1 Fuel Lines**

Fuel lines will be securely mounted, braced and supported as designed by the bus manufacturer to minimize vibration and chafing and will be protected against damage, corrosion or breakage due to strain or wear.

Manifolds connecting fuel containers will be designed and fabricated to minimize vibration and will be installed in protected locations to prevent line or manifold damage from unsecured objects or road debris.
Fuel hose and hose connections, where permitted, will be made from materials resistant to corrosion and fuel and protected from fretting and high heat. Fuel hoses will be accessible for ease of serviceability.

The fuel lines forward of the traditional transit bus “engine” bulkhead will be in conformance to SAE Standard J1149 Type 1 for copper tubing, corrosion-resistant stainless steel tubing, or SAE Standard J844 for nylon tubing color coded orange. Fuel lines will be rated and sized to prevent freezing and plugging due to condensation and/or fuel gelling in extreme weather.

Fuel lines will be capable of carrying the type of fuel specified by the Authority (i.e., up to B20 type fuel).

**TS 17.2 Design and Construction**

**Fuel Tank(s)**
The fuel tank(s) will be made of corrosion-resistant stainless steel. The fuel tank will be made of sufficiently heavy gauge 300 series or ASTM A240 stainless steel.

**Installation**
The fuel tank(s) will be securely mounted to the bus to prevent movement during bus maneuvers.

The fuel tank(s) will be equipped with an external, hex head, drain plug. It will be at least a ¾-Inch size and will be located at the lowest point of the tank(s). The fuel tank(s) will have an inspection plate or easily removable filler neck to permit cleaning and inspection of the tank(s) without removal from the bus. The tank(s) will be baffled internally to prevent fuel-sloshing regardless of fill level. The baffles or fuel pickup location will assure continuous full power operation on a 6 percent upgrade for 15 min starting with no more than 25 gal of fuel over the unusable amount in the tank(s). The bus will operate at idle on a 6 percent downgrade for 30 min starting with no more than 10 gal of fuel over the unusable amount in the tank(s).

The materials used in mounting will withstand the adverse effects of road salts, fuel oils and accumulation of ice and snow for the life of the bus.

**Labeling**
The capacity, date of manufacture, manufacturer name, location of manufacture, and certification of compliance to federal motor carrier safety regulations will be permanently marked on the fuel tank(s). The markings will be readily visible and will not be covered with an undercoating material.

**Fuel Filler**
The fuel filler will be located 7 to 32 ft behind the centerline of the front door on the curbside of the bus. The filler cap will be retained to prevent loss and will be recessed into the body so that spilled fuel will not run onto the outside surface of the bus. The fuel lines forward of the engine bulkhead will be in conformance to SAE Standards.

**Dry-Break Fuel Filler**
The fuel filler will accommodate a nozzle that forms a locked and sealed connection during the refueling process to eliminate spills. Fuel will not be allowed to flow into the tank unless the nozzle has been properly coupled, locked and sealed to the filler. With the nozzle open, fuel will enter the tank at a fill rate of not less than 40 gal per min of foam-free fuel without causing the nozzle to shut off before the tank is full. The nozzle will automatically shut off when the tank is essentially full. Once disconnected, fuel will not be allowed to flow through the nozzle at any time. Any pressure over 3 psi will be relieved from the fuel tank automatically. An audible signal will indicate when the tank is essentially full. The dry break system will be compatible with the Authority’s EMCO Wheaton System. The fuel filler cap will be hinged.

**Bus Fuel Management System**
Vehicle must come with AssetWorks FuelFocus Fuel Management System installed.

Please contact fuelsales@assetworks.com for pricing information.

CTA is currently utilizing Assetworks Fuel Focus bus fuel management system to authorize and keep track of fueling transactions and obtain automated live mileage updates.
Bus will come equipped and pre-programmed with all the necessary equipment detailed under CTA-Detailed SPEC No. 8276-15A including but not limited to Assetworks Vehicle Identification Box, Fuel Inlet Antenna and RF Antenna.

The Vehicle Identification Box will be preset to read and broadcast the vehicle odometer mileage message signal.

Contractor will work with the system OEM and will be responsible for the integration with the bus various systems.

Contractor will work with the system OEM to make sure that the authority will have flawless integration with the current maintenance management system version.

Contract will provide interlock when the fuel nozzles (Diesel) are inserted into the bus via a Multiplexing logic with input from the Fuel Management System. The interlock will prevent engine starter engagement, prevent selection of forward or reverse transmission and will apply the brake and accelerator interlock.

**TS 18. Emissions and Exhaust**

**TS 18.1 Exhaust Emissions**
The engine and related systems will meet all applicable Federal, State, County and City emissions and engine design guidelines and standards.

**TS 18.2 Exhaust System**
Exhaust gases and waste heat will be discharged from the roadside rear corner of the roof. The exhaust pipe will be of sufficient height to prevent exhaust gases and waste heat from discoloring or causing heat deformation to the bus. The entire exhaust system will be adequately shielded to prevent heat damage to any bus component, including the exhaust after-treatment compartment area. The exhaust outlet will 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 after-treatment.

**TS 18.3 Exhaust Aftertreatment**
An exhaust aftertreatment system will be provided to ensure compliance to all applicable EPA or other Federal, local and state regulations currently in effect.

**TS 18.4 Particulate Aftertreatment**
If required by the engine manufacturer to meet particulate level requirements specified by EPA or other Federal, local or state agencies, a particulate trap will be provided. The particulate filter will be designed to allow it to passively regenerate with bus running the Design Operating Profile. Active, automatic regeneration will be performed if clogging of filter is sensed by engine ECM. Regeneration cycles and conditions will be defined by the engine manufacturer.

**TS 18.5 Diesel Exhaust Fluid (DEF) Injection System**
If required by the engine manufacturer to meet NOx level requirements specified by EPA, a DEF injection system will be provided. The DEF system will minimally include a tank, an injector, a pump, an ECM and a selective catalytic converter. The tanks will be designed to store DEF in the operating environment described in TS 5.6, Operating Environment. The DEF fluid lines will be designed to prevent the DEF from freezing. The DEF injection system will not be damaged from a cold soak at -21 °F. The tank and filler will be located at the rear, curbside of the bus. The filler provisions will be of a closed, "dry break" type to prevent spillage.

**STRUCTURE**

**TS 19. General**

**TS 19.1 Design**
The structure of the bus will be designed to withstand the transit service conditions typical of an urban or intercity duty cycle throughout its service life. The vehicle structural frame will be designed to operate with minimal maintenance throughout the 15-year design operating profile. The design operating profile specified by the Authority will be considered for this purpose.
TS 20. Altoona Testing
Prior to acceptance of first bus, the vehicle must have completed any FTA-required Altoona testing. 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 that any and all such failures will not occur will be submitted to the Authority.

If available, the Altoona Test Report will be provided to the Authority with the Proposal submittal. If not available, then the report will be provided prior to the start of any bus manufacturing or assembly processes, the structure of the proposed bus model will have undergone appropriate structural testing and/or analysis, including the complete regimen of FTA-required Altoona tests. Prior to assembly of the first bus, the OEM will provide the Authority with a completed report of Altoona testing for the proposed bus model, along with a plan of corrective action to address deficiencies, breakdowns and other issues identified during Altoona testing. The bus model tested will match the bus model proposed for procurement, including structure, axles and drivetrain. Base model and partial Altoona test reports are acceptable when the combination of these tests adequately represents the proposed bus model.

TS 20.1 Structural Validation

Detailed Structural Analysis
The structure of the proposed bus model will have undergone structural testing and finite element analysis (FEA) prior to assembly of the first bus. The OEM will provide the Authority with completed reports of other structural tests as specified by the Authority.

TS 21. Distortion

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

TS 22. Resonance and Vibration
All structure, body and panel-bending mode frequencies, including vertical, lateral and torsional modes, will be sufficiently removed from all primary excitation frequencies to minimize audible, visible or sensible resonant vibrations during normal service.

TS 22.1 Engine Compartment Bulkheads
The passenger and engine compartments will be separated by a fire-resistant bulkhead. This bulkhead will preclude or retard propagation of a compartment fire into the passenger compartment and will be in accordance with the Recommended Fire Safety Practices defined in FTA Docket 90A, dated Oct. 20, 1993. Only necessary openings will be allowed in the bulkhead, and these will be fire-resistant. Any passageways for the climate control system air will be separated from the engine compartment by fire-resistant material. Piping through the bulkhead will have fire-resistant fittings sealed at the bulkhead. 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 will be fabricated of fire-resistant material and secured with fire-resistant fasteners. These panels, their fasteners and the bulkhead will be constructed and reinforced to minimize warping of the panels during a fire that will compromise the integrity of the bulkhead.

TS 22.2 Crashworthiness (Transit Coach)
The bus body and roof structure will withstand a static load equal to 150 percent of the curb weight evenly distributed on the roof with no more than a 6 in. reduction in any interior dimension. Windows will remain in place and will not open under such a load. These requirements must be met without the roof-mounted equipment installed.

The bus will withstand a 25 mph impact by a 4000 lb automobile at any side, excluding doorways, along either side of the bus and the articulated joint, if applicable, with no more than 3 in. of permanent structural deformation at seated passenger hip height. This impact will not result in sharp edges or protrusions in the bus interior.
Exterior panels below 35 in. from ground level will withstand a static load of 2000 lbs applied perpendicular to the bus by a pad no larger than 5 sq. in. This load will not result in deformation that prevents installation of new exterior panels to restore the original appearance of the bus.

**TS 23. Corrosion**

The bus flooring, sides, roof, understructure, bracketry and axle suspension components will be designed to inherently resist corrosion or deterioration from atmospheric conditions and de-icing materials for the Vehicle Service Life as per TS. 5.3. it will maintain structural integrity and nearly maintain original appearance throughout its service life, with the Authority’s use of proper cleaning and neutralizing agents.

All materials, brackets, panels, hardware, components & subcomponents that are not inherently corrosion resistant will be protected with corrosion-resistant coatings that will not require to be maintained on regular bases under the standard OEM preventive maintenance program. All joints and connections of dissimilar metals will be corrosion resistant and will be protected from galvanic corrosion. Representative samples of all materials and connections will withstand a 1,000 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 exposed surfaces and the interior surfaces and other enclosed members will be inherently corrosion resistant “i.e. Stainless Steel. Or similar alloy” Tubing will have provisions for draining moisture

The vehicle will be constructed using only inherently corrosion-resistant materials and fasteners such as stainless steel to minimize deterioration. The structure, or bracketry will not require corrosion-preventive coatings or aftertreatments, either during construction or throughout the service life of the vehicle.

**TS 24. Towing**

Towing devices will be provided on each end of the bus. Each towing device will withstand, without permanent deformation, tension loads up to 1.2 times the curb weight of the bus within 20 deg of the longitudinal axis of the bus. If applicable, the rear towing device(s) will not provide a toehold for unauthorized riders. The method of attaching the towing device will not require the removal, or disconnection, of front suspension or steering components. The rear towing device(s) will not provide a toehold for unauthorized riders. Removal of the bike rack is permitted for attachment of towing devices. Bicycle rack frame will be designed and mounted in such a manner to allow easy removal by field maintenance personnel and prevent damage to bicycle rack. OEM will provide towing procedure. Shop air connectors will be provided at the front and rear of the bus and will be capable of supplying all pneumatic systems of the bus with externally sourced compressed air. The location of these shop air connectors will facilitate towing operations.

**Lifted (Unsupported) Front Axle and Flat Towing Capability**

The front towing devices will allow attachment of adapters for a rigid tow bar and will permit the lifting and towing of the bus, at curb weight, while the front wheels are clear off the ground. These devices will also permit common flat towing. Two rear recovery devices/tie downs will permit lifting and towing of the bus for a short distance, such as in cases of an emergency, to allow access to provisions for front towing of bus. The method of attaching the tow bar or adapter will require the specific approval of the Authority. Any tow bar or adapter exceeding 50 lbs should have means to maneuver or allow for ease of use and application. Each towing device will accommodate a crane hook with a 1 in. throat. In addition, provisions for attachment of tow eyes will be included at the front of the vehicle, above the bumper to allow for flat-towing of the vehicle at curb weight. Towing provisions will be compatible with the Authority’s towing equipment.

The rear towing devices will permit lifting and towing of the bus for a short distance, such as in cases of an emergency, to allow access to provisions for front towing of bus. The method of attaching the tow bar or adapter will require the specific approval of the CTA. Each towing device will accommodate a crane hook with a 1-inch throat.

**TS 25. Jacking**

It will 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 will 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 will permit easy and safe jacking with the flat tire or dual set on a 6 in. high run-up block not wider than a single tire. The bus will withstand such jacking at any one or any combination of wheel locations without permanent deformation or damage.

Jacking pads will be painted safety yellow.

**TS 26. Hoisting**

The bus axles or jacking plates will accommodate the lifting pads of a two-post (or three-post if 60 ft. articulated bus) hoist system. Jacking plates, if used as hoisting pads, will be designed to prevent the bus from falling off the hoist. Other pads or the bus structure will support the bus on jack stands independent of the hoist.

The vehicle will be capable of lifting by the wheels, and, as necessary to meet tire load requirements, the proper number for wheel lifts and/or adapters must be used. The Authority has hoists from the following manufacturers: Stertil-Koni, Rotary, Joyce, Macton, and Weaver. The vehicle will be capable of utilizing any of these hoists.

**TS 27. Floor**

**TS 27.1 Design**

The floor will be essentially a continuous plane, except at the wheel housings and platforms. Where the floor meets the walls of the bus, as well as other vertical surfaces such as platform risers, the surface edges will be blended with a circular section of radius not less than ¼ in. or installed in a fully sealed butt joint. Similarly, a molding or cover will prevent debris accumulation between the floor and wheel housings. The vehicle floor in the area of the entrance and exit doors will have a lateral slope not exceeding 2 deg to allow for drainage.

**Bi-Level Floor Design**

The floor design will 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 no more than 21 in. above the lower level, with equally spaced steps. An increase slope will be allowed on the upper level, not to exceed 3.5 deg off the horizontal.

**Floor Drain**

A floor drain of noncorrosive materials will be provided on the bus behind the front, curbside wheelhouse near the wall to help drain any water that may accumulate due to ice, snow, rain, etc. The drain pipe will be approximately 1½ in. in diameter and will extend no more than 5 in. below the floor. The drain pipe will be fitted with a rubber drain spout to minimize or prevent air drafts to the interior of the bus. The strainer will be firmly retained but also removable to allow flushing of any accumulated debris.

**TS 27.2 Strength**

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 will not be used to retain the floor, and all floor fasteners will be serviceable from one side only. Any adhesives, bolts or screws used to secure the floor to the structure will last and remain effective throughout the life of the coach. Tapping plates, if used for the floor fasteners, will be no less than the same thickness as a standard nut, and all floor fasteners will be secured and protected from corrosion for the service life of the bus.

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

**TS 27.3 Construction**

The floor will consist of the subfloor and the floor covering that will last the Vehicle Service Life as per TS. 5.3. The floor as assembled, including the sealer, attachments and covering, will be waterproof, non-hygroscopic and resistant to mold growth. The subfloor will be resistant to the effects of moisture, including decay (dry rot). It will be impervious to wood-destroying insects such as termites. The Authority’s preference is a composite flooring material.
TS 28. Platforms
  TS 28.1 Driver's Area
The covering of platform surfaces and risers, except where otherwise indicated, will be the same material as specified for floor covering. Trim will be provided along top edges of platforms unless integral nosing is provided. Any necessary trim or nosing will be brushed stainless steel, installed with stainless hardware.

TS 28.2 Driver's Platform
The driver's platform will be of a height such that, in a seated position, the driver can see an object located at an elevation of 42 in. above the road surface, 24 in. from the leading edge of the bumper. Notwithstanding this requirement, the platform height will not position the driver such that the driver's vertical upward view is less than 15 deg. A warning decal or sign will be provided to alert the driver to the change in floor level.

Figure 3 illustrates a means by which the platform height can be determined, using the critical line of sight.

The Contractor will submit a full report detailing the obscuration angles for all pillars and all other field of view requirements as measured per SAE J1050 must be submitted for compliance to the specifications. The report must detail the reference H-Point as well as any other reference points and values used for calculations.

TS 28.3 Farebox
Farebox placement should minimize impact to passenger access and minimize interference with the driver's line of sight.

Driver Interface Required; Platform Needed to Bring Height to Driver Access
If the driver's platform is higher than 12 in., then the farebox is to be mounted on a platform of suitable height to provide accessibility for the driver without compromising passengers' access.

Yellow, coated grab handle will be located around the farebox.

TS 28.4 Rear Step Area to Rear Area
If the vehicle is of a bi-level floor design, then a rear step area will be provided along the center aisle of the bus to facilitate passenger traffic between the upper and lower floor levels. This step area will be cut into the rear platform and will be approximately the aisle width, a minimum 12 in. deep and approximately half the height of the upper level relative.
to the lower level. The horizontal surface of this platform will be covered with skid-resistant material with a visually contrasting nosing and will be sloped slightly for drainage. A warning decal or sign will be provided at the immediate platform area to alert passengers to the change in floor level.

**TS 29. Wheel Housing**

**TS 29.1 Design and Construction**
Sufficient clearance and air circulation will be provided around the tires, wheels and brakes to preclude overheating when the bus is operating on the design operating profile. Wheel housings will be constructed of corrosion-resistant and fire-resistant material.

Wheel housings, as installed and trimmed, will withstand impacts of a 2 in. steel ball with at least 200 ft-lbs of energy without penetration.

**TS 29.2 Design and Construction**
Interference between the tires and any portion of the bus will not be possible in maneuvers up to the limit of tire adhesion with weights from curb weight to GVWR. Wheel housings will be adequately reinforced where seat pedestals are installed. Wheel housings will have sufficient sound insulation to minimize tire and road noise and meet all noise requirements of this specification.

Design and construction of front wheel housings will allow for the installation of a radio or electronic equipment storage compartment on the interior top surface, or its use as a luggage rack.

The finish of the front wheel housings will be scratch-resistant and complement interior finishes of the bus to minimize the visual impact of the wheel housing. If fiberglass wheel housings are provided, then they will be color-impregnated to match interior finishes. The lower portion extending to approximately 10 to 12 in. above the floor will be equipped with a riveted brushed stainless steel trim.

Wheel housings not equipped with seats or equipment enclosure will have a horizontal assist mounted on the top portion of the housing no more than 4 in. higher than the wheel well housing.

No provision will be made to chain buses.

**CHASSIS**

**TS 30. Suspension**

**TS 30.1 General Requirements**
The front & rear suspensions will be pneumatic type. The basic suspension system will last the service life of the bus without major overhaul or replacement. Adjustment points will be minimized and will not be subject to a loss of adjustment in service. Routine adjustments will be easily accomplished by limiting the removal or disconnecting the component.

**TS 30.2 Alignment**
All axles should be properly aligned so the vehicle tracks accurately within the size and geometry of the vehicle.

**TS 30.3 Springs and Shock Absorbers**

**TS 30.3.1 Suspension Travel**
The suspension system will permit a minimum wheel travel of 2.75 in. jounce-upward travel of a wheel when the bus hits a bump (higher than street surface), and 2.75 in. rebound-downward travel when the bus comes off a bump and the wheels fall relative to the body. Elastomeric bumpers will be provided at the limit of jounce travel. Rebound travel may be limited by elastomeric bumpers or hydraulically within the shock absorbers. Suspensions will incorporate appropriate devices for automatic height control so that regardless of load the bus height relative to the centerline of the wheels does not change more than ½ in. at any point from the height required. The safe operation of a bus cannot be impacted by ride height up to 1 in. from design normal ride height.

**TS 30.3.2 Damping**
Vertical damping of the suspension system will be accomplished by hydraulic shock absorbers mounted to the suspension arms or axles and attached to an appropriate location on the chassis. Damping will be sufficient to control coach motion.
to three cycles or less after hitting road perturbations. The shock absorber bushing will be made of elastomeric material that will last the life of the shock absorber. The damper will incorporate a secondary hydraulic rebound stop. Shock absorbers will be long life type and not require replacement before 300,000 miles.

**TS 30.3.3 Lubrication**

**Standard Grease Fittings**

All elements of steering, suspension and drive systems requiring scheduled lubrication will be provided with grease fittings conforming to SAE Standard J534. These fittings will be located for ease of inspection and will be accessible with a standard grease gun from a pit or with the bus on a hoist. Each element requiring lubrication will have its own grease fitting with a relief path. The lubricant specified will be standard for all elements on the bus serviced by standard fittings and will be required no less than every 6,000 miles per TS 5.4.

Remote grease manifold should be provided. The lines serving the remote grease manifold will be hard pipe or steel braided pipes.

**TS 30.3.4 Kneeling**

A kneeling system will lower the entrance(s) of the bus a minimum of 2.5 in. during loading or unloading operations regardless of load up to GVWR, measured at the longitudinal centerline of the entrance door(s) by the driver. The kneeling control will provide the following functions:

- Downward control must be held to allow downward kneeling movement.
- Release of the control during downward movement must completely stop the lowering motion and hold the height of the bus at that position.
- Upward control actuation must allow the bus to return to normal floor height without the driver having to hold the control.

The brake and throttle interlock will prevent movement when the bus is kneeled. The kneeling control will be disabled when the bus is in motion. The bus will kneel at a maximum rate of 1.25 in. per s at essentially a constant rate. After kneeling, the bus will rise within 4 s to a height permitting the bus to resume service and will rise to the correct operating height within 7 s regardless of load up to GVWR. During the lowering and raising operation, the maximum vertical acceleration will not exceed 0.2g, and the jerk will not exceed 0.3g/s.

An indicator visible to the driver will 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. A warning light mounted near the curbside of the front door, a minimum 2.5 in. diameter amber lens, will be provided that will blink when the kneel feature is activated. Kneeling will not be operational while the wheelchair ramp is deployed or in operation.

When doors are closed, the bus will automatically return to ride height.

The bus should have a “high buoy” option that allows for level boarding on high curbs. Just like kneeling down, the bus will be capable of raising a minimum of 2 in from ride height. This feature will be available if ramp is deployed. (if necessary for level ramp deployment)

**TS 31. Wheels and Tires**

**TS 31.1 Wheels**

Wheels and rims will be hub-piloted with brushed aluminum rims with Teflon spacers to prevent corrosion between drums and wheels, and between two wheels in dual application, and will resist rim flange wear. Wheels will be Alcoa 886520DF (CTA Lot Number 3950004) or approved equal. All wheels will be interchangeable except for the middle axle of an artic where a super single tire size is used and will be removable without a puller. Wheels will be compatible with tires in size and load-carrying capacity. Front wheels and tires will be balanced as an assembly per SAE J1986

Standard non-locking lug nut will be provided.
**TS 31.2 Tires**

Tires will be suitable for the conditions of transit service and sustained operation at the maximum speed capability of the bus. Load on any tire at GVWR will not exceed the tire supplier's rating. The tires will be provided under a lease agreement between the CTA and tire supplier. The buses will be equipped with low profile (305/70R 22.5) tires, Load range H as appropriate for the bus design.

**Note:** CTA has a lease contract with Goodyear Metromile G152 B305/70R22.5 Load Range J with the option to provide Goodyear Metromile G152+ B305/70R22.5 Load Range L if necessary. Bus Manufacturer will provide a list of approved tires in the event contract expires at the end of lease terms. Additionally, Bus Manufacturer will provide any information on impact to performance (i.e. range with the various tire selections).

The bus will be equipped with an electronic tire pressure monitoring system that will sense tire inflation pressure and temperature and report out-of-parameter conditions. The system will be temperature-compensating and will be able to report out-of-parameter conditions for each of the tire locations identifying the reported faults respectively. The system will broadcast diagnostic and performance data through the SAE J1939 communication link to the vehicle’s automatic monitoring system. Tire inflation and temperature parameters will be determined with input from the tire manufacturer, the Contractor and the agency. Software and necessary peripherals to allow designated employees of the CTA to modify the parameters will be provided. A heavy-duty electronic handheld tool for allowing maintenance personnel ability to easily check tire pressures and connection on the bus to update the receiver will be provided. A temperature compensating chart will also be provided with each handheld tool. For critical out-of-parameter conditions, a “Tire Alert” indicating light will illuminate on driver's dash. This system will be Smartire TPMS or approved equal.

**TS 32. Steering**

Electrically assisted steering will be provided to reduce steering effort.

**TS 32.1 Steering Axle**

**Solid Beam Axle and Grease-Type Front Bearings and Seals**

The front axle will be solid beam, non-driving with a load rating sufficient for the bus loaded to GVWR and will be equipped with grease type front wheel bearings and seals.

All friction points on the front axle will be equipped with replaceable bushings or inserts and, if needed, lubrication fittings easily accessible from a pit or hoist.

The steering geometry of the outside (front lock) wheel will be within 2 deg of true Ackerman up to 50 percent lock measured at the inside (back lock) wheel. The steering geometry will be within 3 deg of true Ackerman for the remaining 100 percent lock measured at the inside (back lock) wheel.

**TS 32.2 Steering Wheel**

**TS 32.2.1 Turning Effort**

Steering effort will 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.

Under these conditions, the torque required to turn the steering wheel 10 deg will be no less than 5 ft.-lbs and no more than 10 ft.-lbs. Steering torque may increase to 70 ft.-lbs when the wheels are approaching the steering stops, as the relief valve activates.

Power steering failure will not result in loss of steering control. With the bus in operation, the steering effort will not exceed 55 lbs at the steering wheel rim, and perceived free play in the steering system will not materially increase as a result of power assist failure. Gearing will require no more than seven turns of the steering wheel lock-to-lock.

Caster angle will be selected to provide a tendency for the return of the front wheels to the straight position with minimal assistance from the driver.

**TS 32.2.2 Steering Wheel, General**

The steering wheel diameter will be approximately 18 to 20 in.; the rim diameter will be ⅞ to 1¼ in. and shaped for firm grip with comfort for long periods of time.
Steering wheel spokes and wheel thickness will ensure visibility of the dashboard so that vital instrumentation is clearly visible at center neutral position (within the range of a 95th-percentile male, as described in SAE 1050a, Sections 4.2.2 and 4.2.3). Placement of steering column must be as far forward as possible, but either in line with or behind the instrument cluster.

**TS 32.2.3 Steering Column Tilt**
The steering column will have full tilt capability with an adjustment range of no less than 40 deg from the vertical and easily adjustable by the driver and will be accessible by a 5th percentile female and 95th percentile male.

**TS 32.2.4 Steering Wheel Telescopic Adjustment**
The steering wheel will have full telescoping capability and have a minimum telescopic range of 2 in. and a minimum low-end adjustment of 29 in., measured from the top of the steering wheel rim in the horizontal position to the cab floor at the heel point.

<table>
<thead>
<tr>
<th>Table 1. Steering Wheel Height Relative to Angle of Slope</th>
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<tr>
<td>Angle of Slope</td>
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<tr>
<td>----------------</td>
</tr>
<tr>
<td>0 deg</td>
</tr>
<tr>
<td>15 deg</td>
</tr>
<tr>
<td>25 deg</td>
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<tr>
<td>35 deg</td>
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</tbody>
</table>

1. Measured from bottom portion closest to driver.

**TS 33. Drive Axle**
The bus will be driven by a heavy-duty axle with a load rating sufficient for the bus loaded to GVWR. The drive axle will have a design life to operate for not less than 300,000 miles on the design operating profile without replacement or major repairs. The lubricant drain plug will be magnetic type. If a planetary gear design is employed, the oil level in the planetary gears will be easily checked through the plug or sight gauge. The axle and driveshaft components will be rated for both propulsion and retardation modes with respect to duty cycle.

**NOTE:** The retardation duty cycle can be more aggressive than propulsion.

The drive shaft will be guarded to prevent hitting any critical systems, including brake lines, coach floor or the ground, in the event of a tube or universal joint failure.

**Non-Drive Axle**
The non-drive axle is the drive axle without the drive gear with a load rating sufficient for the load to GVWR.

**TS 34. Turning Radius**

<table>
<thead>
<tr>
<th>Table 2. Maximum Turning Radius</th>
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</thead>
<tbody>
<tr>
<td>Bus Length (approximate)</td>
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<tr>
<td>--------------------------</td>
</tr>
<tr>
<td>40 ft.</td>
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<tr>
<td>60 ft.</td>
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</table>
**Figure 4. Turning Radius**

**TS 35. Brakes**

**TS 35.1 Service Brake**
Brakes will be self-adjusting. Brake wear indicators (visible and electronic) will be provided. The electronic brake wear indicator will send faults and values via J1939 for each wheel position. Additionally, the sensor will be replaceable without replacing any other components on the brake system by the Authority.

**TS 35.2 Actuation**
Service brakes will be controlled and actuated by a compressed air system. Force to activate the brake pedal control will be an essentially linear function of the bus deceleration rate and will not exceed 75 lbs at a point 7 in. above the heel point of the pedal to achieve maximum braking. The heel point is the location of the driver’s heel when his or her foot is rested flat on the pedal and the heel is touching the floor or heel pad of the pedal. The ECU for the ABS system will be protected, yet in an accessible location to allow for ease of service.

The total braking effort will be distributed among all wheels in such a ratio as to ensure equal friction material wear rate at all wheel locations. Manufacturer will demonstrate compliance by providing a copy of a thermodynamic brake balance test upon request.

The ABS/EBC controller must support EBC1 (PGN 61441) “Brake Pedal Position” (SPN 521) to support and enhance fuel savings technologies.

The microprocessor based ABS will have on-board diagnostic capabilities, able to monitor vital functions, store out of parameter conditions in memory, and communicate faults and vital conditions to service personnel. A diagnostic, reader device connector port, suitably protected against dirt and moisture, will be provided in operator’s area. The on-board diagnostic system will inform the operator via a visual alarm when out-of-parameter conditions exist for vital ABS functions. In addition, a two way, spring loaded toggle switch located behind an easily removed panel in the operator’s area will be provided to illuminate blink codes using the visual alarm to aid service personnel in identifying ABS faults.

**TS 35.3 Friction Material**
The brake linings will 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 a chamfer indicating the thickness at which replacement becomes necessary will
be provided on each brake lining. The complete brake lining wear indicator will be clearly visible from the hoist or pit without removing backing plates.

Remote brake wear indicator will be provided.

The entire service brake system, including friction material, will have a minimum overhaul or replacement life of 60,000 miles on design operating profile. Brakes will be self-adjusting throughout this period.

Contractor will optimize braking system and related components, such as retarder/regenerative braking, to provide the maximum possible average brake life.

**TS 35.4 Hubs and Discs**
Replaceable wheel bearing seals will run on replaceable wear surfaces or be of an integral wear surface sealed design. Wheel bearing and hub seals and unitized hub assemblies will not leak or weep lubricant when operating on the design operating profile for the duration of the initial manufacturer’s warranty or 100,000 whichever is greater.

**Disc Brakes on All Axles**
The bus will be equipped with disc brakes on all axles, and the brake discs will allow machining of each side of the disc to obtain smooth surfaces per manufacturer’s specifications.

The brake system material and design will be selected to absorb and dissipate heat quickly so that the heat generated during braking operation does not glaze the brake linings. The heat generated during braking will not increase the temperature of tire beads and wheel contact area to more than that allowed by the tire manufacturer.

**TS 35.5 Parking/Emergency Brake**

**Air Brakes**
The parking brake will be a spring-operated system, actuated by a valve that exhausts compressed air to apply the brakes. The parking brake may be manually enabled when the air pressure is at the operating level per FMVSS 121.

**Emergency Brake**
An emergency brake release will be provided to release the brakes in the event of automatic emergency brake application. The driver will 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 driver releases the emergency brake release valve, the brakes will engage to hold the bus in place. Air to the emergency brake release system will be provided by a dedicated emergency air tank. The parking brake valve button will pop out when air pressure drops below requirements of FMVSS 121.

**TS 36. Interlocks**

**TS 36.1 Passenger Door Interlocks**
To prevent opening front, mid, and rear passenger doors while the bus is in motion, a speed sensor will be integrated with the door controls to prevent the mid/rear doors from being enabled or opened unless the bus speed is 0 mph.

To preclude movement of the bus, an accelerator interlock will lock the accelerator in the closed position, and a brake interlock will engage the service brake system to stop movement of the bus when the driver's door control is moved to a mid/rear door enable or open position, or a mid or rear door panel is opened more than 3 in. from the fully closed position (as measured at the leading edge of the door panel). The interlock engagement will bring the bus to a smooth stop and will be capable of holding a fully loaded bus on a 6 percent grade, with the engine at idle and the transmission in gear, until the interlocks are released. These interlock functions will be active whenever the vehicle master run switch is in any run position.

All door systems employing brake and accelerator interlocks will be supplied with supporting failure mode effects analysis (FEMA) documentation, which demonstrates that failure modes are of a failsafe type, thereby never allowing the possibility of release of interlock while an interlocked door is in an unsecured condition, unless the door master switch has been actuated to intentionally release the interlocks.

Braking effort adjustable with hand tools.
Requiring Accelerator Interlock Whenever Front Doors Are Open
An accelerator interlock will lock the accelerator in the closed position, and a brake interlock will engage the service brake system to stop movement of the bus whenever front doors are open.

TS 37. Pneumatic System

TS 37.1 General
The bus air system will operate the air-powered accessories and the braking system with reserve capacity. New buses will not leak down more than 5 psi over a 15-min period of time as indicated on the dash gauge.

Provision will be made to apply shop air to the bus air systems. A quick disconnect fitting will be easily accessible and located in the engine compartment and near the front bumper area for towing. Retained caps will be installed to protect fitting against dirt and moisture when not in use. Air for the compressor will be filtered. The air system will be protected per FMVSS 121. This valve will be \( \frac{1}{4}'' \) quick disconnect coupling, Hansen 2-R-21 or equal, with dust cap. This valve will be filtered or plumbed through the air dryer to prevent contamination of the air system.

TS 37.2 Air Compressor
The engine-driven air compressor will be sized to charge the air system from 40 psi to the governor cutoff pressure in less than 4 minutes while not exceeding the fast idle speed setting of the engine.

TS 37.3 Air Lines and Fittings
Air lines, except necessary flexible lines, will conform to the installation and material requirements of SAE Standard J1149 for copper tubing with standard, brass, flared or ball sleeve fittings, or SAE Standard J844 for nylon tubing if not subject to temperatures over 200 °F. The air on the delivery side of the compressor where it enters nylon housing will not be above the maximum limits as stated in SAE J844. Nylon tubing will be installed in accordance with the following color-coding standards:

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

Line supports will prevent movement, flexing, tension, strain and vibration. Copper lines will be supported to prevent the lines from touching one another or any component of the bus. To the extent practicable and before installation, the lines will be pre-bent on a fixture that prevents tube flattening or excessive local strain. Copper lines will be bent only once at any point, including pre-bending and installation. Rigid lines will be supported at no more than 5 ft intervals. Nylon lines may be grouped and will be supported at 30 in. intervals or less.

The compressor discharge line between power plant and body-mounted equipment will be flexible convoluted copper or stainless steel line, or may be flexible Teflon hose with a braided stainless steel jacket. Other lines necessary to maintain system reliability will be flexible Teflon hose with a braided stainless steel jacket. End fittings will be standard SAE or JIC brass or steel, flanged, swivel-type fittings. Flexible hoses will be as short as practicable and individually supported. They will not touch one another or any part of the bus except for the supporting grommets. Flexible lines will be supported at 2 ft intervals or less.

Air lines will be clean before installation and will be installed to minimize air leaks. All air lines will be routed to prevent water traps to the extent possible. Grommets or insulated clamps will protect the air lines at all points where they pass through understructure components.

TS 37.4 Air Reservoirs
All air reservoirs will meet the requirements of FMVSS Standard 121 and SAE Standard J10 and will be equipped with drain plugs and guarded or flush type drain valves. Major structural members will protect these valves and any automatic moisture ejector valves from road hazards. Reservoirs will be sloped toward the drain valve. All air reservoirs will have drain valves that discharge below floor level with lines routed to eliminate the possibility of water traps and/or freezing in the drain line.
**TS 37.5 Air System Dryer**
An air dryer will prevent accumulation of moisture and oil in the air system. The air dryer system will include one or more replaceable desiccant cartridges.

Automatic Drain Valves (ADV) will be included to purge water/oil from the system on the supply tank & ping tank if applicable. The ADV will be programmable via Multiplex Logic.

A provision will be included to collect/remove oil from the air system to prevent affecting function and/or damaging pneumatic system components.

The air system will be equipped with an air dryer located before the no. 1 air tank. Air dryer will be installed per the manufacturer recommendations. Air dryer desiccant will be replaceable and the standard preventive maintenance will not require the removal of the air dryer.

Validation testing results showing compliance with the manufacturer requirements will have to be submitted to be reviewed by the Authority before accepting the first bus.

**ELECTRICAL, ELECTRONIC AND DATA COMMUNICATION SYSTEMS**

**TS 38. Overview**
The electrical system will consist of vehicle battery systems and components that generate, distribute and store power throughout the vehicle. (e.g., generator, voltage regulator, wiring, relays and connectors).

Electronic devices are individual systems and components that process and store data, integrate electronic information or perform other specific functions.

The data communication system consists of the bi-directional communications networks that electronic devices use to share data with other electronic devices and systems. Communication networks are essential to integrating electronic functions, both onboard the vehicle and off.

Information level systems that require vehicle information for their operations or provide information will adhere to J1939 data standard.

The bus will be equipped with a programmable logic control system that is computer based (IBM compatible) and completely modular. The programmable logic control collects information received from input devices throughout the bus and then communicates with its system components or other output devices in remote areas of the bus through a multiplex wiring system. The entire system will reduce the amount of wiring over a conventional wiring/harness electrical system. Versatility and future expansion will be provided for by expandable system architecture. The system components will be capable of operating in an environment of between -20 degrees F to 170 degrees F while encountering mobile shock and vibrations. The system will store and retrieve data for the mechanical and electrical functions of the bus. All components in the system will be interchangeable.

Redundant grounds will be used for all electrical equipment, except where it can be demonstrated that redundant grounds are not feasible or practicable. One ground may be the bus body and framing. Grounds will not be carried through hinges, bolted joints (except those specifically designed as electrical connectors), or power plant mountings. Electrical equipment will not be located in an environment that will reduce the performance or shorten the life of the component or electrical system. Two (2) grounding straps will be provided near front axle to reduce static discharge.

To the extent practicable, wiring will not be located under the bus floor. Wiring and electrical equipment necessarily located under the bus will be insulated from water, heat, corrosion, and mechanical damage.

The electrical system will provide and distribute power to ensure satisfactory performance of all electrical components.

The system will supply a nominal 12 and/or 24 volts of direct current (DC), and employ alternating current up to 500 amps that does not present an electrical shock hazard. An equalizer will be designed to meet the maximum 12 volts DC current draws and provide even charge levels in all batteries.
Electrical power provided for the fare collection device and the radio compartment will be 12 and/or 24 volts DC as specified. Precautions will be taken to minimize hazards to service personnel. Transient voltages above 220 amps may be used in the fluorescent lighting system if provided. The power generating system will be rated sufficiently higher than the total possible electrical load to maintain the charge on the batteries at all operating conditions including the engine at idle.

All circuits, except for those involved in propulsion system start-up, will be protected by circuit breakers or fuses. Fuses will be used only where it can be demonstrated that circuit breakers are not practicable, and they will be easily accessible for replacement.

Data communications systems are divided into three levels to reflect the use of multiple data networks:

- **Drivetrain level**: Components related to the drivetrain including the propulsion system components (engine, transmission), and anti-lock braking system (ABS), which may include traction control.
- **Information level**: Components whose primary function is the collection, control or display of data that is not necessary to the safe drivability of the vehicle (i.e., the vehicle will continue to operate when those functions are inoperable). These components typically consist of those required for automatic vehicle location (AVL) systems, destination signs, fare boxes, passenger counters, radio systems, automated voice and signage systems, video surveillance and similar components.
- **Multiplex level**: Electrical or electronic devices controlled through input/output signals such as discrete, analog and serial data information (i.e., on/off switch inputs, relay or relay control outputs). Multiplexing is used to control components not typically found on the drivetrain or information levels, such as lights; wheelchair lifts; doors; heating, ventilation and air conditioning (HVAC) systems; and gateway devices.

**FIGURE 5**

Data Communications Systems Levels

**TS 38.1 Modular Design**

Design of the electrical, electronic and data communication systems will be modular so that each electronic device, apparatus panel, or wiring bundle is easily separable from its interconnect by means of connectors.

Propulsion system wiring will be an independent wiring harness. Replacement of the propulsion system compartment wiring harness(es) will not require pulling wires through any bulkhead or removing any terminals from the wires.

The electrical system and all subsystems will be designed such that they are compliant with Clever Devices. Additionally, all performance and Fault code data will be readable for Clever.

**TS 39. Environmental and Mounting Requirements**

The electrical system and its electronic components will be capable of operating in the area of the vehicle in which they will be installed, as recommended in SAE J1455.
Electrical and electronic equipment will not be located in an environment that will reduce the performance or shorten the life of the component or electrical system when operating within the design operating profile.

The Authority will follow recommendations from bus manufacturers and subsystem suppliers regarding methods to prevent damage from voltage spikes generated from welding, jump-starts, shorts, etc.

All electrical/electronic hardware, controllers, connectors, or wiring mounted on the interior and exterior of the vehicle that is not designed to be installed in an exposed environment will be protected. All electrical/electronic hardware, controllers, connectors, or wiring (both interior & exterior) and all exterior will be IP 67 or higher.

All electrical/electronic hardware and its mounting will comply with the shock and vibration requirements of published industry standards (i.e. SAE, ISO, etc.).

**TS 39.1 Hardware Mounting**
The mounting of the hardware will not be used to provide the sole source ground, and all hardware will be isolated from potential EMI/RFI, as referenced in SAE J1113.

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

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

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

**TS 40. General Electrical Requirements**

**TS 40.1 Low-Voltage (SLI) Batteries**
Selected or specified batteries will have a sufficient capacity to execute start after the as-delivered bus has been parked and off for a minimum of 48 hours. In order to extend battery life and ensure starts, the Authority requires an equalizer capable of reporting SOC (State of Charge) and SOH (State of Health) via J1939. The equalizer will have a configurable Low SOC disconnect. The disconnect will not occur when the bus is in revenue service.

**TS 40.1.1 Low-Voltage Batteries (24 V)**

Four Group 31 AGM Batteries with SAE Post
Four Group 31 Series deep-cycling sealed non spill able maintenance free absorbed glass mat (AGM) batteries will be provided. Each battery will have a minimum of 1000 cold cranking amps (CCA) at 0 °F. The batteries will be designed and installed to withstand the operating environment. Each battery will have a purchase date no more than 2 months from the date of release for shipment to the Authority.

Minimum Amp Hour capacity of 100Ah.

If Reverse Polarity per Error! Reference source not found. is sufficient, then the agency may consider the following:

Four Group 31 AGM Batteries with same size Post, 3/8”-16 UNC
Four Group 31 Series deep-cycling sealed non spill able maintenance free absorbed glass mat (AGM) batteries will be provided. Each battery will have a minimum of 1000 cold cranking amps (CCA) at 0 °F. The batteries will be designed and installed to withstand the operating environment. Each battery will have a purchase date no more than 2 months from the date of release for shipment to the Authority.

**Battery Cables**
The battery terminal ends and cable ends will be color-coded with red for the primary positive, black for negative and blue for any intermediate voltage (12V) cables. Positive and negative battery cables will not cross each other if at all possible, will be flexible and will be sufficiently long to reach the batteries with the tray in the extended position without stretching or pulling on any connection and will not lie directly on top of the batteries. Except as interrupted by the
master battery switch, battery and starter wiring will be continuous cables with connections secured by bolted terminals and will conform to specification requirements of SAE Standard J1127–Type SGR, SGT, SGX or GXL and SAE Recommended Practice J541, with 2100 strand 4/0 cable or greater recommended.

The battery terminals will be configured in such a way that a bus can be jump started, using standard, heavy-duty cable clamps, without having to pull out the battery tray. Access to battery terminals for jump starting will be possible by merely opening the battery compartment door. The ground, 12volt and 24 volt terminals will be side mounted (facing the compartment opening) and clearly marked with “Ground”, “12 Volt” and “24 Volt”. Terminals will be placed in the following order, front of bus to back: 24 volt, 12 volt, ground.

Battery terminal ends will be insulated so that short to ground cannot occur.

**Battery Compartment**

The battery compartment will prevent accumulation of snow, ice and debris on top of the batteries and will be vented and self-draining. The battery compartment will be accessible only from the outside of the vehicle. All components within the battery compartment, and the compartment itself, will be protected from damage or corrosion from the electrolyte. The inside surface of the battery compartment’s access door will 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. The battery compartment temperature should not exceed battery manufacturer’s specification under all operating conditions.

The vehicle will be equipped with a 12 VDC and 24 VDC quick disconnect switch(es). The battery compartment door will conveniently accommodate operation of the 12 VDC and 24 VDC quick disconnect switch(es). The battery quick disconnect access door will be identified with a decal. The decal size will not be less than 3.5 × 5 in. (8.89 × 12.7 cm).

The battery hold-down bracket will be constructed of a nonconductive and corrosion-resistant material (plastic or fiberglass).

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

If not located in the engine compartment, the same fire-resistant properties must apply to the battery compartment. No sparking devices should be located within the battery box.

A wiring schematic decal illustrating the battery cable connection will be provided in the battery compartment, clearly visible to maintenance personnel servicing the batteries.

This access door will be equipped with a 5/16" internal square locking device to gain access to the switch, to prevent tampering and vandalism. The door will be flush-fitting and incorporate a spring tensioner or equal to retain the door in a closed position when not in use.

If not located in the engine compartment, the same fire-resistant properties must apply to the battery compartment. No sparking devices should be located within the battery box.

It will be accessible only from the outside of the vehicle and located on the curb or roadside. All components within the battery compartment, and the compartment itself, will be protected from damage or corrosion. The inside surface of the battery compartment’s access door will 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.

**Auxiliary Electronic Power Supply**

If required, gel-pack, or any form of sealed (non-venting) batteries used for auxiliary power are allowed to be mounted on the interior of the vehicle if they are contained in an enclosed, non-air tight compartment and accessible only to maintenance personnel. This compartment will contain a warning label prohibiting the use of lead-acid batteries.
**Master Battery Switch**
The location of the master battery switch will be clearly identified on the exterior access panel, be accessible in less than 10 s for deactivation and prevent corrosion from fumes and battery acid when the batteries are washed or are in normal service.

Turning the master switch off with the power plant operating, during an emergency, will shut off the engine and will not damage any component of the electrical system. The master switch will be capable of carrying and interrupting the total circuit load.

**Single Switch**
The batteries will be equipped with a single switch for disconnecting both 12 V and 24 V power, except for safety devices such as the fire sensor system, communication system, video system and other systems to be specified.

**Solenoid Battery Cutoff**
A multiplex system activated battery cutoff solenoid to disconnect battery except critical items.

**Master Battery Switch Access Panel Door Lock**
Lock should be accessed with a standard square key.

**Low-Voltage Generation and Distribution**
The low-voltage generating systems will maintain the charge on fully charged batteries, except when the vehicle is at standard idle to allow-voltage generator load exceeding 70 percent of the low-voltage generator name plate rating.

Voltage monitoring and over-voltage output protection (recommended at 32 V) will be provided. Charging profile will be maintained within battery manufacturers guidelines or specifications.

Dedicated power and ground will be provided as specified by the component or system manufacturer. Cabling to the equipment must be sized to supply the current requirements with no greater than a 5 percent volt drop across the length of the cable.

**Circuit Protection**
All branch circuits, except battery-to-starting motor and battery-to-generator/alternator circuits, will be protected by current-limiting devices such as circuit breakers, fuses or solid-state devices sized to the requirements of the circuit. Electronic circuit protection for the cranking motor will be provided to prevent engaging of the motor for more than 30 s at a time to prevent overheating. The circuit breaker fuses will be easily accessible for authorized personnel. Fuses will be used only where it can be demonstrated that circuit breakers are not practicable. This requirement applies to in-line fuses supplied by either the Contractor or a supplier. Fuse holders will be constructed to be rugged and waterproof. All manual reset circuit breakers critical to the operation of the bus will be mounted in a location convenient to the Authority mechanic with visible indication of open circuits. The Authority will consider the application of automatic reset circuit breakers on a case-by-case basis. The Contractor will show all in-line fuses in the final harness drawings. Any manually resettable circuit breakers will provide a visible indication of open circuits. Any manually resettable circuit breakers will provide a visible indication of open circuits.

Circuit breakers or fuses will be sized to a minimum of 15 percent larger than the total circuit load. The current rating for the wire used for each circuit must exceed the size of the circuit protection being used.

**Reverse Polarity**
The bus should be designed with poka-yoke mechanisms to minimize the risk of incorrect low and high voltage battery polarity connections. Electronic global reverse polarity mechanisms protecting will be employed in addition to the mechanical poka-yoke mechanisms to protect the entire electrical system from reverse voltage occurrences.

The bus and its electronic control units will be designed to meet at least the following ISO standards on for road vehicles: Global reverse polarity mechanisms protecting:

ISO 7636 Road vehicles – Electrical disturbances from conduction and coupling
ISO 16750 Road vehicles – Environmental conditions and testing for electrical and electronic Equipment.
The vehicle and its electrical components will meet the requirements, tests, and standards described in ISO 16750-2:2012(E) and ISO 7636-2: 2011 Road vehicles – Electrical disturbances from conduction and coupling.

**TS 40.2 Grounds**
The battery will be grounded to the vehicle chassis/frame at one location only, as close to the batteries as possible. When using a chassis ground system, the chassis will be grounded to the frame in multiple locations, evenly distributed throughout the vehicle to eliminate ground loops. No more than three (3) ring terminal connections will be made per ground stud with spacing between studs ensuring conductivity and serviceability. Electronic equipment requiring an isolated ground of the battery (i.e., electronic ground) will not be grounded through the chassis.

**TS 40.3 Low Voltage Wiring and Terminals**
All power and ground wiring will conform to specification requirements of SAE Recommended Practice J1127, J1128 and J1292. All high-voltage power and ground wiring will conform to specification requirements of SAE Standards J1763 and J1654, and SAE Recommended Practice J2910. In the case of conflicts with the requirements below, SAE Standards will apply. Double insulations shall be maintained as close to the junction box, electrical compartment or terminals as possible. The requirement for double insulations shall be met by wrapping the harness with plastic electrical tape or by sheathing all wires and harnesses with non-conductive, rigid or flexible conduit.

The bus will be manufactured so that high voltage systems and cabling do not interfere with the operation of low voltage control systems. To this end, high voltage cabling and low voltage control wiring must be separated as far as practical. Additionally, parallel runs of high voltage cabling and low voltage control wiring will be minimized.

Wiring will be grouped, numbered and/or color-coded. Wiring harnesses will not contain wires of different voltage classes unless all wires within the harness are insulated for the highest voltage presenting the harness. Kinking, grounding at multiple points, stretching, and exceeding minimum bend radius will be prevented.

Strain-relief fittings will be provided at all points where wiring enters electrical compartments. Grommets or other protective material will be installed at points where wiring penetrates metal structures outside of electrical enclosures. Wiring supports will be protective and non-conductive at areas of wire contact and will not be damaged by heat, water, solvents or chafing.

To the extent practicable, wiring will not be located in environmentally exposed locations under the vehicle. Wiring and electrical equipment necessarily located under the vehicle will be insulated from water, heat, corrosion and mechanical damage. Where feasible, front-to-rear electrical harnesses should be installed above the window line of the vehicle.

All wiring harnesses over 5 ft. long and containing at least five wires will include 10 percent (minimum one wire) excess wires for spares. This requirement for spare wires does not apply to datalinks and communication cables. Wiring harness length will allow end terminals to be replaced twice without pulling, stretching or replacing the wire. Terminals will be crimped to the wiring according to the connector manufacturer’s recommendations for techniques and tools. All cable connectors will be locking type, keyed and sealed, unless enclosed in water tight cabinets or vehicle interior. Pins will be removable, crimp contact type, of the correct size and rating for the wire being terminated. Unused pin positions will be sealed with sealing plugs. Adjacent connectors will use either different inserts or different insert orientations to prevent incorrect connections.

Terminals will be crimped, corrosion-resistant and full ring type or interlocking lugs with insulating ferrules. When using pressure type screw terminal strips, only stranded wire will be used. Insulation clearance will ensure that wires have a minimum of “visible clearance” and a maximum of two times the conductor diameter or 1/16 in., whichever is less. When using shielded or coaxial cable, upon stripping of the insulation, the metallic braid will be free from frayed strands that can penetrate the insulation of the inner wires.

Ultra-sonic and T-splices may be used with 8 AWG or smaller wire. When a T-splice is used, it will meet these additional requirements:

- It will include a mechanical clamp in addition to solder on the splice.
- The wire will support no mechanical load in the area of the splice.
- The wire will be supported to prevent flexing.
- No splicing is allowed in locations exposed to below the lower window line (both interior & exterior) and all exterior
All splicing will be staggered in the harness so that no two splices are positioned in the same location within the harness. Wiring located in the powertrain compartment will be routed away from high-heat sources or shielded and/or insulated from temperatures exceeding the wiring and connector operating requirements.

The instrument panel and wiring will be easily accessible for service from the driver’s seat or top of the panel. The instrument panel will be separately removable and replaceable without damaging the instrument panel or gauges. Wiring will have sufficient length and be routed to permit service without stretching or chafing the wires.

**TS 40.4 Electrical Components**

All electrical components, including switches, relays, flashers, and circuit breakers, will be heavy-duty designs with either a successful history of application in heavy-duty vehicles or design specifications for an equivalent environment.

All electric motors will be heavy-duty brushless type where practical, and have a continuous duty rating of no less than 40,000 hours (except cranking motors, washer pumps, auxiliary heater pumps, defroster and wiper motors). All electric motors will be easily accessible for servicing.

**TS 40.5 Electrical Compartments**

All relays, controllers, flashers, circuit breakers and other electrical components will be mounted in easily accessible electrical compartments. All compartments exposed to the outside environment will be corrosion-resistant and sealed. The components and their functions in each electrical compartment will be identified and their location permanently recorded on a drawing attached to the inside of the access panel or door. The drawing will be protected from oil, grease, fuel and abrasion.

The front compartment will be completely serviceable from the driver’s seat, vestibule or from the outside. “Rear start and run” controls will be mounted in an accessible location in the engine compartment and will be protected from the environment.

**TS 41. General Electronic Requirements**

If an electronic component has an internal real-time clock, it will provide its own battery backup to monitor time when battery power is disconnected, and/or it may be updated by a network component. If an electronic component has an hour meter, it will record accumulated service time without relying on battery backup.

All electronic component suppliers will ensure that their equipment is self-protecting in the event of shorts in the cabling, and also in over-voltage (over 32 VDC on a 24 VDC nominal voltage rating with a maximum of 50 VDC) and reverse polarity conditions. If an electronic component is required to interface with other components, it will not require external pull-up and/or pull-down resistors. Where this is not possible, the use of a pull-up or pull-down resistor will be limited as much as possible and easily accessible and labeled.

**TS 41.1 Wiring and Terminals**

Kinking, grounding at multiple points, stretching and reducing the bend radius below the manufacturer’s recommended minimum will not be permitted.

All wiring between electrical components and terminations, will have double electrical insulation, will be waterproof, and will conform to specification requirements of SAE Recommended Practice J1127 and J1128 (except at cable mounting blocks closest to the alternator). Except as interrupted by the master battery disconnect switch, battery and starter wiring will be continuous cables, grouped, numbered, and/or color-coded with connections secured by bolted terminals; and will conform to specification requirements of SAE Standard J1127-Type SGT or SGX and SAE Recommended Practice J541. Wiring harnesses will not contain wires of different voltages unless all wires within the harness are sized to carry the current and insulated for the highest voltage wire in the harness.

All wiring harnesses will be loomed. Double insulation will be maintained as close to the terminals as possible. The requirement for double insulation will be met by sheathing all wires and harnesses with non-conductive, rigid or flexible conduit. Wrapping of harnesses with plastic electrical tape will be allowed only in limited, enclosed areas. Grommets of elastomeric material will be provided at points where wiring penetrates metal structures outside of electrical enclosures. Wiring supports will be protective and non-conductive at areas of wire contact and will not be damaged by heat, water, solvents, or chafing.
Wiring harnesses are to be properly routed and supported using fully wrapped silicone, stainless steel, insulated P-clamps. TYRAPS will only be used to group or "bundle" the wiring but not for support. Wires / Wiring harness must not be near sharp edges / objects that will chafe into the wiring harness / wires, sharp edges must be covered with a rubber or similar material.

All wiring harnesses over 5 feet long and containing at least 5 wires will include 10 percent excess wires for spares that are the same size as the largest wire in the harness excluding the battery cables. This requirement for spare wires does not apply to data links and/or communication cables. Wiring length will allow end terminals to be replaced twice without pulling, stretching, or replacing the wire. Except for large wires such as battery cables, terminals will be crimped to the wiring and may be soldered only if the wire is not stiffened above the terminal and no flux residue remains on the terminal. Large terminals, such as those used for the battery cables, will be crimped and soldered. Terminals will be corrosion-resistant and full ring type or interlocking lugs with insulating ferrules. T splices may be used when there is less than 25,000 circular mills of copper in the cross section and a mechanical clamp is used in addition to solder on the splice; the wire supports no mechanical load in the area of the splice; and the wire is supported to prevent flexing.

All cable connectors will be locking type, keyed, and watertight, unless enclosed in watertight cabinets. Pins will be removable, crimp contact type of the correct size and rating for the wire being terminated. Unused pin positions will be sealed with sealing plugs. Adjacent connectors will either use different inserts or different insert orientations to prevent incorrect connections.

Discrete I/O (Inputs/Outputs)
All wiring to I/O devices, either at the harness level or individual wires, will be labeled, stamped or color-coded in a fashion that allows unique identification at a spacing not exceeding 4 in. Wiring for each I/O device will be bundled together. If the I/O terminals are the same voltages, then jumpers may be used to connect the common nodes of each I/O terminal.

Shielding
All wiring that requires shielding will meet the following minimum requirements. A shield will be generated by connecting to a ground, which is sourced from a power distribution bus bar or chassis. A shield will be connected at one location only, typically a tone end of the cable. However, certain standards or special requirements, such as SAE J1939 or RF applications, have separate shielding techniques that also will be used as applicable. NOTE: A shield grounded at both end forms a ground loop, which can cause intermittent control or faults.

When using shielded or coaxial cable, upon stripping of the insulation, the metallic braid will be free from frayed strands, which can penetrate the insulation of the inner wires. To prevent the introduction of noise, the shield will not be connected to the common side of a logic circuit.

Communications
The data network cabling will be selected and installed according to the selected protocol requirements. The physical layer of all network communication systems will not be used for any 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 24 V power line) will meet the most stringent applicable wiring and terminal specifications.

The modules on the vehicle network must enter sleep mode when the bus is switched out of the engine run position or is running and then enters an engine shutdown time event.

Parasitic Loads
The bus will be designed to produce low engine switch off loads. The bus will be able to sit in the off position for at least 2 weeks before the battery system is lowered to a capacity that prevents engine start. The engine run position off load of the vehicle should be under 1 amp.

Radio Frequency (RF)
RF components, such as radios, video devices, cameras, global positioning systems (GPS), etc., will use coaxial cable to carry the signal. All RF systems require special design consideration for losses along the cable. Connectors will be
minimized, since each connector and crimp has a loss that will contribute to attenuation of the signal. Cabling should allow for the removal of antennas or attached electronics without removing the installed cable between them. If this cannot be done, then a conduit of sufficient size will be provided for ease of attachment of antenna and cable assembly. The corresponding component vendors will be consulted for proper application of equipment, including installation of cables.

Audio
Cabling used for microphone level and line level signals will be 22 AWG minimum with shielded twisted pair. Cabling used for amplifier level signals will be 18 AWG minimum.

TS 42. Multiplexing
TS 42.1 General
The primary purpose of the multiplexing system is control of components necessary to operate the vehicle. This is accomplished by processing information from input devices and controlling output devices through the use of an internal logic program.

Versatility and future expansion will be provided for by expandable system architecture. The multiplex system will be capable of accepting new inputs and outputs through the addition of new modules and/or the utilization of existing spare inputs and outputs. All like components in the multiplex system will be modular and interchangeable with self-diagnostic capabilities. The modules will be easily accessible for troubleshooting electrical failures and performing system maintenance. Multiplex input/output modules will use solid-state devices to provide extended service life and individual circuit protection.

Ten percent of the total number of inputs and outputs, or at least one each for each voltage type utilized (0 V, 12 V, 24 V) at each module location will be designated as spares.

The components of the multiplex system will be of modular design, thereby providing for ease of replacement by maintenance personnel. The modules will be easily accessible for troubleshooting electrical failures and performing system maintenance. Each module will be shielded to prevent interference by EMI and RFI; and will have an installed system to indicate circuit integrity and assist in rapid circuit diagnostics and verification of the load and wiring integrity.

In conjunction with relays if necessary, each circuit will be capable of providing a current load of up to 10 Amperes. The internal controls will be a solid state device, providing an extended service life. Wiring for data bus and node module power will consist of three, 22 gage or larger, UL approved, shielded, twisted pairs.

The multiplex system will be capable of data acquisition and storage with sufficient memory to allow monitoring of all circuits for one week. The multiplex system will also have provisions for current sensing to aid in determining whether certain components such as headlamps or motors are beginning to fail.

Protection to each individual circuit will be provided. An automatic test system, integral to the multiplexing, will be provided. The multiplex system will have self-diagnostics which monitor and display communication fault codes, program errors, etc. The system will be accessible by an IBM-compatible personal computer as well as a hand held field diagnostic unit capable of reading the network data, control function and address data, or function code. The mechanic will be able to use either unit to check bus wire function.

The system will revert to a "sleep mode" shutting off all electrical components, except as noted, after 15 minutes of inactivity. All systems directly wired to the battery, including but not limited to, the Clever IVN (ITS), camera system, and radio system, will not be shut down during this sleep mode and will have a low voltage monitoring cut off device in line with the direct wired battery feeds that is adjustable to a voltage cutoff value that can be set and later modified by CTA. The hazard lights will not be affected. Hazard lights activation will prevent system from reverting to “sleep mode”.

In order to minimize training, the operation and functionality of the vehicle and its various components will be standardized to be same as those on the Authority’s existing vehicles.
**TS 42.2 System Configuration**

Multiplexing may either be distributed or centralized. A distributed system will process information on multiple control modules within the network. A centralized system will process the information on a single control module. Either system will consist of several modules connected to form a control network.

**I/O Signals**

The input/output for the multiplex system may contain four types of electrical signals: discrete, modulating, analog and serial data.

Discrete signals will reflect the on/off status of switches, levers, limit switches, lights, etc. Analog signals will reflect numerical data as represented by a voltage signal (0–12 V, 10–24 V, etc.) or current signal (4–20 mA). Both types of analog signals will represent the status of variable devices such as rheostats, potentiometers, temperature probes, etc. Serial data signals will reflect ASCII or alphanumeric data used in the communication between other onboard components.

**TS 43. Data Communications**

**TS 43.1 General**

All data communication networks will be either in accordance with a nationally recognized interface standard, such as those published by SAE, IEEE or ISO, or will be published to the Authority 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 level of data, application software and firmware.
- The capability and procedures for uploading new firmware or application software.
- Evidence that applicable data will be broadcast to the network in an efficient manner such that the overall network integrity is not compromised.

Any electronic vehicle components used on a network will be conformance tested to the corresponding network standard.

CleverDevices Automatic Vehicle Monitoring (AVM) Certification is required to ensure no conflicts. Sign off on a mutually agreed initial bus and firmware. On-going support of changes is the responsibility of Clever Devices.

**TS 43.2 Drivetrain Level**

Drivetrain components, consisting of the engine, transmission, retarder, anti-lock braking system and all other related components, will be integrated and communicate fully with respect to vehicle operation with data using SAE Recommended Communications Protocols such as J1939 and/or J1708/J1587 with forward and backward compatibilities or other open protocols. At a minimum, drivetrain components consisting of the engine, transmission, retarder ASR, and anti-lock braking systems will be powered by a dedicated and isolated ignition supply voltage to ensure data communication among components exists when the vehicle ignition is switched to the “on” position.

**Diagnostics, Fault Detection and Data Access**

Drive-train performance, maintenance and diagnostic data, and other electronic messages will be formatted and transmitted on the communications networks.

The drivetrain level will 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 will provide live/fail status, current hardware serial number, software/data revisions and uninterrupted timing functions.

**Programmability (Software)**

The drivetrain level components will be programmable by the Authority with limitations as specified by the subsystem Supplier.
**TS 43.3 Multiplex Level**  
**Data Access**
At a minimum, information will be made available via a communication port on the multiplex system. The location of the communication port will be easily accessible. A hardware gateway and/or wireless communications system are options if requested by the Authority. The communication port(s) will be located as specified by the Authority.

**Diagnostics and Fault Detection**
The multiplex system will 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. In addition to the indicators, the system will employ a diagnostic and fault detection system, which will be accessible via either a personal computer or a hand held unit. Either unit will have the ability to check logic function.

**Provide Mock-Up Board**
A mock-up board, where key components of the multiplexing system are replicated on a functional model, will be provided as a tool for diagnostic, design verification and training purposes. The mock-up board should be priced into the base bus pricing.

**Programmability (Software)**
The multiplex system will have security provisions to protect its software from unwanted changes. This will 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
- Hardware protection that prevents undesired changes to the software

Provisions for programming the multiplex system will be possible through a PC or laptop. The multiplex system will have proper revision control to ensure that the hardware and software are identical on each vehicle equipped with the system. Revision control will 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
- Software revision identification where all copies of the software in service display the most recent revision number
- A method of determining which version of the software is currently in use in the multiplex system

Revision control labels will be electronic.

**TS 43.4 Vehicle Message Database & General Data Requirements**
The Contractor will supply the full vehicle CAN database file (.dbc or equivalent) and information for all CAN communication nodes of the network, CAN messages and signals transmitted in the messages with their positions, bit counts, physical units and linear conversion formulas. The contractor will supply the full database for the entire vehicle and all the subsystems and components for the vehicle.

Contractor will provide on-going support for CTA to have full access to the latest complete CAN database files throughout the life of the bus.

Acknowledgement that CTA owns the Data generated from the bus with a means to access the information (without a service subscription). This includes all information transmitted over the vehicles CAN networks.

**TS 43.5 Electronic Noise Control**
Electrical and electronic subsystems and components on all buses will not emit electromagnetic radiation that will interfere with on-board systems, components or equipment, telephone service, radio or TV reception, or violate regulations of the Federal Communications Commission.
Electrical and electronic subsystems on the coaches will not be affected by external sources of RFI/EMI. This includes, but is not limited to, radio and TV transmission, portable electronic devices including computers in the vicinity of or onboard the buses, AC or DC power lines and RFI/EMI emissions from other vehicles.

As a recommendation, no vehicle component will 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 and UNECE Council Directive 95/54 (R 10).

**DRIVER PROVISIONS, CONTROLS AND INSTRUMENTATION**

**TS 44. Driver’s Area Controls**

**TS 44.1 General**

In general when designing the driver’s area, it is recommended that SAE J833, “Human Physical Dimensions,” be used. Switches and controls will 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.”

**TS 44.2 Glare**

The driver’s work area will be designed to minimize glare to the extent possible. Objects within and adjacent to this area will 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 driver’s area will be avoided.

**TS 44.3 Visors/Sun Grades**

**Front and Side Sun Shade/Visor**

Adjustable sun visor(s) will be provided for the driver’s windshield and the driver’s side window. Visors will be shaped to minimize light leakage between the visor and windshield pillars. Visors will store out of the way and will not obstruct airflow from the climate control system or interfere with other equipment, such as the radio handset or the destination control. Deployment of the visors will not restrict vision of the rearview mirrors. Visor adjustments will be made easily by hand with positive locking and releasing devices and will not be subject to damage by over-tightening. Sun visor construction and materials will be strong enough to resist breakage during adjustments. Visors may be transparent but will not allow a visible light transmittance in excess of 10 percent. Visors, when deployed, will be effective in the driver’s field of view at angles more than 5 deg above the horizontal.

**Driver’s Window Sunscreens**

An adjustable roller type sunscreen will be provided over the driver’s windshield and/or the driver’s side window. The sunscreen will be capable of being lowered to the midpoint of the driver’s window. When deployed, the screen will be secure, stable, and will not rattle, sway or intrude into the driver’s field of view due to the motion of the coach or as a result of air movement. Once lowered, the screen will remain in the lowered position until returned to the stowed position by the driver. Sunscreen will be shaped to minimize light leakage between the visor and windshield pillars to the extent possible.

**TS 44.4 Driver’s Controls**

Frequently used controls must be in easily accessible locations. These include the door control, kneel control, windshield wiper/washer controls, ramp, and lift and run switch. Any switches and controls necessary for the safe operation of the bus will be conveniently located and will provide for ease of operation. They will be identifiable by shape, touch and permanent markings. Controls also will be located so that passengers may not easily tamper with control settings.

All panel-mounted switches and controls will be marked with easily read identifiers. Graphic symbols will conform to SAE Recommended Practice J2402, “Road Vehicles – Symbols For Controls, Indicators, and Tell Tales,” where available and applicable. Color of switches and controls will be dark with contrasting typography or symbols.

Mechanical switches and controls will be replaceable, and the wiring at these controls will be serviceable from a convenient location. Switches, controls and instruments will be dust- and water-resistant.

All switches/controls in the driver’s controls area will be mounted in an angled panel deep enough to discourage drivers from using it as a personal storage area for items like food, drinks, cellphones, etc.
**TS 44.5 Normal Bus Operation Instrumentation and Controls**

The following list identifies bus controls used to operate the bus. These controls are either frequently used or critical to the operation of the bus. They will be located within easy reach of the operator. The operator will not be required to stand or turn to view or actuate these controls unless specified otherwise.

Systems or components monitored by onboard diagnostics system will be displayed in clear view of the operator and provide visual and/or audible indicators. The intensity of indicators will permit easy determination of on/off status in bright sunlight but will not cause a distraction or visibility problem at night. All indicators will be illuminated using backlighting.

The indicator panel will be located in Area 1 or Area 5, within easy view of the operator instrument panel. All indicators will have a method of momentarily testing their operation. The audible alarm will be tamper-resistant and will have an outlet level between 80 and 83 dBA when measured at the location of the operator’s ear.

On-board displays visible to the operator will be limited to indicating the status of those functions described herein that are necessary for the operation of the bus. All other indicators needed for diagnostics and their related interface hardware will be concealed and protected from unauthorized access. Table 6 represents instruments and alarms. The intent of the overall physical layout of the indicators will be in a logical grouping of systems and severity nature of the fault.

Consideration will be provided for future additions of spare indicators as the capability of onboard diagnostic systems improves. Blank spaces will contain LEDs.

**Table 6 (Transit Coach)**

<table>
<thead>
<tr>
<th>Device</th>
<th>Description</th>
<th>Location</th>
<th>Function</th>
<th>Visual/Audible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master run switch</td>
<td>Rotary, four-position detent</td>
<td>Side console</td>
<td>Master control for bus, off, day run, night run and clearance ID lights</td>
<td></td>
</tr>
<tr>
<td>System start, front</td>
<td>Approved momentary switch</td>
<td>Side console</td>
<td>Activates vehicle systems</td>
<td></td>
</tr>
<tr>
<td>System start, rear</td>
<td>Approved momentary switch</td>
<td>Rear system compartment</td>
<td>Activates vehicle systems</td>
<td></td>
</tr>
<tr>
<td>System run, rear</td>
<td>Three-position toggle switch</td>
<td>Rear system compartment</td>
<td>Permits activating vehicle system from rear start, normal front run position and off</td>
<td>Amber light</td>
</tr>
<tr>
<td>Drive selector</td>
<td>Touch panel switch</td>
<td>Dash right wing</td>
<td>Provides selection of propulsion: forward, reverse and neutral</td>
<td>Gear selection</td>
</tr>
<tr>
<td>Driver’s ventilation</td>
<td>Switch or switches to control driver ventilation</td>
<td>Side console or dash left wing</td>
<td>Permits supplemental ventilation: fan off, low or high</td>
<td></td>
</tr>
<tr>
<td>Defroster fan</td>
<td>Switch or switches to control defroster fan</td>
<td>Side console or dash left wing</td>
<td>Permits defroster: fan off, low, medium or high</td>
<td></td>
</tr>
<tr>
<td>Defroster temperature</td>
<td>Variable position</td>
<td>Side console or dash left wing</td>
<td>Adjusts defroster water flow and temperature</td>
<td></td>
</tr>
<tr>
<td>Windshield wiper</td>
<td>One-variable position switch operating both wipers</td>
<td>Dash left wing</td>
<td>Variable speed control of left and right windshield wipers</td>
<td></td>
</tr>
<tr>
<td>Windshield washer</td>
<td>Push button</td>
<td>Dash left wing</td>
<td>Activates windshield washers</td>
<td></td>
</tr>
<tr>
<td>Device</td>
<td>Description</td>
<td>Location</td>
<td>Function</td>
<td>Visual/Audible</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------</td>
<td>-------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Dash panel lights</td>
<td>Rotary rheostat or stepping switch</td>
<td>Side console or dash left wing</td>
<td>Provides adjustment for light intensity in night run position</td>
<td></td>
</tr>
<tr>
<td>Interior lights</td>
<td>Three-position switch</td>
<td>Side console</td>
<td>Selects mode of passenger compartment lighting: off, on or reduced lighting</td>
<td></td>
</tr>
<tr>
<td>Front door ramp</td>
<td>Three-position momentary switch</td>
<td>dash right wing</td>
<td>Permits deploy and stow of front ramp</td>
<td>Red light</td>
</tr>
<tr>
<td>Front kneel</td>
<td>Three-position momentary switch</td>
<td>dash right wing</td>
<td>Permits kneeling activation and raise and normal at front door remote location</td>
<td>Amber odash indicator exterior alarm and amber light</td>
</tr>
<tr>
<td>Silent alarm</td>
<td>Recessed push button, NO and NC contacts momentary</td>
<td>Side console</td>
<td>Activates emergency radio alarm at dispatch and permits covert microphone and/or enables destination sign emergency message</td>
<td></td>
</tr>
<tr>
<td>Video system event switch</td>
<td>Momentary on/off momentary switch with plastic guard</td>
<td>Side console</td>
<td>Triggers event equipment and event light on dash</td>
<td>Amber light</td>
</tr>
<tr>
<td>Left remote mirror (if Required)</td>
<td>Four-position toggle type</td>
<td>Side console</td>
<td>Permits two-axis adjustment of left exterior mirror</td>
<td></td>
</tr>
<tr>
<td>Right remote mirror</td>
<td>Four-position toggle type</td>
<td>Side console</td>
<td>Permits two-axis adjustment of right exterior mirror</td>
<td></td>
</tr>
<tr>
<td>Passenger door control</td>
<td>Five-position handle type detent or two momentary push buttons</td>
<td>Side console, forward</td>
<td>Permits open/close control of front and rear passenger doors</td>
<td>Red light</td>
</tr>
<tr>
<td>Rear door override</td>
<td>Two-position switch in approved location</td>
<td>Side console, forward</td>
<td>Allows driver to override activation of rear door passenger tape switches</td>
<td></td>
</tr>
<tr>
<td>System shutdown override</td>
<td>Momentary switch with operation protection</td>
<td>Side console</td>
<td>Permits driver to override auto system shutdown</td>
<td></td>
</tr>
<tr>
<td>Hazard flashers</td>
<td>Two-position switch</td>
<td>Side console or dash right wing</td>
<td>Activates emergency flashers</td>
<td>Two green lights</td>
</tr>
<tr>
<td>Transit Control Head (TCH)</td>
<td>TCH operator interface panel</td>
<td>In approved location</td>
<td>Facilitates driver interaction with communication system and master logon</td>
<td>LCD display with visual status and text messages</td>
</tr>
<tr>
<td>Farebox interface</td>
<td>Farebox coach operator interface panel</td>
<td>Near farebox</td>
<td>Facilitates driver interaction with farebox system</td>
<td>LCD display</td>
</tr>
<tr>
<td>Destination sign interface</td>
<td>Destination sign interface panel</td>
<td>In approved location</td>
<td>Facilitates driver interaction with destination sign system, manual entry</td>
<td>LCD display</td>
</tr>
<tr>
<td>Turn signals</td>
<td>Momentary push button (two required) raised from other switches</td>
<td>Left foot panel</td>
<td>Activates left and right turn signals</td>
<td>Two green lights and optional audible indicator</td>
</tr>
</tbody>
</table>
## TABLE 6 (Transit Coach)
Transit Bus Instruments and Alarms

<table>
<thead>
<tr>
<th>Device</th>
<th>Description</th>
<th>Location</th>
<th>Function</th>
<th>Visual/Audible</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA manual</td>
<td>Momentary push button</td>
<td>In approved location</td>
<td>Permits driver to manually activate public address microphone</td>
<td>Yellow Light</td>
</tr>
<tr>
<td>High beam</td>
<td>push button</td>
<td>In approved location</td>
<td>Permits driver to toggle between low and high beam</td>
<td>Blue light</td>
</tr>
<tr>
<td>Parking brake</td>
<td>Pneumatic PPV</td>
<td>Vertical side of the side console</td>
<td>Permits driver to apply and release parking brake</td>
<td>Red light</td>
</tr>
<tr>
<td>Parking brake Release</td>
<td>Pneumatic PPV</td>
<td>Vertical side of the side console</td>
<td>Permits driver to push &amp; hold to release brakes</td>
<td></td>
</tr>
<tr>
<td>Master door/interlock</td>
<td>Multi-pole toggle, detented</td>
<td>Out of operator's reach</td>
<td>Permits driver override to disable door and brake/throttle interlock</td>
<td>Red light</td>
</tr>
<tr>
<td>Warning interlocks deactivated</td>
<td>Red indicator light</td>
<td>Dash panel center</td>
<td>Illuminates to warn driver that interlocks have been deactivated</td>
<td>Red light</td>
</tr>
<tr>
<td>Indicator/alarm test button</td>
<td>Momentary switch or programming¹</td>
<td>Dash center panel</td>
<td>Permits driver to activate test of sentry, indicators and audible alarms</td>
<td>All visuals and audibles</td>
</tr>
<tr>
<td>Speedometer</td>
<td>Speedometer, odometer, and diagnostic capability, 5-mile increments</td>
<td>Dash center panel</td>
<td>Visual indication of speed and distance traveled, accumulated vehicle mileage, fault condition display</td>
<td>Visual</td>
</tr>
<tr>
<td>Air pressure gauge</td>
<td>Primary and secondary, 5 psi increments</td>
<td>Dash center panel</td>
<td>Visual indication of primary and secondary air systems</td>
<td>Red light and buzzer</td>
</tr>
<tr>
<td>Fire detection</td>
<td>Coach operator display</td>
<td>Property specific or dash center</td>
<td>Indication of fire detection activation by zone/location</td>
<td>Buzzer and red light</td>
</tr>
<tr>
<td>Door obstruction</td>
<td>Sensing of door obstruction</td>
<td>Dash center</td>
<td>Indication of rear door sensitive edge activation</td>
<td>Red light and buzzer</td>
</tr>
<tr>
<td>Door ajar</td>
<td>Door not properly closed</td>
<td>Property specific or dash center</td>
<td>Indication of rear door not properly closed</td>
<td>Buzzer or alarm and red light</td>
</tr>
<tr>
<td>Low system air pressure</td>
<td>Monitors primary and secondary air tank pressure</td>
<td>Dash center</td>
<td>Indication of low air system pressure</td>
<td>Buzzer and red light</td>
</tr>
<tr>
<td>System coolant indicator</td>
<td>Low coolant indicator may be supplied as audible alert and visual and/or text message</td>
<td>Within driver's sight</td>
<td>Detects low coolant condition</td>
<td>Amber light</td>
</tr>
<tr>
<td>Hot system indicator</td>
<td>Temperature indicator may be supplied as audible alert and visual and/or text message</td>
<td>Within driver's sight</td>
<td>Detects system overheat condition and initiates time delay shutdown</td>
<td>Red light</td>
</tr>
<tr>
<td>ABS indicator</td>
<td>Detects system status</td>
<td>Dash center</td>
<td>Displays system failure</td>
<td>Amber light</td>
</tr>
<tr>
<td>HVAC indicator</td>
<td>Detects system status</td>
<td>Dash center</td>
<td>Displays system failure</td>
<td>Amber or red light</td>
</tr>
</tbody>
</table>
### TABLE 6 (Transit Coach)

Transit Bus Instruments and Alarms

<table>
<thead>
<tr>
<th>Device</th>
<th>Description</th>
<th>Location</th>
<th>Function</th>
<th>Visual/Audible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charging system indicator (12/24 V)</td>
<td>Detect charging system status</td>
<td>Dash center</td>
<td>Detects no-charge condition and optionally detects battery high, low, imbalance, no-charge condition, and initiates time-delayed shutdown</td>
<td>Red light flashing or solid based on condition</td>
</tr>
<tr>
<td>Bike rack deployed indicator (Option)</td>
<td>Detects bike rack position</td>
<td>Dash center</td>
<td>Indication of bike rack not being in fully stowed position</td>
<td>Amber or red light</td>
</tr>
<tr>
<td>State of charge</td>
<td>Gauge, graduated based on SOC</td>
<td>Dash center</td>
<td>Indication of SOC</td>
<td></td>
</tr>
<tr>
<td>State of charge warning indicator</td>
<td>Indicates when SOC becomes low</td>
<td>Dash Center</td>
<td>Indicates loss of strings and state of charge near derate point.</td>
<td></td>
</tr>
<tr>
<td>Range (Mileage)</td>
<td>Estimated Range in Mileage based on last 1 hr of operation</td>
<td>Dash Center</td>
<td>Indication of Remaining Range</td>
<td>Visual</td>
</tr>
<tr>
<td>Range (Hours)</td>
<td>Estimated Range in Operating Hours based on last 1 hr of operation</td>
<td>Dash Center</td>
<td>Indication of Remaining Range</td>
<td>Visual</td>
</tr>
<tr>
<td>Charge Sufficient</td>
<td>Display shows when charge is sufficient to continue on route</td>
<td>Dash Center</td>
<td>Red indicates Charge isn’t enough, Green Indicates charge is sufficient</td>
<td>Visual</td>
</tr>
<tr>
<td>Estimated Charge Time</td>
<td>Display shows estimate time to full charge</td>
<td>Dash Center</td>
<td>Countdown Timer when charger is connected</td>
<td>Visual</td>
</tr>
</tbody>
</table>

1. Indicate area by drawing. Break up switch control from indicator lights.

**TS 44.6 Driver Foot Controls**

Accelerator and brake pedals will be designed for ankle motion. Foot surfaces of the pedals will be faced with wear-resistant, non-skid, replaceable material.

**Pedal Angle**

The vertical angle of the accelerator and brake pedals will be determined from a horizontal plane regardless of the slope of the cab floor. The accelerator and brake pedals will be positioned at an angle of 37 to 50 deg at the point of initiation of contact and extend downward to an angle of 10 to 18 deg at full throttle.

The location of the brake and accelerator pedals will be determined by the manufacturer, based on space needs, visibility, lower edge of windshield and vertical H-point.

**Pedal Dimensions and Position**

The floor-mounted accelerator pedal will be 10 to 12 in. long and 3 to 4 in. wide. Clearance around the pedal must allow for no interference precluding operation.

The accelerator and brake pedals will be positioned such that the spacing between them, measured at the heel of the pedals, is between 1 and 2 in. Both pedals should be located approximately on the same plane coincident to the surface of the pedals.

**TS 44.7 Brake and Accelerator Pedals**

**Brake Pedal**

Non-adjustable brake pedal.
**TS 44.8 Driver Foot Switches**

**Floor-Mounted Foot Control Platform**
The angle of the turn signal platform will be determined from a horizontal plane, regardless of the slope of the cab floor. The turn signal platform will be angled at a minimum of 10 deg and a maximum of 37 deg. It will be located no closer to the seat front than the heel point of the accelerator pedal.

The control switches for the turn signals will be mounted on an inclined, floor-mounted stainless steel enclosure or metal plate mounted to an incline integrated into the driver’s platform, located to the left of the steering column. The location and design of this enclosure will be such that foot room for the operator is not impeded. The inclined mounting surface will be skid-resistant. All other signals, including high beam and public address system, will be in approved locations. The foot switches will be UL-listed, heavy-duty type, of a rugged, corrosion-resistant metal construction. The foot switches for the directionals will be momentary type, while those for the PA system and the high beam will be latching type. The spacing of the switches will be such that inadvertent simultaneous deflection of switches is prevented.

**TS 45. Driver’s Amenities**

**TS 45.1 Coat Hanger**

**Coat Hook**
A hook and loop will be provided to secure the driver’s coat.

**TS 45.2 Drink Holder**
No drink holder.

**TS 45.3 Storage Box**
A keyed storage compartment will be provided in the operator’s area to contain his/her personal effects, such as lunch, gloves, etc. The lock key number will be WN03.

**TS 45.4 Other**
A running time cardholder will be furnished and installed by the Contractor. The holder will be spring-loaded, to hold a 3-1/2" wide by 6-1/2" high running card. The holder will be located on the dash panel and will be easily visible by the driver.

The Contractor will furnish and install a 5-lb., dry chemical type Ansul No. A5 or equal extinguisher with "Foray" dry chemical and a twenty (20) inch hose assembly. The fire extinguisher will be die-stamped with the words, "PROPERTY OF CTA" with letters approximately 1/4-inch high.

A safety triangular reflector kit is to be provided on each bus for use in emergency situations when bus breaks down in service. The kit will be contained in a compartment near the driver’s area.

**TS 46. Windshield Wipers and Washers**

**TS 46.1 Windshield Wipers**
The bus will be equipped with a windshield wiper for each half of the windshield. At 60 mph, no more than 10 percent of the wiped area will be lost due to windshield wiper lift. For two-piece windshields, both wipers will park along the center edges of the windshield glass. For single-piece windshields, wipers will park along the bottom edge of the windshield.

Windshield wiper motors and mechanisms will be easily accessible for repairs or service. The fastener that secures the wiper arm to the drive mechanism will be corrosion-resistant.

A variable intermittent feature will be provided to allow adjustment of wiper speed for each side between approximately 5 to 25 cycles per minute. If powered by compressed air, exhaust from the wiper motors will be muffled or piped under the floor of the bus. No part of the windshield wiper mechanism will be damaged by manual manipulation of the arms.

**TS 46.2 Windshield Washers**
The windshield washer system, when used with the wipers, will deposit washing fluid evenly and completely wet the entire wiped area.
The windshield washer system will have a minimum 3-gallon reservoir, located for easy refilling from outside the bus. Reservoir pumps, lines and fittings will be corrosion-resistant and must include a means to determine fluid level.

**TS 47. Driver’s Seat**

*Figure 5. Driver’s Seat*

Seat will be Recaro Ergo M (CTA Lot # 7600042 Recaro Part # 8Q6.81.7A1.VVQB) or approved equal.

**TS 47.1 Dimensions**
The driver’s seat will be comfortable and adjustable so that people ranging in size from a 95th-percentile male to a 5th-percentile female may operate the bus.

**Seat Pan Cushion Length**
Measurement will 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 will be no less than 16.5 in. at its minimum length and no more than 20.5 in. at its maximum length.

**Seat Pan Cushion Height**
Measurement will be from the cab floor to the top of the level seat at its center midpoint. The seat will adjust in height from a minimum of 14 in., with a minimum 6 in. vertical range of adjustment.

**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 will be stated in degrees of incline relative to the horizontal plane (0 deg). The seat pan will adjust in its slope from no less than plus 12 deg (rearward “bucket seat” incline) to no less than minus 5 deg (forward slope).

**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 will be measured from the front edge of the seat when it is adjusted to its minimum seat pan depth (approximately 15 in.). The seat base will travel horizontally a minimum of 9 in. It will adjust no closer to the heel point than 6 in.
**Seat Pan Cushion Width**
Measurement is the horizontal distance across the seat cushion. The seat pan cushion will be 17 to 21 in. across at the front edge of the seat cushion and 20 to 23 in. across at the side bolsters.

**Seat Suspension**
The driver's seat will be appropriately dampened to support a minimum weight of 380 lbs. The suspension will be capable of dampening adjustment in both directions.

Rubber bumpers will be provided to prevent metal-to-metal contact.

**Seat Back**
- **Width**
  Measurement is the distance between the outermost points of the front of the seat back, at or near its midpoint in height. The seat back width will be no less than 19 in. Seat back will include dual recliner gears on both sides of the seat.
- **Height**
  Standard height seat back.

**Headrests**
No headrest.

**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 will provide adjustable-depth lumbar back support with three individual operating lumbar cells within a minimum range of 7 to 11 in.

**Seat Back Angle Adjustment**
The seat back angle will be measured relative to a level seat pan, where 90 deg is the upright position and 90 deg-plus represents the amount of recline.

The seat back will adjust in angle from a minimum of no more than 90 deg (upright) to at least 105 deg (reclined), with infinite adjustment in between.

**TS 47.2 Seat Belt**
The belt assembly should be an auto-locking retractor (ALR). All seat belts should be stored in automatic retractors. The belts will be mounted to the seat frame so that the driver may adjust the seat without resetting the seat belt.

The seat and seatbelt assemblies as installed in the bus will withstand static horizontal forces as required in FMVSS 207 and 210.

Seatbelt webbing will be black in color.

**Lap and Shoulder (Three-Point) Seat Belt**
Seat belts will be provided across the driver's lap and diagonally across the driver's chest. The driver will be able to use both belts by connecting a single buckle on the right side of the seat cushion. Three-point seatbelts must be emergency locking retractor (ELR) in design.

**Lap Belt Length**
The lap belt assembly will be a minimum of 72 in. in length and should accommodate the 95\textsuperscript{1} percentile male.

**TS 47.3 Adjustable Armrest**
No armrests.
TS 47.4 Seat Control Locations
While seated, the driver will be able to make seat adjustments by hand without complexity, excessive effort or being pinched. Adjustment mechanisms will hold the adjustments and will not be subject to inadvertent changes. The controls should be located on the ride side of the seat.

TS 47.5 Seat Structure and Materials
Cushions
Cushions will be fully padded with at least 3 in. of materials in the seating areas at the bottom and back.

Cushion Materials
Foam and fabric that meets FTA Docket 90A.

TS 47.6 Pedestal
The seat pedestal material will be brushed stainless steel.

TS 47.7 Seat Options
An operator’s seat alarm will be provided. An audible alarm and indicator lamp will activate after 2 seconds if the bus operator leaves the seat without applying the parking brake. The alarm system will be deactivated if the bus operator returns to the seat or applies the parking brake.

TS 47.8 Mirrors
Exterior Mirrors
The bus will be equipped with corrosion-resistant, outside rearview mirrors mounted with stable supports to minimize vibration. Mirrors will be firmly attached to the bus to minimize vibration and to prevent loss of adjustment with a breakaway mounting system. The breakaway mounting system will ensure that body panels aren’t extensively damaged when mirror is knocked off in an accident. Mirrors will permit the driver to view the roadway along the sides of the bus, including the rear wheels. Mirrors should be positioned to prevent blind spots. The contractor shall provide the CTA with a range of mirror options.

Mirrors will retract or fold sufficiently to allow bus washing operations but avoid contact with windshield. The mirrors will have spring-loaded mirror heads auto return.

Combination of flat and convex mirrors referred to as transit-specific.

The bus will have provisions for multiple mounts for curbside and street side mirrors in the event the Authority decides to test other mirror configurations. (e.g. high mount street side vs. low mount street side)

The curbside and street side mirror assemblies will include a back mounted yellow reflective decal.

Curbside Mirrors
The curbside rearview mirror will be mounted so that its lower edge is no less than 76 in. above the street surface. The curb side exterior mirror glass will be a nominal 7-3/4 inches by 10-3/4 inches, and will be interchangeable with mirror presently being used by the Authority for remote control, right-side mirrors.

Remote Adjustment of Curbside Mirror
The driver will be able to adjust the curbside mirror remotely while seated in the driving position. The control for remote positioning of the mirror will be a single switch or device.

Street-Side Mirrors
One flat, nominal eight (8) inch by eight (8) inch or larger exterior rearview mirror and one (1) convex minimum six (6) inch diameter exterior rearview mirror will be mounted on the outside left front corner of the body. The convex mirror will be located below the flat mirror. Mirrors will be separate and independently adjustable. Mirror bracket and arm will be mounted so that it may be turned to side of body.

Street side exterior mirrors will be provided with rubber surrounds for shock absorption.
Mirror will be mounted as high and close to bus body as practicable without obstructing driver’s view. View will not be obstructed based on the open/closed position of the driver's window. Mirrors will be independently adjustable and operator will be able to easily adjust from inside of bus. If mirrors cannot be easily adjusted from inside bus, then they will be remotely controlled. Mirror bracket and arm will be mounted so that it may be turned to side of body.

Mirrors with integrated turn signal, both sides will be provided.

**Interior Mirrors**

Mirrors will be provided for the driver to observe passengers throughout the bus without leaving the seat and without shoulder movement. The driver will be able to observe passengers in the front/entrance and rear/exit areas, anywhere in the aisle, and in the rear seats.

**Center Rearview** An interior rear view mirror 7-1/2” x 16-1/2” or larger will be mounted ahead of, and above the operator’s position completely clear of driver’s field of view through windshield to provide a general view of the interior of the bus. Mirror will be flat. Mirror glass will be tempered.

**Front Entrance Area** One interior mirror will be mounted on the ceiling above the front entrance area to provide the operator a view of the front entrance area and outside area adjacent to the lower step. Mirror will be rectangular shape, diminishing convex type approximately six (6) inches by nine (9) inches. Mirror glass will be tempered.

**Upper Right-Hand Corner** One interior flat mirror will be mounted at the upper right-hand corner of windshield header panel of suitable size to provide the operator a clear, unobstructed view of the rear exit area mirror. Mirror diameter will be six inches (6”). Mirror glass will be tempered.

**Rear Exit Area** One interior mirror will be mounted on the ceiling near the rear door so as to provide the operator an unobstructed view of the rear exit area by looking in the mirror mounted at the upper right interior corner. Mounting of mirror to vertical stanchion at rear door will be allowed if necessary provided that stanchion strength is adequate to prevent twisting or damage and set bolt is provided to preclude rotation. Mirror will be convex twelve (12) inch diameter and be of sturdy design and will withstand vibration. Mirror glass will be tempered. The ceiling mount will be by tapping plates.

**Barrier** One interior, 6 inch diameter round mirror will be mounted at the front of the bus to provide the operator with a clear view of the area immediately behind the driver’s barrier and/or street wheel house. Mirror glass will be tempered.

**Bike Rack** One interior, 6 inch diameter, round mirror will be mounted under the destination sign box at the front of the bus to provide the operator with a clear view of the bike rack.

Mirrors will include wrench flats to allow for ease removing, installing, and tightening of mirrors.

**WINDOWS**

**TS 48. General**

Detailed manufacturing drawings of the side and rear window glazing will be provided. Drawings will include reference to type of material, dimensions, window glazing part numbers, and any additional information which may be required to properly identify the window glazing material.

A minimum of 10,000 sq in. of window area, including operator and door windows, will be required on each side of the standard configuration bus.

Window Tint must comply with Illinois Vehicle Code 625 5/12-503

**TS 49. Windshield**

The windshield will permit an operator’s field of view as referenced in SAE Recommended Practice J1050. The vertically upward view will be a minimum of 14 deg, measured above the horizontal and excluding any shaded band. The vertically downward view will permit detection of an object 3½ ft high no more than 2 ft in front of the bus. The horizontal view will be a minimum of 90 deg above the line of sight. Any binocular obscuration due to a center divider may be ignored.
when determining the 90 deg requirement, provided that the divider does not exceed a 3 deg angle in the operator’s field of view. Windshield pillars will not exceed 10 deg of binocular obscuration. The windshield will be designed and installed to minimize external glare as well as reflections from inside the bus.

The windshield will be easily replaceable by removing zip-locks from the windshield retaining moldings. Bonded-in-place windshields will not be used.

**TS 49.1 Glazing**
The windshield glazing material will have a ¼ in. nominal thickness laminated safety glass conforming to the requirements of ANSI Z26.1 Test Grouping AS-1 and the recommended practices defined in SAE J673.

**Shaded Band**
The upper portion of the windshield above the driver’s field of view will have a dark, shaded band and marked AS-3, with a minimum luminous transmittance of 5 percent when tested in accordance to ASTM D-1003.

**TS 50. Driver’s Side Window**
The driver’s side window will be the sliding type, requiring only the rear half of the sash to latch upon closing, and will open sufficiently to permit the seated operator to easily adjust the street-side outside rearview mirror. When in an open position, the window will not rattle or close during braking. This window section will slide in tracks or channels designed to last the service life of the bus. Sliders in the tracks will not be made of plastic due to likelihood of damage. The operator's side window will not be bonded in place, incorporate an emergency release, and will be easily replaceable. The glazing material will have a single-density tint.

The driver’s view, perpendicular through operator’s side window glazing, should extend a minimum of 33 in. (840 mm) 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 26 in. (660 mm) above the operator’s floor to ensure visibility of an under-mounted convex mirror. Driver’s window construction will maximize ability for full opening of the window.

The driver’s side window glazing material will have a ¼ in. nominal thickness laminated safety glass conforming to the requirements of ANSI Z26.1-1996 Test Grouping AS-2 and the recommended practices defined in SAE J673.

The design will prevent sections from freezing closed in the winter. Light transmittance will be 75 percent on the glass area below 53 in. from the operator platform floor. On the top-fixed-over-bottom-slider configuration, the top fixed area above 53 in. may have a maximum 5 percent light transmittance.

**TS 51. Side Windows**

**TS 51.1 Configuration**
Side windows will not be bonded in place, but will be easily replaceable without disturbing adjacent windows and will be mounted so that flexing or vibration from engine operation or normal road excitation is not apparent. All aluminum and steel material will be treated to prevent corrosion.

**TS 51.2 Emergency Exit (Egress) Configuration**

**Minimum Egress**
All side windows will be fixed in position, except as necessary to meet the emergency escape requirements.

**TS 51.3 Configuration**

**Fixed Side Windows**
All side windows will be fixed in position, except as necessary to meet the emergency escape requirements.

**TS 51.4 Materials**

**Safety Glass Glazing Panels**
Side windows glazing material will have a minimum of 3/16 in. nominal thickness tempered safety glass. The material will conform to the requirements of ANSI Z26.1-1996 Test Grouping 2 and the recommended practices defined in SAE J673.
Anti-Vandalism Polyester Sacrificial Film
All glazing material that is aft of the standee line will be equipped with a 4 layer 0.5 mm laminated polyester film. This material will be easily installed and removed without the use of specialized tools. Polyester film will adhere to the window and be resistant to peeling, curling and discoloration by ultraviolet rays. The film will withstand normal cleaning operations. The Liner will be 3M Scotchgard Multi-Layer Film for Glass 1004 or approved equal. The Film will have a Stepped Edge at the top-right corner of the window. The Stepped Edge is intended to allow for easy removal of a damaged layer.

Windows on the bus sides and in the rear door will be tinted a neutral color, complementary to the bus exterior. The maximum solar energy transmittance will not exceed 27 percent, as measured by ASTM E-424. Luminous transmittance will be measured by ASTM D-1003. Windows over the destination signs will not be tinted.

NOTE: All glass treatments must be permanent, within the glass and/or in the center membrane. Surface films are not permitted. The Authority will consider other tints or window material to improve HVAC performance during extreme cold or hot weather. SHGC and light transmission performance will be defined by the National Fenestration Rating Council.

TS 51.5 Rear Window
No requirement for rear window.

HEATING, VENTILATING AND AIR CONDITIONING
TS 52. Capacity and Performance
The HVAC climate control system will be capable of controlling the temperature and maintaining the humidity levels of the interior of the bus as defined in the following paragraphs.

The HVAC unit may either be roof or rear-mounted.

With the bus running at the design operating profile with corresponding door opening cycle “50% of the time”, and carrying a number of passengers equal to 200 percent of the bus seated capacity, the HVAC system will control the average passenger compartment temperature within a range between 65 and 75 °F measured at three spots “front, mid & rear sections”, while maintaining the relative humidity to a value of 50 percent or less. The system will maintain these conditions while subjected to any outside ambient temperatures within a range of 10 to 95 °F and at any ambient relative humidity levels between 5 and 80 percent.

When the bus is operated in outside ambient temperatures of 95 to 115 °F, the interior temperature of the bus will be permitted to rise 0.5 °F for each degree of exterior temperature in excess of 95 °F.

When the bus is operated in outside ambient temperatures in the range of -20 to 10 °F, the interior temperature of the bus will not fall below 55 °F while the bus is running on the design operating profile.

System capacity testing, including pull-down/warm-up, stabilization and profile, will be conducted in accordance to the APTA's latest revision for “Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System.”

Additional testing will be performed as necessary to ensure compliance to performance requirements stated herein.

NOTE: 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 the immediate path of an air duct outlet. In general, the locations are intended to accurately represent the interior passenger area. Additional testing will be performed as necessary to ensure compliance to performance requirements stated herein.

Capacity and Performance Requirements
The air-conditioning portion of the HVAC system will be capable of reducing the passenger compartment temperature from 115 to 90 °F in less than 20 min after engine start-up. Engine temperature will be within the normal operating range at the time of start-up of the cool-down test, and the engine speed will be limited to fast idle, which may be activated by a driver-controlled device. During the cool-down period, the refrigerant pressure will not exceed safe high-side pressures,
and the condenser discharge air temperature, measured 6 in. from the surface of the coil, will be less than 45 °F above the condenser inlet air temperature.

Note: The appropriate solar load as recommended in the APTA "Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System," representing 4 p.m. on August 21, will be used. There will be no passengers on board, and the doors and windows will be closed.

Colder Ambient Conditions
The pull-up requirements for the heating system will be in accordance with Section 11.1 of APTA’s Recommended Practice “Transit Bus HVAC System Instrumentation and Performance Testing.” With ambient temperature at -20 °F, and vehicle cold soaked at that temperature, the bus heating system will warm the interior passenger compartment to an average temperature of 70 °F ±2 °F within 70 min.

R134a
The air conditioning system will meet these performance requirements using R134a.

TS 53. Controls and Temperature Uniformity
The HVAC system excluding the driver’s heater/defroster will be centrally controlled with an advanced electronic/diagnostic control system with provisions for extracting/reading data. The system will be compliant with J1939 Communication Protocol for receiving and broadcasting of data.

Hot coolant water will be delivered to the HVAC system driver’s defroster/heater and other heater cores by means of an auxiliary coolant pump, sized for the required flow, which is brushless and seal-less having a minimum maintenance-free service life for both the brushless motor and the pump of at least 40,000 hours at full power.

Fully Automatic Climate Control System
The climate control system will be fully automatic and control the interior average temperature to within ±2 °F of specified temperature control set-point.

Dual-Temperature Control Set Point
The temperature control set point for the system will be 72 °F in the cooling mode and 68 °F in the heating mode.

Interior temperature distribution will 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 to 72 in. above the floor, will not vary by more than 5 °F with doors closed. The interior temperatures, measured at the same height above the floor, will not vary more than ±5 °F from the front to the rear from the average temperature determined in accordance with APTA’s “Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System.”

The driver will have full control over the defroster and driver’s heater. The driver will be able to adjust the temperature in the driver’s area through air distribution and fans. The interior climate control system will switch automatically to the ventilating mode if the refrigerant compressor or condenser fan fails.

The Authority requires the Bus Manufacturer to provide additional temperature data on the rear podium of the bus for all of the testing requested by the Authority in APTA’s “Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System.” As a general guide line seating surface temperature will not vary more than ±5 °F from the temperature control set point.

TS 53.1 Auxiliary Heater
An auxiliary heater fired by diesel fuel will be provided to supplement the heat supplied by the engine and will have an output necessary to meet the performance criteria specified as well as maintain engine manufacturer’s minimum operating temperature in cold weather ambient conditions. The heater will be equipped with safety devices to prevent the following: over-fueling, overheating due to loss of coolant or water pump failure, and operation during conditions of low battery voltage. The auxiliary heater will have capability of functioning in the supplemental mode and preheat mode. The supplemental mode will automatically cycle the auxiliary heater ON and OFF according to the coolant temperature. No driver input will be required when the engine is running. The preheat mode will be enabled through a single-pole double-
throw momentary switch. With the master run switch in the OFF position, toggling the switch to its momentary upward (ON) position will enable the auxiliary heater to operate in preheat. Once in preheat, the unit will continue to operate and cycle until either the preheat switch is toggled to its momentary downward (OFF) position, or the master run switch is turned ON, or the time elapsed exceeds 60 minutes at which time the preheat mode will automatically be disabled. The supplement mode will always override the preheat mode.

The auxiliary heater coolant pump will shut down when the coolant is up to temperature during the supplemental mode. With the engine running, there will be coolant flow through the heater all the time. The temperature sensor will constantly measure the coolant temperature and cycle ON if required at which time the coolant pump turns on.

The auxiliary heater will be equipped with a self-priming fuel pump. The unit will be electronically controlled with appropriate diagnostics for troubleshooting. Operation, as well as, diagnostic data will be stored and will be retrievable through an IBM compatible PC.

The auxiliary heater maintenance/diagnostic information will be communicated through SAE 11939 to the vehicles' Automatic Vehicle Monitoring system.

**TS 54. Air Flow**

**TS 54.1 Passenger Area**
The cooling mode of the interior climate control system will introduce air into the bus at or near the ceiling height at a minimum rate of 35 cubic ft. per min (cfm) per passenger based on the standard configuration bus carrying a number of passengers equal to 200 percent of the seated load. Airflow will be evenly distributed throughout the bus, with air velocity not below 50 ft. per min, or exceeding 100 ft. per min on any passenger. The ventilating mode will provide air at a minimum flow rate of 40 cfm per passenger.

Airflow may be reduced to 15 cfm per passenger (200 percent of seated load) when operating in the heating mode. The fans will not activate until the heating element has warmed sufficiently to ensure at least 70 °F air outlet temperature. The heating air outlet temperature will not exceed 120 °F under any normal operating conditions.

The climate control blower motors and fan will be designed such that their operation complies with the interior noise level requirements.

Dedicated insulated ducts are to be used to maximize HVAC airflow efficiency, overall airflow distribution and ensure appropriate comfort level are met.

**Note:** There should be no dead spots in airflow in any region of the bus. The Bus Manufacturer will validate that air flow is distributed evenly and provide evidence to the Authority.

**TS 54.2 Driver's Area**
The bus interior climate control system will deliver at least 100 cfm of air to the driver’s area when operating in the ventilating and cooling modes. Adjustable nozzles will permit variable distribution or shutdown of the airflow. Airflow in the heating mode will be reduced proportionally to the reduction of airflow into the passenger area. The windshield defroster unit will meet the requirements of SAE Recommended Practice J382, “Windshield Defrosting Systems Performance Requirements,” and will have the capability of diverting heated air to the driver’s feet and legs. The defroster or interior climate control system will maintain visibility through the driver’s side window.

**Note:** Driver’s Area will be validated with the Driver’s Barrier closed. It is suggested that the Bus Manufacturer have a dedicated duct from the evaporator to the driver’s area to ensure appropriate comfort.

**TS 54.3 Controls for the Climate Control System (CCS)**
The controls for the driver’s compartment for heating, ventilation and cooling systems will be integrated and will meet the following requirements:

- The heat/defrost system fan will be controlled by a separate switch that has an “off” position and at least two positions for speed control. All switches and controls will preclude the possibility of clothing becoming entangled, and shields will be provided, if required. If the fans are approved by the Authority, an “on/off” switch will be located to the right of or near the main defroster switch.
• A manually operated control valve will control the coolant flow through the heater core.
• If a cable-operated manual control valve is used, then the cable length will be kept to a minimum to reduce cable seizing. Heater water control valves will be “positive” type, closed or open. The method of operating remote valves will require the concurrence of the Authority project manager.

**TS 54.4 Driver's Compartment Requirements**
A separate heating, ventilation and defroster system for the driver’s area will be provided and will be controlled by the driver. The system will meet the following requirements:
• The heater and defroster system will provide heating for the driver and heated air to completely defrost and defog the windshield, driver’s side window, and the front door glasses in all operating conditions. Fan(s) will be able to draw air from the bus body interior and/or exterior through a control device and pass it through the heater core to the defroster system and over the driver’s feet. A minimum capacity of 100 cfm will be provided. The driver will have complete control of the heat and fresh airflow for the driver’s area.
• The defroster supply outlets will be located at the lower edge of the windshield. These outlets will be durable and will be free of sharp edges that can catch clothes during normal daily cleaning. The system will be such that foreign objects such as coins or tickets cannot fall into the defroster air outlets. Adjustable ball vents or louvers will be provided at the left of the driver’s position to allow direction of air onto the side windows.

A ventilation system will be provided to ensure driver comfort and will be capable of providing fresh air in both the foot and head areas. Vents will be controllable by the driver from the normal driving position. Decals will be provided, indicating “operating instructions” and “open” and “closed” positions. When closed, vents will be sealed to prevent the migration of water or air into the bus.

**TS 54.5 Driver's Cooling**
A separate fan unit will provide 100 cfm of air to the driver’s area through directionally adjustable nozzles and an infinitely variable fan control, both of which will be located above and ahead of the driver.

**TS 55. Air Filtration**
Air will be filtered before entering the AC system and being discharged into the passenger compartment. The filter will 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 g per 1000 cfm cell. Air filters will be easily removable for service.

Filters will not need to be maintained more frequently than the mileage interval noted in TS 54. The Authority prefers cleanable and fire retardant air filters. However, disposable type may be considered if it increases servicing intervals.

**TS 56. Roof Ventilators**
Each ventilator will be easily opened and closed manually. When open with the bus in motion, this ventilator will provide fresh air inside the bus. The ventilator will cover an opening area no less than 425 sq in. and will be capable of being positioned as a scoop with either the leading or trailing edge open no less than 4 in., or with all four edges raised simultaneously to a height of no less than 3½ in. An escape hatch will be incorporated into the roof ventilator. Roof ventilator(s) will be sealed to prevent entry of water when closed.

**Two Roof Ventilators**
Two roof ventilators will 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. These ventilators will design to perform as escape hatches.

**TS 57. Maintainability**
Manually controlled shut-off valves in the refrigerant lines will allow isolation of the compressor and dehydrator filter for service. To the extent practicable, self-sealing couplings utilizing O-ring seals will be used to break and seal the refrigerant lines during removal of major components, such as the refrigerant compressor. Shut-off valves may be provided in lieu of self-sealing couplings. The condenser will be located to efficiently transfer heat to the atmosphere and will not ingest air warmed above the ambient temperature by the bus mechanical equipment, or to discharge air into any other system of the bus. The location of the condenser will preclude its obstruction by wheel splash, road dirt or debris. HVAC components located within 6 in. of floor level will be constructed to resit damage and corrosion.

High and low refrigerant pressure electronic gauges to be located in the return air area.
TS 58. Entrance/Exit Area Heating

Entrance/Exit Area Heating
Heat will be supplied to the entrance and exit areas to maintain a tread surface temperature no less than 35 °F in an ambient of -10 °F to prevent accumulation of snow, ice or slush with the bus operating under design operating profile and corresponding door opening cycle.

TS 59. Floor-Level Heating

TS 59.1 Transit Coach
Sufficient floor-level heaters will be provided to evenly supply heated forced air through floor ducts across the length of bus. Floor ducts may be discontinued at the upper level and/or the articulated joint, but additional provisions to prevent cold floors and ensure temperature uniformity will be included. Control of the floor-level heating will be through the main heating system electronic control. These floor level heaters will have a separate temperature sensor controlled through the main heating system electronic control to eliminate temperature stratification and improve distribution.

EXTERIOR PANELS, FINISHES AND EXTERIOR LIGHTING

TS 60. Design
The bus will have a clean, smooth, simple design, primarily derived from bus performance requirements and passenger service criteria. The exterior and body features, including grilles and louvers, will be shaped to facilitate cleaning by automatic bus washers without snagging washer brushes. Water and dirt will not be retained in or on anybody feature to freeze or bleed out onto the bus after leaving the washer. The body and windows will be sealed to prevent leaking of air, dust or water under normal operating conditions and during cleaning in automatic bus washers for the service life of the bus.

Exterior panels will be sufficiently stiff to minimize vibration, drumming or flexing while the bus is in service. When panels are lapped, the upper and forward panels will act as a watershed. However, if entry of moisture into the interior of the vehicle is prevented by other means, then rear cap panels may be lapped otherwise. The windows, hatches and doors will be able to be sealed. Accumulation of spray and splash generated by the bus’s wheels will be minimized on windows and mirrors.

TS 60.1 Materials
Body materials will be selected and the body fabricated to reduce maintenance, extend durability and provide consistency of appearance throughout the service life of the bus. Detailing will be kept simple, and add-on devices and trim will be minimized and integrated into the basic design.

TS 60.2 Roof-Mounted Equipment
A non-skid, clearly marked walkway or steps will be incorporated on the roof to provide access to equipment without damaging any system or bus paneling.

TS 61. Pedestrian Safety
Exterior protrusions along the side and front of the bus greater than ½ in. and within 80 in. of the ground will have a radius no less than the amount of the protrusion. The exterior rearview mirrors, cameras and required lights and reflectors are exempt from the protrusion requirement. Advertising frames will protrude no more than ⅞ in. from the body surface. Grilles, doors, bumpers and other features on the sides and rear of the bus will be designed to minimize toeholds or handholds.

Exterior protrusions will not cause a line-of-sight blockage for the driver.

TS 62. Repair and Replacement

TS 62.1 Side Body Panels
Structural elements supporting exterior body panels will allow side body panels below the windows to be repaired in lengths not greater than 12.5 ft

Easily Replaceable Lower Side Body Panels
The lower section (approximately 17.5 in.) of the side body panels (low-floor buses) or skirt panels (high-floor buses) will be made of impact-resistant material and will be easily and quickly replaceable.
TS 63. Rain Gutters
Rain gutters will be provided to prevent water flowing from the roof onto the passenger doors and driver’s side window. When the bus is decelerated, the gutters will not drain onto the windshield, driver’s side window or door boarding area. Cross sections of the gutters will be adequate for proper operation.

TS 64. License Plate Provisions
Provisions will be made to mount standard-size U.S./Canada license plates per SAE J686 on the front and rear of the bus. These provisions will direct-mount or recess the license plates so that they can be cleaned by automatic bus-washing equipment without being caught by the brushes. The rear license plate provision will be illuminated per SAE J587.

TS 64.1 Rub rails
No requirement for rub rails.

TS 65. Fender Skirts
Features to minimize water spray from the bus in wet conditions will be included in wheel housing design. Any fender skirts will be easily replaceable. They will be flexible if they extend beyond the allowable body width. Wheels and tires will be removable with the fender skirts in place.

TS 66. Wheel Covers (Transit Coach)
Wheel covers not required

TS 66.1 Splash Aprons
Standard Splash Aprons
Splash aprons, composed of ¼ in. minimum composition or rubberized fabric, will be installed behind and/or in front of wheels as needed to reduce road splash and to protect underfloor components. The splash aprons will extend downward to within 6 in. off the road surface at static conditions. Apron widths will be no less than tire widths. Splash aprons will be bolted to the bus understructure. Splash aprons and their attachments will be inherently weaker than the structure to which they are attached. The flexible portions of the splash aprons will not be included in the road clearance measurements. Splash apron will be installed as necessary to protect the wheelchair loading device from road splash. Other splash aprons will be installed where necessary to protect bus equipment. All hardware utilized with splash aprons will be stainless steel.

Note: The Authority requires a full width rear splash apron. Installation subject to CTA approval

TS 67. Service Compartments and Access Doors

TS 67.1 Access Doors
Access openings will be sized for easy performance of tasks within the compartment, including tool operating space. Access doors will be of rugged construction and will maintain mechanical integrity and function under normal operations throughout the service life of the bus. They will close flush with the body surface. All doors will be hinged at the top or on the forward edge and will be prevented from coming loose or opening during transit service or in bus washing operations. All access doors will be retained in the open position by props or counterbalancing with over-center or gas-filled springs with safety props and will be easily operable by one person. Springs and hinges will be corrosion resistant. Latch handles will be flush with, or recessed behind, the body contour and will be sized to provide an adequate grip for opening. Access doors, when opened, will not restrict access for servicing other components or systems.

If precluded by design, the manufacturer will provide door design information specifying how the requirements are met.

LED lights will be provided in the powertrain and all other compartments, where service may be required, to generally illuminate the area for night emergency repairs or adjustments. Sealed lamp assemblies will be provided in the powertrain compartment and will be controlled by a switch located near the rear start controls in the powertrain compartment. Necessary lights, located in other service compartments, will be provided with switches on the light fixture or convenient to the light.

TS 67.2 Access Door Latch/Locks
Requirement for Latches on Access Doors
Access doors larger than 100 sq in. in area will be equipped with corrosion-resistant flush-mounted latches or locks except for coolant and fuel fill access doors. All such access doors that require a tool to open will be standardized throughout the vehicle and will require a nominal 5/16 in. square male tool to open or lock.

**TS 68. Bumpers**

**TS 68.1 Location**

Bumpers will provide impact protection for the front and rear of the bus with the top of the bumper being 27 in., ±2 in., above the ground. Bumper height will be such that when one bus is parked behind another, a portion of the bumper faces will contact each other.

**Note:** Bumper will be easily removed from side or top of the bus. There should standard tool clearance for easy removal and installation.

**TS 68.2 Front Bumper**

No part of the bus, including the bumper, will be damaged as a result of a 5 mph impact of the bus at curb weight with a fixed, flat barrier perpendicular to the bus’s longitudinal centerline. The bumper will return to its pre-impact shape within 10 min of the impact. The bumper will 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 4000 lbs parallel to the longitudinal centerline of the bus. It will protect the bus from damage as a result of 5.5 mph impacts into the corners at a 30 deg angle to the longitudinal centerline of the bus. The energy absorption system of the bumper will be independent of every power system of the bus and will not require service or maintenance in normal operation during the service life of the bus. The bumper may increase the overall bus length specified by no more than 7 in.

There will be mounting provisions for bike rack noted in TS 68.5.

**TS 68.3 Rear Bumper**

No part of the bus, including the bumper, will 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 will return to its pre-impact shape within 10 min of the impact.

When using a yard tug with a smooth, flat plate bumper 2 ft wide contacting the horizontal centerline of the rear bumper, the bumper will provide protection at speeds up to 5 mph, over pavement discontinuities up to 1 in. high, and at accelerations up to 2 mph/sec. The rear bumper will 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 4000 lbs, at 4 mph parallel to or up to a 30 deg angle to the longitudinal centerline of the bus. The rear bumper will be shaped to preclude unauthorized riders standing on the bumper. The bumper will not require service or maintenance in normal operation during the service life of the bus. The bumper may increase the overall bus length specified by no more than 7 in.

**TS 68.4 Bumper Material**

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

**TS 68.5 Bike Rack**

A heavy-duty modular stainless steel bicycle rack proven in transit service will be provided and installed at the front of the bus. Rack will be mounted in such a manner as to prevent damage to the bus. Contractor will install Sportworks Modular DL2 Bike rack (Part Number 100982-QR) or approved equal.

**TS 69. Finish and Color**

**TS 69.1 Appearance**

All exterior surfaces will be smooth and free of wrinkles and dents. Exterior surfaces to be painted will be properly prepared as required by the paint system Supplier prior to application of paint to ensure 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 will be made prior to cleaning, priming and painting, where possible, to prevent corrosion. The bus will be painted prior to installation of exterior lights, windows, mirrors and other items that are applied to the exterior of the bus. Body filler materials may be used for surface dressing, but not for repair of damaged or improperly fitted panels.
Paint will be applied smoothly and evenly with the finished surface free of visible dirt and the following other imperfections:

- blisters or bubbles appearing in the topcoat film
- chips, scratches or gouges of the surface finish
- cracks in the paint film
- craters where paint failed to cover due to surface contamination
- overspray
- peeling
- runs or sags from excessive flow and failure to adhere uniformly to the surface
- chemical stains and water spots
- dry patches due to incorrect mixing of paint activators
- buffing swirls

All exterior finished surfaces will be impervious to diesel fuel, gasoline and commercial cleaning agents. Finished surfaces will resist damage by controlled applications of commonly used graffiti-removing chemicals.

Proper adhesion between the basic surface and successive coats of the original paint will be measured using an Elcometer adhesion tester as outlined in ASTM D4541-85. Adhesion will be a minimum 300 ft-lbs. The bus manufacturer will supply test samples of the exterior surface for each step of the painting process that may be subject to adhesion testing per ASTM G4541-87 and ASTM D4145-85. ASTM D4541-93 may be used for inspection testing during assembly of the vehicle.

Paint for the exterior of the bus must be polyurethane automotive type or equal and will match the following colors:

<table>
<thead>
<tr>
<th>Color</th>
<th>CTA Lot No.</th>
<th>VALSPAR p/n</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>3540097</td>
<td>327 W 1916</td>
</tr>
<tr>
<td>Grey</td>
<td>3540096</td>
<td>327 N 1728</td>
</tr>
<tr>
<td>Black</td>
<td>3540095</td>
<td>327 K 090</td>
</tr>
</tbody>
</table>

Red Stripe, Blue Stripe, Logos and Numbers will be reflective decal type, 3M Image Graphics Ruby Red 680-82 and Blue 680-75 or equal.

Paint scheme will be according to Drawing "A"

![Diagram of bus paint scheme](Figure 6. CTA Paint Scheme)

**TS 70. Decals, Numbering and Signing**

Energy storage and delivery systems will be identified in accordance with federal, state and local requirements, codes and standards.
Monograms, numbers and other special signing will be applied to the inside and outside of the bus as required. Signs will be durable and fade-, chip- and peel-resistant. They may be painted signs, decals or pressure-sensitive appliqués. All decals will be installed per the decal Supplier recommendations. Signs will be provided in compliance with the ADA requirements defined in 49 CFR Part 38, Subpart B, 38.27.

**TS 70.1 Passenger Information**
ADA priority seating signs as required and defined by 49 CFR will be provided to identify the seats designated for passengers with disabilities.

Requirements for a public information system in accordance with 49 CFR will be provided.

**TS 70.2 Exterior Decal Layout**

![Sample Exterior Decal Layout](image)

**Figure 7. Sample Exterior Decal Layout**

Decals Legend:
1. CTA Logo
2. CTA Logo
3. Bus Number
4. CTA Logo
5. Exact Fare Required
6. RTA Logo (Decal Only Necessary on buses bought with RTA Funds)
7. Exit Only
8 – 17. Reserved
18. Right Turn in Front of Bus Illegal
19. Bus kneels and ramp lowered upon any request
20. Reserved
21. International Symbol of Accessibility
22– 24. Reserved
25. Kneel and Arrow Decal
26– 29. Reserved
30. Battery Disconnect Switch
31. Reserved
32. American Flag (1 on each side of bus)
33. Bus Type (e.g. Hybrid, Electric)
34. Web Address
Note: Art will be provided by CTA SIGNAGE & WAYFINDING. Details on Size, Color, and Location to be finalized with successful bidder.

**TS 70.3 Interior Decal Layout**

![Diagram of interior decal layout](image)

**Figure 8. Sample Interior Decal Layout**

**DECALS LEGEND**

1. COMPANY LOGO, "CTA" (44"X10-1/2") - SIDE, DIE-CUT REFLECTIVE VINYL, DECAL BLUE
2. COMPANY LOGO, "CTA" (16-1/2"X4-1/2") - FRONT, DIE-CUT REFLECTIVE VINYL, DECAL, BLUE
3. BUS NUMBER, HELVETICA, MED., NUMERALS 0-9 (4-1/2" HIGH) (DIE-CUT REFLECTIVE VINYL DECAL BLUE/WHITE)
4. COMPANY LOGO, "CTA" (16-1/2"X4-1/2") DIE-CUT REFLECTIVE VINYL DECAL, WHITE OR (BLUE)
5. "EXACT FARE REQUIRED . . .", DECAL SP 6713, STICKY ON BACK, 4"X17" W, LEFT SECTION - WHITE ON RED, RIGHT SECTION - BLACK ON WHITE
6. RTA LOGO, DECAL DIE CUT WHITE BACKGROUND
7. "EXIT ONLY", DECAL SDP 5989 P22 8" X 7-1/2" W, TOP - WHITE ON BLACK, BOTTOM - BLACK ON WHITE
8. "PLEASE MOVE TO REAR . . .", DECAL SDP 6318(L), & 6319(R) LEFT AND RIGHT ARROW, 4-1/2"X18"W, WHITE ON RED
9. "FOR YOUR PROTECTION . . .", DECAL OP 229 R-1, 3-3/4" X 8" W, TOP - WHITE ON BLACK BOTTOM - BLACK ON WHITE
10. "NO SMOKING, EATING, LITTERING OR RADIO PLAYING" DECAL OP 5619-R1, 3 ¾" X 8"W TOP - WHITE ON BLACK, BOTTOM - BLACK ON WHITE
11. NO SMOKING SYMBOL, DECAL OP 2424, 6" X 6" PRESSURE SENSITIVE PVC, RED AND BLACK ON WHITE
12. FARE SCHEDULE, CURRENT ISSUE, CARDBOARD INSERT, 10½" X 15½" W,
13. BUS NUMBER, INTERIOR 2-3/4" HELVETICA MEDIUM NUMERALS 0-9 DIE-CUT WHITE PRESSURE SENSITIVE PVC
14. "EASY-OUT EXIT DOORS . . .", DECAL OP 757-R2, 5-1/2" X 11-1/4" W PRESSURE SENSITIVE PVC TOP - WHITE ON BLACK, BOTTOM - BLACK ON WHITE
15. "STOP REQUEST . . .", DECAL OP 2399, 3" X 4" w, PRESSURE SENSITIVE PVC TOP - WHITE ON BLACK, BOTTOM - BLACK ON WHITE
16. "EMERGENCY EXIT DOORS . . .", DECAL P21-2, 4-12" X 5" W, PLUS ARROW TAB TOP - WHITE ON RED, BOTTOM - RED ON WHITE
17. "DO NOT PUT HEAD OR ARMS OUT WINDOW", ALUMINUM PLATE, ANODIZED, SIZE TO BE DETERMINED. RED ON ALUMINUM AS REQUIRED
18. "RIGHT TURN IN FRONT OF BUS IS ILLEGAL", DECAL, OP-5941-R3 (3½" X 17" W) BLACK LETTERS ON WHITE REFLECTIVE BACK
19. "LIFT OR STEP WILL BE LOWERED ON REQUEST", DECAL BLUE p.m.s. 300
20. BRAILLE/TACTILE BUS NUMBER, STAINLESS STEEL PLATE (1-5/8" X 3" W)
21. INTERNATIONAL SYMBOL OF ACCESSIBILITY, DECAL OP-1906, (6-1/4" X 6-1/4") WHITE ON BLUE (P.M.S. 300)
22. PRIORITY SEATING, ANODIZED ALUMINUM PLATE SDP 6598, 6" X 3½" W, WHITE ON BLUE (P.M.S. 300)
23. "EMERGENCY EXIT - LIFT HERE - PUSH OUT WINDOW", WINDOW EMERGENCY EXIT INSTRUCTION PLATE TO BE ATTACHED PERMANENTLY BY BUILDER AT EVERY EMERGENCY EXIT WINDOW LOCATION SIZE TO BE DETERMINED.
24. WHEELCHAIR FLIP SEAT INSTRUCTION PLATE, METAL PLATE INSTALLED BY SEAT MANUFACTURER
25. KNEEL DECAL AND ARROW, SIZE AND COLOR TO BE DETERMINED
26. PLEASE MOVE WHEN REQUESTED RTA-001, LOT NO. 1467975
27. "CAUTION BEFORE LEAVING SEAT OPERATOR MUST . . .", OP 5942-R1, 3" X 2-1/2" W, BLACK ON YELLOW
28. "WATCH YOUR STEP", HELVETICA MEDIUM TYPE FONT, 3" X 18" W, WHITE ON RED (P.M.S. 200) FE-7920
29. "ATTENTION: THERE MAY BE A SECURITY CAMERA ABOARD" DECAL, OP-8412 8" X 4 ½” TOP WHITE ON RED (PMS 200), BOTTOM RED ON WHITE
30. "BATTERY DISCONNECT SWITCH"
31. “FOR YOUR SAFETY, DO NOT SPEAK WITH THE OPERATOR” TOP WHITE ON RED (PMS 200), BOTTOM RED ON WHITE 3¼” X 4¼” OP 660-R1
32. U.S. FLAG 11” X 8” (1 ON EACH SIDE)
33. ROOF BUS NUMBER DECAL (EACH NUMBER APPROXIMATELY 30” HIGH AND 13” WIDE)
34. CTA WEBSITE DECAL transitchicago.com BLUE HELVETICA, SWISS OR ARIAL FONT APPROXIMATELY 6" HIGH x 108" WIDE REFLECTIVE DECAL
35. "Clean Air Bus" BLUE BOLD HELVETICA, SWISS OR ARIAL ITALICIZED FONT APPROXIMATELY 10" HIGH x 108" WIDE REFLECTIVE DECAL
36. TITLE IV DECAL, OP-10377 (LOT NO. 1467976)

Note: Art will be provided by CTA SIGNAGE & WAYFINDING. Details on Size, Color, and Location to be finalized with successful bidder. Braille Tags to be fastened with Rivets and Adhesive.

**TS 71. Exterior Lighting**
All exterior lights will be designed to prevent entry and accumulation of moisture or dust. Lamps, lenses and fixtures will be interchangeable to the extent practicable. Two hazard lamps at the rear of the bus will be visible from behind when the engine service doors are opened. Light lenses will be designed and located to prevent damage when running the vehicle through an automatic bus washer.

Front marker (clearance) lights along with lights located on the roof and sides of the bus will have protective shields or be of the flush mount type to protect the lens against minor impacts.

Commercially available LED-type lamps will be utilized at all exterior lamp locations.

All exterior lamps will remove easily without damaging light housing.

Exterior lighting and reflectors will comply, as applicable, with Part 393, Subpart B of the FMCSA and FMVSS 108. Side directionals will be installed forward of the axles. The light will project outward from the body to allow greater visibility.
Exterior entrance and exit door lights will be located high enough to prevent damage due to curbs or minor side impacts.

**Standard Lamps**
All LED lamps will be standard installation of the OEM. The entire assembly will be specifically coated to protect the light from chemical and abrasion degradation.
Potted Lamps
LED lamps will be potted type and designed to last the life of the bus.

**TS 71.1 Backup Light/Alarm**
Visible and audible warnings will inform following vehicles or pedestrians of reverse operation. Visible reverse operation warning will conform to SAE Standard J593. Audible reverse operation warning will conform to SAE Recommended Practice J994 Type C or D.

**TS 71.2 Doorway Lighting**
Lamps at the front and rear passenger doorways (if applicable) will comply with ADA requirements and will activate only when the doors open. These lamps will illuminate the street surface to a level of no less than 1 foot-candle for a distance of 3 ft 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 will be shielded to protect passengers’ eyes from glare.

**TS 71.3 Turn Signals**
Wraparound Front Turn Signals
Front turn signals will be of wraparound design or will be designed to be visible from the front and the near side of the bus.

**TS 71.4 Headlights**
Headlamps will be designed for ease of replacement. (e.g. Roved headlamps will be designed for replacement without removing the headlamp bezel.)

**Standard Installation**
Standard OEM headlight installation will be provided in accordance with federal regulations.

**LED**
Headlamps will be LED, sealed beam.

**TS 71.5 Brake Lights**
**Transit Coach**
Brake lights will be provided in accordance with federal regulations.

**High and Center Mount Red Brake Lamp**
Bus will include red, high and center mount brake lamp(s) along the backside of the bus in addition to the lower brake lamps required under FMVSS. The high and center mount brake lamp(s) will illuminate steadily with brake application.

Brake lighting will be LED type and maximized and will be a minimum of 7.0 inches in diameter. Two 4.0 inch diameter lights will be allowed on each side in lieu of one 7.0 inch diameter light. Center brake light will be provided by two (2) 4" diameter LED lights. Exterior entrance and exit door lights will be located high enough to prevent damage due to curbs or minor side impacts. Polycarbonate lights will be coated to prevent cracking due to chemicals. The LED lights will be protected/regulated for 6 volts to full power.

**TS 71.6 Service Area Lighting (Interior and Exterior)**
LED lamps will be provided in the engine and all other compartments where service may be required to generally illuminate the area for night emergency repairs or adjustments. These service areas will include, but not be limited to, the engine compartment, the communication box, junction/apparatus panels and passenger door operator compartments.

Lighting will be adequate to light the space of the service areas to levels needed to complete typical emergency repairs and adjustments. The service area lamps will be suitable for the environment in which they are mounted.

Powertrain compartment lamps will be controlled by a switch mounted near the rear start controls. All other service area lamps will be controlled by switches mounted on or convenient to the lamp assemblies. Power to the service area lighting will be programmable. Power will latch on with activation of the switch and will be automatically discontinued (timed out) after 30 min to prevent damage caused by inadvertently leaving the service area lighting switch in the “on” position after repairs are made.
INTERIOR PANELS AND FINISHES

TS 72. General Requirements
Materials will be selected on the basis of maintenance, durability, appearance, safety, flammability and tactile qualities. Materials will be strong enough to resist everyday abuse and be vandalism and corrosion resistant. Trim and attachment details will be kept simple and unobtrusive. Interior trim will be secured to avoid resonant vibrations under normal operational conditions.

Interior surfaces more than 10 in. below the lower edge of the side windows or windshield will be shaped so that objects placed on them fall to the floor when the coach is parked on a level surface. Any components and other electrical components within close proximity to these surfaces will also be resistant to this cleaning method.

Internal surfaces, as possible, are to be stainless steel or other corrosion/vandal resistant material. All metal components mounted at or near floor level will be constructed of stainless steel or other corrosion resistant material.

TS 73. Interior Panels
Panels will be easily replaceable and tamper-resistant. They will be reinforced, as necessary, to resist vandalism and other rigors of transit bus service. Individual trim panels and parts will be interchangeable to the extent practicable.

Fire Resistance

Interior side trim panels and operator's barrier will be textured stainless steel, anodized aluminum, plastic or melamine-type material. Panels will be easily replaceable and tamper-resistant. They will be reinforced, as necessary, to resist vandalism and other rigors of transit bus service. Individual trim panels and parts will be interchangeable to the extent practicable.

TS 73.1 Driver Area Barrier
Transit Coach
A barrier or bulkhead between the driver and the street-side front passenger seat will be provided. The barrier will minimize glare and reflections in the windshield directly in front of the barrier from interior lighting during night operation. Location and shape must permit full seat travel and reclining possibilities that can accommodate the shoulders of a 95th-percentile male. The partition will have a side return and stanchion to prevent passengers from reaching the driver by standing behind the driver's seat. The lower area between the seat and panel must be accessible to the driver.

The partition must be strong enough in conjunction with the entire partition assembly for mounting of such equipment as flare kits, fire extinguishers (1.2 kg), microcomputer, public address amplifier, etc. The panel should be properly attached to minimize noise and rattles. Dark or black panels are preferred behind the driver's head. The panel should be isolated for noise control and attached with rubber grommets.

Full-Height (Floor-to-Ceiling) Configuration of Driver's Barrier
The driver's barrier will extend continually from the floor area to the ceiling and from the bus wall to the first stanchion immediately behind the driver to provide security to the driver and to limit passenger conversation.

For bus instruction, the driver's barrier glass and/or barrier will be easily removable (less than 15 min) or have securement to the StreetSide wheel well. These design features are necessary so that the instructor who supervises an operator will have unimpeded access to the wheel during bus operation.

Driver's barrier will not restrict any of the camera views. (e.g. the top of the barrier will not interfere with Camera A as mentioned in TS 83.1)

The Driver's barrier glass will be constructed of tempered safety glass and should have anti-glare coating to reduce interior and exterior light reflectance.

Design will permit an unobstructed view of the curbside mirrors and to the bottom of the entrance door for operators included in the 95th percentile of operator population in accordance with SAE J941.
The Driver’s barrier will also incorporate a sliding two piece glass system. The two piece glass system will allow the driver to adjust the sliding glass into multiple positions. The two piece glass system will be in compliance with AS-2 regulations and ADA requirements. The system will also have a pyrolytic anti-glare coating.

Airflow will be sufficient with barrier closed as referenced in TS 54.2.+

**TS 73.2 Modesty Panels**

Sturdy divider panels constructed of durable, unpainted, corrosion-resistant material complementing the interior will be provided to act as both a physical and visual barrier for seated passengers.

Design and installation of modesty panels located in front of forward-facing seats will include a handhold or grab handle along its top edge. These dividers will be mounted on the sidewall and will project toward the aisle no farther than passenger knee projection in longitudinal seats or the aisle side of the transverse seats. Modesty panels will extend from at least the window opening of the side windows, and those forward of transverse seats will extend downward to 1 and ½ in. above the floor. Panels forward of longitudinal seats will extend to below the level of the seat cushion. Dividers positioned at the doorways, where applicable, will provide no less than a 2½ in. clearance between the modesty panel and a fully open, inward opening door, or the path of a deploying flip-out ramp to protect passengers from being pinched.

Modesty panels installed at doorways will be equipped with grab rails if passenger assists are not provided by other means.

The modesty panel and its mounting will withstand a static force of 250 lbs applied to a 4 × 4 in. area in the center of the panel without permanent visible deformation.

**TS 73.3 Front End**

The entire front end of the bus will be sealed to prevent debris accumulation behind the dash and to prevent the driver’s feet from kicking or fouling wiring and other equipment. The front end will be free of protrusions that are hazardous to passengers standing at the front of the standee line area of the bus during rapid decelerations. Paneling across the front of the bus and any trim around the driver’s compartment will be formed metal or composite material. Composite dash panels will be reinforced as necessary, vandal-resistant and replaceable. All colored, painted and plated parts forward of the driver’s barrier will be finished with a surface that reduces glare. Any mounted equipment must have provision to support the weight of equipment.

**TS 73.4 Rear Bulkhead**

The rear bulkhead and rear interior surfaces will be material suitable for exterior skin; painted and finished to exterior quality; or paneled with melamine-type material, composite, scratch-resistant plastic or carpeting and trimmed with stainless steel, aluminum or composite.

The rear bulkhead paneling will be contoured to fit the ceiling, side walls and seat backs so that any litter or trash will tend to fall to the floor or seating surface when the bus is on a level surface. Any air vents in this area will 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, then the panel will be hinged or will be able to be easily removed and replaced. Grilles where access to or adjustment of equipment is required will be heavy duty and designed to minimize damage and limit unauthorized access.

**TS 73.5 Headlining**

Ceiling panels will be made of durable, corrosion resistant, easily cleanable material. Headlining will be supported to prevent buckling, drumming or flexing and will be secured without loose edges. Headlining materials will 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, will be stainless steel, aluminum or plastic, colored to complement the ceiling material. Headlining panels covering operational equipment that is mounted above the ceiling will be on hinges for ease of service but retained to prevent inadvertent opening.

**TS 73.6 Fastening**

Interior panels will be attached so that there are no exposed unfinished or rough edges or rough surfaces. Fasteners should be corrosion resistant. Panels and fasteners will not be easily removable by passengers. Exposed interior fasteners should be minimized, and where required will be tamper resistant.
**TS 73.7 Insulation**

Any insulation material used between the inner and outer panels will minimize the entry and/or retention of moisture. Insulation properties will be unimpaired during the service life of the bus. Any insulation material used inside the engine compartment will not absorb or retain oils or water and will be designed to prevent casual damage that may occur during maintenance operations.

The combination of inner and outer panels on the sides, roof, wheel wells and ends of the bus, and any material used between these panels, will provide a thermal insulation sufficient to meet the interior temperature requirements. The bus body will be thoroughly sealed so that the driver or passengers cannot feel drafts during normal operations with the passenger doors closed.

**FTA Docket 90-A**

All insulation materials will comply with the Recommended Fire Safety Practices defined in FTA Docket 90-A, dated October 20, 1993.

**TS 73.8 Floor Covering**

The floor covering will have a non-skid walking surface that remains effective in all weather conditions. The floor covering, as well as transitions of flooring material to the main floor and to the entrance and exit area, will be smooth and present no tripping hazards. Seams will be sealed/welded per manufacturer’s specifications. The standee line will be approximately 2 in. wide and will extend across the bus aisle. The color and pattern will be consistent throughout the floor covering. Joints in floor will be sealed with epoxy sealer or thermoplastic sealing process at the joints.

Any areas on the floor that are not intended for standees, such as areas “swept” during passenger door operation, will be clearly and permanently marked.

The floor will be easily cleaned and will be arranged to minimize debris accumulation.

A one-piece center strip will extend from the vertical wall of the rear settee between the aisle sides of transverse seats to the standee line. If the floor is of a bi-level construction, then the center strip will be one piece at each level. The covering between the center strip and the wheel housings may be separate pieces. At the rear door, however, a separate strip as wide as the door will extend from the center strip to the outboard edge of the rear/exit area.

The floor under the seats will be covered with smooth surface flooring material. The floor covering will closely fit the sidewall in a fully sealed butt joint or extend to the top of the cove.

**TS 73.9 Interior Lighting**

The light source will be located to minimize windshield glare, with distribution of the light focused primarily on the passengers’ reading plane while casting sufficient light onto the advertising display. The lighting system may be designed to form part of or the entire air distribution duct.

The lens material will be translucent polycarbonate. Lenses will be designed to effectively “mask” the light source. Lenses will be sealed to inhibit incursion of dust and insects yet be easily removable for service. Access panels will be provided to allow servicing of components located behind light panels. If necessary, the entire light fixture will be hinged.

All interior lighting will be turned off whenever the transmission selector is in reverse and the powertain run switch is in the “on” position.

Night Run and Day Run will have different light configurations that will be approved by the Authority.

The interior lighting system will be LED. The bin rating of LED bulbs will be closely matched to ensure consistency in color and appearance. Lighting will be designed to eliminate/minimize dark spots between any two sections.

The interior lighting system will provide a minimum 15 foot-candle illumination on a 1 square foot plane at an angle of 45 degrees from horizontal, centered 33 inches above the floor and 24 inches in front of the seat back at each seat position. Allowable average light level for the rear bench seats will be 7 foot-candles. Floor surface in the aisles will 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.

The light source will be located to minimize windshield glare with distribution of the light focused primarily on the passengers' reading plane while casting sufficient light onto the advertising display. The lighting will run above passenger windows along both curb and street side of bus, approximately from behind driver's barrier to the back wall.

Lens material will be translucent polycarbonate and will be designed to effectively diffuse the LED lights. Lens will be sealed to inhibit incursion of dust and insects yet are easily removable for service. If threaded fasteners are used they must be held captive in the lens. Access panels will be provided to allow servicing of components located behind light panels. If necessary, the entire light fixture will be hinged.

The lights will be enclosed to prevent dust intrusion into the lens.

**TS 73.10 Passenger**

**Dimming during Night Modes**

To help eliminate windshield reflection on suburban roads where street lighting is at a low level, all lights will dim to 60% power, when “night run” or “night park” is selected and interior lights are in the “on” position. If any of the doors are opened, the lights will adjust to 100% power.

**TS 73.11 Driver's Area**

The driver’s area will have a light to provide general illumination, and it will illuminate the half of the steering wheel nearest the driver to a level of 5 to 10 foot-candles.

**TS 73.12 Seating Areas**

The interior lighting system will provide a minimum 15 foot-candle illumination on a 1 sq ft plane at an angle of 45 deg from horizontal, centered 33 in. above the floor and 24 in. in front of the seat back at each seat position. Allowable average light level for the rear bench seats will be 7 foot-candles.

**TS 73.13 Vestibules/Doors**

Floor surface in the aisles will be a minimum of 10 foot-candles, and the 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.

The front entrance area and curb lights will illuminate when the front door is open and master run switch is in the “Lights” positions. Rear exit area and curb lights will illuminate when rear door is enabled.

**TS 73.14 Step Lighting**

Step lighting for the intermediate steps between lower and upper floor levels will be a minimum of 4 foot-candles and will illuminate in all engine run positions. The step lighting will be low profile to minimize tripping and snagging hazards for passengers and will be shielded as necessary to protect passengers’ eyes from glare.

**TS 73.15 Ramp Lighting**

Exterior and interior ramp lighting will comply with federal regulations.

**TS 73.16 Farebox Lighting**

A light fixture will be mounted in the ceiling above the farebox location. The fixture will be capable of projecting a concentrated beam of light on the farebox. This light will automatically come on whenever the front doors are opened and the run switch is in the “night run” or “night park” position.

**TS 74. Fare Collection**

**TS 74.1 Farebox**

Space and structural provisions will be made for installation of currently available fare collection devices, which will be as far forward as practicable. Location of the fare collection device will not restrict traffic in the vestibule, including wheelchairs if a front door loading device is used, and will allow the driver to easily reach the farebox controls and to view the fare register. The farebox will not restrict access to the driver area, will not restrict operation of driver controls and will not—either by itself or in combination with stanchions, transfer mounting, cutting and punching equipment, or route destination signs—restrict the driver's field of view per SAE Recommended Practice J1050. The location and mounting
of the fare collection device will allow use, without restriction, by passengers. The farebox location will permit accessibility to the vault for easy manual removal or attachment of suction devices. Meters and counters on the farebox will be readable on a daily basis. The floor under the farebox will be reinforced as necessary to provide a sturdy mounting platform and to prevent shaking of the farebox.

**Note:** A GFI/GenFare, Centsibell electronic farebox with Cubic Ticket Processor is used. Approximate total weight 113lbs (full). Provisions for installation are mounting plate GFI C03138-0001, wood spacer, and Hardware (four of each): A03174-0001, A00294-0008, A03173-0001 or equal.

![Figure 9. Farebox Dimensions](image)

CTA will install its own fare box.

Contractor will provide fare collection installation layout to the Authority for approval. Farebox should be wired to be off whenever the multiplexer system is in sleep mode.

**TS 74.2 Ventra**

Any required wiring, harness, etc., for the installation of CTA’s Ventra Mobile Validator (MV) & Driver Terminal (DT) readers will be provided and installed. The MV will be located near the farebox; and the DT will be located in the driver’s area. This wiring and its routing will be installed per SAE guidelines and require the agencies approval. Installation requirements to be finalized in pre-production planning. Please contact Ted.Tueres@cubic.com, kenny.evans@cubic.com, and charles.mullins@cubic for more information.

**TS 75. Interior Access Panels and Doors**

Access for maintenance and replacement of equipment will be provided by panels and doors that appear to be an integral part of the interior. Access doors will be hinged with gas props or over-center springs, where practical, to hold the doors
out of the mechanic’s way. Panels will prevent entry of mechanism lubricant into the bus interior. All fasteners that retain access panels will be captive in the cover.

**Access Doors with Locks**
Access doors will be secured with locks. The locks will be standardized so that only one tool is required to open access doors on the bus.

**TS 75.1 Floor Panels**
Access openings in the floor will be sealed to prevent entry of fumes and water into the bus interior. Flooring material at or around access openings will be flush with the floor and will be edge-bound with stainless steel or another material that is acceptable to the Authority to prevent the edges from coming loose. Access openings will be asymmetrical so that reinstalled flooring will be properly aligned. Fasteners will tighten flush with the floor.

The number of special fastener tools required for panel and access door fasteners will be minimized.

**PASSENGER ACCOMMODATIONS**

**TS 76. Passenger Seating**

**TS 76.1 Arrangements and Seat Style**
The passenger seating arrangement in the bus will be such that seating capacity is maximized and in compliance to the following requirements.

**NOTE:** The Authority recognizes that ramp location, foot room, hip-to-knee room, doorway type, width, seat construction, floor level type, seat spacing requirements, ramp or lift, number of wheelchair positions, etc. ultimately affect seating capacity and layout.

Passenger seats will be arranged generally in a perimeter configuration where seats are aisle facing in the front section of the coach. In the rear section, seats will be arranged generally in a 2 x 2 forward facing configuration except over rear wheel housings or other compartments that intrude into passenger area.

Each seat will have a minimum width of 17 in., not including any armrest.

Seats will be designed for easy cleanability.

**TS 76.2 Rearward Facing Seats (Transit Coach)**
Rearward facing seats not allowed.

**TS 76.3 Inserts/ Seats**

**Hard Plastic Seat Inserts**
The passenger seats will be equipped with hard plastic seat insert. This seats will be vandal resistant and equipped with an anti-graffiti coating. The color will be color pigment through the entire component; and the seat must meet the Recommended Fire Safety Practices defined in FTA Docket 90-A, dated Oct. 20, 1993. Additionally, the seats will be Phthalate-free. The seat must have slip resistant features (e.g. that do not impact passenger comfort.)

**TS 76.4 Seat back fitness**

**Back insert Seat Configuration**
The seat back insert thickness will not exceed 1 in. in the knee room area.

Seats, back cushions and other pads will be securely attached and will be detachable by means of a simple release mechanism so that they are easily removable by the maintenance staff but not by passengers. To the extent practicable, seat cushions and pads will be interchangeable throughout the bus. Materials will have high resistance to tearing, flexing and wetting.

**TS 76.5 Drain Hole in Seats**

**Requirement for Drain Hole Provision in Seat Inserts**
Provision, such as a small grommeted hole, to allow drainage will be incorporated into seat insert. (Drain through hole, ¼ in. through hole, bottom seat only, one per seat.)
**TS 76.6 Hip-to-Knee Room**
Hip-to-knee room measured from the center of the seating position, from the front of one seat back horizontally across the highest part of the seat to a vertical surface immediately in front, will be a minimum of 26 in. At all seating positions in paired transverse seats immediately behind other seating positions, hip-to-knee room will be no less than 28 in.

**TS 76.7 Foot Room**
Foot room, measured at the floor forward from a point vertically below the front of the seat cushion, will be no less than 14 in. Seats immediately behind the wheel housings and modesty panels may have foot room reduced.

**TS 76.8 Aisles**
The aisle between the seats will be no less than 20 in. wide at seated passenger hip height. Seat backs will be shaped to increase this dimension to no less than 24 in. at 32 in. above the floor (standing passenger hip height).

**TS 76.9 Dimensions**

![Diagram of seat dimensions](image)

**Figure 10. Seating Dimensions and Standard Configuration**
Seat dimensions for the various seating arrangements will have the dimensions as follows (refer to Figure 10):
- The width, W, of the two-passenger transverse seat will be a minimum 35 in.
- The length, L, will be 17 in., ±1 in.
- The seat back height, B, will be a minimum of 15 in.
- The seat height, H, will be 17 in., ±1 in. 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 in., ±2 in., will be allowed. This will also be allowed for limited transverse seats, but only with the expressed approval of the Authority.
- Foot room = F.
- The seat cushion slope, S, will be between 5 and 11 deg.
- The seat back slope, C, will be between 8 and 17 deg.
- Hip to knee room = K.
- The pitch, P, is shown as reference only.

**TS 76.10 Structure and Design**
The passenger seat frame and its supporting structure will be constructed and mounted so that space under the seat is maximized and is completely free of obstructions to facilitate cleaning.

Seats, structures and restraints around the securement area should not infringe into the mobility device envelope or maneuverability.

The transverse seat structure will be fully cantilevered from the sidewall with sufficient strength for the intended service. The lowest part of the seat assembly that is within 12 in. of the aisle will be at least 10 in. above the floor.

In locations at which cantilevered installation is precluded by design and/or structure, other seat mounting may be allowed.
All transverse objects—including seat backs, modesty panels, and longitudinal seats—in front of forward-facing seats will not impart a compressive load in excess of 1000 lbs 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 will peak at 0.05 to 0.015 s from initiation. Permanent deformation of the seat resulting from two 95th-percentile males striking the seat back during this 10g deceleration will not exceed 2 in., measured at the aisle side of the seat frame at height H. The seat back should not deflect more than 14 in., 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 will not introduce a laceration hazard.

The seat assembly will withstand static vertical forces of 500 lbs applied to the top of the seat cushion in each seating position with less than ¼ in. permanent deformation in the seat or its mountings. The seat assembly will withstand static horizontal forces of 500 lbs evenly distributed along the top of the seat back with less than ¼ in. permanent deformation in the seat or its mountings. The seat backs at the aisle position and at the window position will withstand repeated impacts of two 40-lb sandbags without visible deterioration. One sandbag will strike the front 40,000 times and the other sandbag will strike the rear 40,000 times. Each sandbag will be suspended on a 36 in. pendulum and will strike the seat back 10,000 times each from distances of 6, 8, 10 and 12 in. Seats at both seating positions will withstand 4000 vertical drops of a 40-lb sandbag without visible deterioration. The sandbag will be dropped 1000 times each from heights of 6, 8, 10 and 12 in. Seat cushions will withstand 100,000 randomly positioned 3½ in. drops of a squirming, 150-lb, smooth-surfaced, buttocks-shaped striker with only minimal wear on the seat covering and no failures to seat structure or cushion suspension components.

The back of each transverse seat will incorporate a handhold no less than 7¼ in. in diameter for standees and seat access/egress. The handhold will not be a safety hazard during severe decelerations. The handhold will extend above the seat back near the aisle so that standees will have a convenient vertical assist, no less than 4 in. long that may be grasped with the full hand. This handhold will not cause a standee using this assist to interfere with a seated 50th-percentile male passenger. The handhold will 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. The upper rear portion of the seat back and the seat back handhold immediately forward of transverse seats will 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) will not exceed 400 for passengers ranging in size from a 5th percentile female through a 95th percentile male.

The seat back handhold may be deleted from seats that do not have another transverse seat directly behind and where a vertical assist is provided.

Longitudinal seats will be the same general design as transverse seats but without seat back handholds. Longitudinal seats may be mounted on the wheelhouses. Armrests will 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 driver’s barrier, or a modesty panel, when 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 3½ in. of the end of the seat cushion. Armrests will be located from 7 to 9 in. above the seat cushion surface. The area between the armrest and the seat cushion will be closed by a barrier or panel. The top and sides of the armrests will have a minimum width of 1 in. and will be free from sharp protrusions that form a safety hazard.

Seat back handhold and armrests will withstand static horizontal and vertical forces of 250 lbs applied anywhere along their length with less than ¼ in. permanent deformation. Seat back handhold and armrests will withstand 25,000 impacts in each direction of a horizontal force of 125 lbs with less than ¼ in. permanent deformation and without visible deterioration.

**TS 76.11 Construction and Materials**

Selected materials will minimize damage from vandalism and will reduce cleaning time. The seats will be attached to the frame with tamper-resistant fasteners. Coloring will be consistent throughout the seat material, with no visually exposed portion painted. Any exposed metal touching the sides or the floor of the bus will be stainless steel. The seat, pads and cushions will be contoured for individuality, lateral support and maximum comfort and will fit the framework to reduce exposed edges.

The minimum radius of any part of the seat back, handhold or modesty panel in the head or chest impact zone will be a nominal ¼ in. The seat back and seat back handhold immediately forward of transverse seats will be constructed of...
energy-absorbing materials to provide passenger protection and, in a severe crash, to allow the passenger to deform the seating materials in the impact areas. Complete seat assemblies will be interchangeable to the extent practicable.

The base color of the seat shell will be RAL5017 or equal. Back side of seat will have a stainless steel diamond pattern panel to protect against vandalism. Seat inserts of wheel chair flip seats and priority seat locations will have the International symbol for accessibility woven into the fabric.

Seats will be designed for easy clean ability. Seats installed over routinely maintained component compartments will be hinged up for access.

**TS 77. Passenger Assists**

Passenger assists in the form of full grip, vertical stanchions or handholds will be provided for the safety of standees and for ingress/egress. Passenger assists will 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 will be provided either as the vertical portion of the seat back assist 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. All handholds and stanchions at the front doorway, around the farebox, and at interior steps for bi-level designs will be powder-coated in a high-contrast yellow color.

The forward-most vertical stanchions on either side of the aisle immediately behind the driver’s area will be a brushed stainless steel finish.

**TS 77.1 Assists**

Excluding those mounted on the seats and doors, the assists will have a cross-sectional diameter between 1¼ and 1½ in. or will provide an equivalent gripping surface with no corner radii less than ¼ in. All passenger assists will permit a full hand grip with no less than 1½ in. of knuckle clearance around the assist. Passenger assists will be designed to minimize catching or snagging of clothes or personal items and will be capable of passing the NHTSA Drawstring Test.

Any joints in the assist structure will be underneath supporting brackets and securely clamped to prevent passengers from moving or twisting the assists. Seat handholds may be of the same construction and finish as the seat frame. Door-mounted passenger assists will be of anodized aluminum, stainless steel or powder-coated metal. Connecting tees and angles may be powder-coated metal castings. Assists will withstand a force of 300 lbs applied over a 12 in. 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 will be designed to eliminate pinching, snagging and cutting hazards and will be free from burrs or rough edges.

**TS 77.2 Front Doorway**

Front doors, or the entry area, will be fitted with ADA-compliant assists. Assists will be as far outward as practicable, but will be located no farther inboard than 6 in. from the outside edge of the entrance step and will be easily grasped by a 5th-percentile female boarding from street level. Door assists will 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.

**TS 77.3 Vestibule**

The aisle side of the driver’s barrier, the wheel housings and when applicable the modesty panels will be fitted with vertical passenger assists that are functionally continuous with the overhead assist and that extend to within 36 in. of the floor. These assists will have sufficient clearance from the barrier to prevent inadvertent wedging of a passenger’s arm.

A horizontal passenger assist will be located across the front of the bus and will 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 will provide support for a boarding passenger from the front door through the fare collection procedure. The assist will be no less than 36 in. above the floor. The assists at the front of the bus will 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 driver’s barrier, wheel housings or front modesty panel.
**TS 77.4 Rear Doorway(s)**
Vertical assists that are functionally continuous with the overhead assist will 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 will be provided on modesty panels that are functionally continuous with the rear door assists. Rear doors, or the exit area, will be fitted with assists having a cross-sectional diameter between 1¼ and 1½ in. or providing an equivalent gripping surface with no corner radii less than ¼ in., and will provide at least 1½ in. of knuckle clearance between the assists and their mounting. The assists will be designed to permit a 5th-percentile female to easily move from one assist to another during the entire exiting process. The assists will be located no farther inboard than 6 in. from the outside edge of the rear doorway step.

**TS 77.5 Overhead**
Except forward of the standee line and at the rear door, a continuous, full-grip, overhead assist will be provided. This assist will be located over the center of the aisle seating position of the transverse seats. The assist will be no less than 70 in. above the floor.

Grab straps or other extensions as necessary will be provided for sections where vertical assists are not available and for use by passengers that cannot reach to 70 in. Grab straps/collars will be placed approximately every 16 inches on both sides of aisle.

Grab straps will be flexible grey rubber and approved for use on CTA’s buses. Straps will be affixed to CTA approved collars. Collars will be affixed to stanchion with stainless steel hardware.

Overhead assists will simultaneously support 150 lbs on any 12 in. length. No more than 5 percent of the full grip feature will be lost due to assist supports.

**TS 77.6 Longitudinal Seat Assists**
Longitudinal seats will have vertical assists located between every other designated seating position, except for seats that fold/flip up to accommodate wheelchair securement. Assists will extend from near the leading edge of the seat and will be functionally continuous with the overhead assist. Assists will be staggered across the aisle from each other where practicable and will be no more than 52 in. apart or functionally continuous for a 5th percentile female passenger.

**TS 77.7 Wheel Housing Barriers/Assists**
Unless passenger seating is provided on top of wheel housings, passenger assists will be mounted around the exposed sides of the wheel housings, which will also be designed to prevent passengers from sitting on wheel housings. Such passenger assists will also effectively retain items, such as bags and luggage, placed on top of wheel housings. Brushed stainless Kick Plates around the wheel housing will be attached via rivets.

**TS 78. Passenger Doors**

**TS 78.1 Transit Coach**
Doorways will be provided in the locations and styles as follows. Passenger doors and doorways will comply with ADA requirements. Two doorways will be provided in the curbside of the bus for passenger ingress and egress.

All doors will be Electric-powered. For a forty foot bus, the front doors will be of a slide-glide or inward gliding design. The vehicle will be equipped with a swing-type air-open/spring-close, single-stream rear door, hinged to open outward or plug slide door

**Front door**
Door will be forward of the front wheels and under direct observation of the driver.

**Rear Door(s)**
Curbside doorway centerline located rearward of the point midway between the front door centerline and the rearmost seat back.

In cases where street-side and curbside doors are chosen, provisions will be made for operating the front door, curbside rear door(s) and street-side rear door(s) independently or in the combinations shown in Table 3 while providing positive tactile feedback to the operator identifying the door control selection.
Table 3 Door Operating Combinations

<table>
<thead>
<tr>
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<th>Front</th>
<th>Curbside Rear</th>
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</thead>
<tbody>
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<td>Closed</td>
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</tr>
<tr>
<td>Open</td>
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<td>Open</td>
</tr>
<tr>
<td>Closed</td>
<td>Open</td>
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</tr>
</tbody>
</table>

**TS 78.2 Commuter Coach**
Not Used.

**TS 78.3 Materials and Construction**
Structure of the doors, their attachments, inside and outside trim panels and any mechanism exposed to the elements will be corrosion resistant. Door panel construction will be of corrosion-resistant metal or reinforced non-metallic composite materials. When fully opened, the doors will provide a firm support and will not be damaged if used as an assist by passengers during ingress or egress. Door edges will be sealed to prevent infiltration of exterior moisture, noise, dirt and air elements from entering the passenger compartment, to the maximum extent possible based on door types.

The closing edge of each door panel will have no less than 2 in. of soft weather stripping. The doors, when closed, will be effectively sealed, and the hard surfaces of the doors will be at least 4 in. apart (not applicable to single doors). The combined weather seal and window glazing elements of the front door will not exceed 10 deg of binocular obstruction of the driver’s view through the closed door.

**TS 78.4 Dimensions**
Transit Coach
When open, the doors will leave an opening no less than 75 in. in height.

The front door clear width will be a minimum of 32 in. with the doors fully opened. The rear door clear width will be a minimum of 36 in. with the doors fully opened.

Note: The rear door opening for a 40 ft. bus can be a minimum of 27 in. Bus Manufacturer will provide info if this is part of their design.

**TS 78.5 Door Glazing**

The upper section of both front and rear doors will be glazed for no less than 45 percent of the respective door opening area of each section. The lower section of the front door will be glazed for no less than 25 percent of the door opening area of the section. The edge of a 6-inch high curb will be visible to the seated operator through the closed front door when the bus is more than 12 inches from the curb. The slide-glide rear doors on the sixty foot articulated bus will be glazed in same proportion as the front doors. For the swing type rear doors on the forty foot bus, only the upper section will be glazed. The lower section is to be solid with a brushed stainless steel kick panel installed at the bottom interior surface.

Door glazing will be easily replaceable.

The front door panel glazing material will have a nominal ¼ in. 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 will be the same material, thickness and color as the side windows with a protective film on the interior surface. The Liner will be 3M Scotchgard Multi-Layer Film for Glass 1004 or approved equal. The Film will have a Stepped Edge at the top-right corner of the window. The Stepped Edge is intended to allow for easy removal of a damaged layer.
**TS 78.6 Door Projection**

**Exterior**
The exterior projection of the front doors beyond the side of the bus will be minimized and will not block the line of sight of the rear exit door via the curb side mirror when the doors are fully open. The exterior projection of both doors will be minimized and will not exceed 14 in. during the opening or closing cycles or when doors are fully opened.

**Interior**
Projection inside the bus will not cause an obstruction of the rear door mirror or cause a hazard for standees.

**TS 78.7 Door Height Above Pavement**
It will be possible to open and close either passenger door when the bus loaded to gross vehicle weight rating is not knelt and parked with the tires touching an 8 in. high curb on a street sloping toward the curb so that the street-side wheels are 5 in. higher than the right-side wheels.

**TS 78.8 Closing Force**
Closing door edge speed will not exceed 12 in. per s, and opening door speed will not exceed 19 in. per s. Power doors will not slam closed under any circumstance, even if the door is obstructed during the closing cycle. If a door is obstructed during the closing cycle, the pressure exerted on the obstruction will not increase once initial contact has been made.

Power-close rear doors will be equipped with an obstruction sensing system such that if an obstruction is within the path of the closing doors, the doors will stop and/or reverse direction prior to imparting a 10-lb force on 1 sq in. of that obstruction. If a contactless obstruction sensing system is employed, it will be capable of discriminating between the normal doorway environment and passengers or other obstructions within the doorway, and of altering the zones of detection based upon the operating state of the door system.

Doors closed by a return spring or counterweight-type device will be equipped with an obstruction-sensing device that, at a minimum, alerts the driver if an obstruction is detected between the closing doors. Doors closed by a return spring or counterweight type device, when unlocked, will be capable of being pushed to the point where the door starts to open with a force not to exceed 25 lbs applied to the center edge of the forward door panel.

Whether or not the obstruction-sensing system is present or functional, it will be possible to withdraw a 1½ in. diameter cylinder from between the center edges of a closed and locked door with an outward force not greater than 35 lbs.

**Rear Door Closing Force (Transit Coach)**
Not Used

**TS 78.9 Actuators**
Doors will open or close completely in not more than 3.5 s from the time of control actuation and will be subject to the closing force requirements.

Door actuators will be adjustable so that the door opening and closing speeds can be independently adjustable to satisfy the above requirements. Actuators and the complex door mechanism will be concealed from passengers but will be easily accessible for servicing. The door actuators will be rebuildable. If powered by compressed air, exhaust from the door system will be routed below the floor of the bus to prevent accumulation of any oil that may be present in the air system and to muffle sound.

Door actuators and associated linkages will maximize door holding forces in the fully open and fully closed positions to provide firm, non-rattling, non-fluttering door panels while minimizing the force exerted by the doors on an obstruction midway between the fully open and closed positions.

The rear doors will be passenger-controlled. The vehicle operator will unlock and enable the opening mechanism, which will be annunciated by illumination of a green light near the door. After enabling and unlocking, the doors will be opened by either the passenger manually pushing the door open, or by a powered mechanism actuated by passenger activation of a touch bar or touch switch, or by passenger activation of a contactless sensing system. A switch located within reach of the seated operator will, when actuated, restore rear door function to complete operator control.
Operator Controlled Rear Door
Doors that employ a “swing” or pantograph geometry and/or are closed by a return spring or counterweight-type device will be equipped with a positive mechanical holding device that automatically engages and prevents the actuation mechanism from being back-driven from the fully closed position. The holding device will be overcome only when the driver’s door control is moved to an “Exit Door Enable” position and the vehicle is moving at a speed of 0 mph, or in the event of actuation of the emergency door release.

Locked doors will require a force of more than 300 lbs to open manually. When the locked doors are manually forced to open, damage will be limited to the bending of minor door linkage with no resulting damage to the doors, actuators or complex mechanism.

Rear Door Interlocks
See TS 36.1 for door system interlock requirements.

TS 78.10 Emergency Operation
In the event of an emergency, it will be possible to manually open doors designated as emergency exits from inside the bus using a force of no more than 25 lbs after actuating an unlocking device. The unlocking device will be clearly marked as an emergency-only device and will require two distinct actions to actuate. The respective door emergency unlocking device will be accessible from the doorway area. The unlocking device will be easily reset by the operator without special tools or opening the door mechanism enclosure. Doors that are required to be classified as “emergency exits” will meet the requirements of FMVSS 217.

TS 78.11 Door Control
The door control will be located in the operator’s area within the hand reach envelope described in SAE Recommended Practice J287, “Driver Hand Control Reach.” The driver’s door control will provide tactile feedback to indicate commanded door position and resist inadvertent door actuation.

Door control located on street side.

The front door will remain in the commanded position even if power is removed or lost.

The control device will be protected from moisture. Mounting and location of the door control device handle will be designed so that it is within comfortable, easy arm’s reach of the seated driver.

The door control device handle will be free from interference by other equipment and have adequate clearance so as not to create a pinching hazard.

TS 78.12 Door Controller
Transit Coach
Five-Position Driver’s Door Controller
The control device will be protected from moisture. Mounting and location of the door control device handle will be designed so that it is within comfortable, easy arm’s reach of the seated driver. The door control device handle will be free from interference by other equipment and have adequate clearance so as not to create a pinching hazard.

Operation of, and power to, the front passenger doors will be completely controlled by the operator. Power to rear doors will be controlled by operator. The opening of rear doors will be controlled by passenger via an ultra-sonic sensing system. A bypass provision will be included to allow driver full control to open rear doors for rear passenger boarding. Rear doors will not unlock/open until bus speed is completely stopped. An alarm will sound whenever the rear door is opened or attempted to be opened when rear doors are not powered. Doors will remain open so long as passengers are in the doorway and automatically close when the doorway is clear. Once opened, the sensors that open the door will remain active until the door is fully closed, even if door control is returned to Neutral position, and will activate doors to open if ultrasonic beam is interrupted. Door control positions will be as shown below:

Position of the door control handle will result in the following operation of the front and rear doors:

- **Center position:** Front door closed, rear door(s) closed or set to lock.
• **First position forward:** Front door open, rear door(s) closed or set to lock.

• **Second position forward:** Front door open, rear door(s) open or set to open.

• **First position back:** Front door closed, rear door(s) open or set to open.

• **Second position back:** Front door open, rear door(s) open or set to open.

**TS 78.13 Door Open/Close**

**Operator-Controlled Front and Passenger-Controlled Rear Doors with Provision for Driver Override**

Operation of, and power to, the front passenger doors will be completely controlled by the operator. Power to rear doors will be controlled by the operator. After enabling, the rear doors will be opened by the passenger. A switch will be provided to enable the driver to obtain full control of the rear doors.

A control or valve in the operator’s compartment will shut off the power to, and/or dump the power from, the front door mechanism to permit manual operation of the front door with the bus shut down. A master door switch, which is not within reach of the seated operator, when set in the “off” position will close the rear doors, deactivate the door control system, release the interlocks, and permit only manual operation of the rear. This master switch will also over-ride the interlocks associated with the wheel chair ramp.

To preclude movement of the bus when the rear door control is activated, an accelerator interlock will lock the accelerator in the closed position and a brake interlock will engage the service brake system. The braking effort will be adjustable with hand tools.

An accelerator interlock will lock the accelerator in the closed position whenever front doors are open.

**TS 79. Accessibility Provisions**

Space and body structural provisions will be provided at the front door of the bus to accommodate a wheelchair loading system.

**TS 79.1 Loading System for 30 to 60 ft Low-Floor Bus**

An automatically controlled, electrically power-operated ramp system compliant to requirements defined in all Federal (e.g. 49 CFR Part 38, Subpart B, §38.23c), State, and Local ADA regulations will 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.

**Front Door Location of Loading System, Flip-Out Design Ramp with Multi-Slope Functionality**

The wheelchair loading system will be located at the front door, with the ramp being a flip-out type design being capable of deploying with the least possible, continuous slope with a maximum slope of 1:6 (Rise over Run).

Ramp will require cleaning no more than 6,000 miles per TS 5.4.

Ramp will not require any special tool for manual deployment.

As shown in Figure 12, the Ramp will have no/minimal slope on the back wheel while wheelchair is stopped to pay for CTA fares. Figure 13 shows the ramp incline that isn’t acceptable to the agency.
Figure 12. No Slope for Back Wheel of Wheelchair (Acceptable)

Figure 13. Slope for Back Wheel of Wheelchair (Unacceptable)

TS 79.2 Wheelchair Accommodations

Two Forward-Facing Wheelchair Securement Locations

Two forward-facing locations, as close to the wheelchair loading system as practical, will provide parking space and securement system compliant with ADA requirements for a passenger in a wheelchair.

Folding seats will be provided at the wheelchair securement locations to allow the area to be used as a normal seat location when not used for wheelchair securement. The folding seats will conform to the same general design requirement as the transverse seat. For all forward facing flip seats, there should be an articulating stanchion bar (or other means) to provide passengers with an assist in the event of a sudden stop.

To increase clearances for maneuvering of mobility devices, the securement locations will be staggered. At least, one of the wheelchair securement locations will have a minimum clear floor area of 30 inches by 60 inches. No more than 6 inches of the required clear floor space may extend under another seat so long as the lowest part of that seat overhanging the space is no less than 9 inches from the floor.

An instruction plate showing the step-by-step procedure for the proper securement of the wheelchair will be provided and attached to the underside of the flip seat, and will become visible when seat is flipped upward.

The wheelchair securement system will consist of two retractable belts to secure the front of the wheelchair frame, mounted to a stainless steel telescoping arm which can be stowed out of the way when not in use, and two retractable belts to secure the rear of the wheelchair frame. The housing for the retractable belts will be constructed of stainless steel.
The rear retracting belts will be mounted to the barrier panel supporting structure and located in a manner so as not to interfere with passenger movement, present any hazardous condition and will be reasonably protected from vandalism. The securement system will be compatible with ADA requirements.

A wheelchair wheel lock will be provided to hold wheelchair firmly in place and located so as not to create any hazards to either the wheelchair occupant or any other passenger. The wheelchair wheel lock will be mounted to the barrier assembly. The device will automatically engage the wheelchair wheel when the wheelchair is backed into place. An electric push-button type release feature for the wheelchair lock is to be provided in a location easily accessible to the wheelchair bound passenger. In addition, a manual release lever will also be provided to allow release of lock if the electrical release is not functioning. The wheelchair wheel lock will have a minimum three-and-one-half inch (3-1/2") opening to accept wheelchair wheel.

In addition to the wheelchair securement device, a double acting, automatic locking retractor, lap type seat belt and shoulder harness will be provided at each wheelchair location. The shoulder harness retractor will be mounted to the flip seat if a 3-passenger flip seat is provided. If the two 2-passenger configuration is provided, the shoulder harness retractor may be mounted on sidewall below window level.

NOTE: Authority will approve acceptable securement system.

**TS 79.3 Interior Circulation**

Maneuvering room inside the bus will accommodate easy travel for a passenger in a wheelchair from the loading device and from the designated securement area. It will be designed so that no portion of the wheelchair protrudes into the aisle of the bus when parked in the designated parking space(s). When the positions are fully utilized, an aisle space of no less than 20 in. will be maintained. As a guide, no width dimension should be less than 34 in.

Areas requiring 90° turns of wheelchairs should have a clearance arc dimension no less than 45 in., and in the parking area where 180° turns are expected, space should be clear in a full 60 in. diameter circle. A vertical clearance of 12 in. above the floor surface should be provided on the outside of turning areas for wheelchair footrests.

See “Wheelchair 90° Clearance Arc” diagram below. This clearance will be confirmed with a simple test using a box of dimensions 30 inches high by 30 inches wide by 48 inches long. In the parking area where 180-degree turns are expected, space should be clear in a full 60-inch-diameter circle with the other position not occupied. When the other position is occupied, space should be, no less than, clear in a full 50-inch-diameter circle. A vertical clearance of 12 inches above the floor surface should be provided on the outside of the turning areas no more than 6 inches inward from perimeter of circle for wheelchair footrest. To increase clearances for maneuvering of mobility devices, the securement locations will be staggered as shown on Figure 14. Wheel Chair Turning Radius Figure 14. At least, one of the wheelchair securement locations will have a minimum clear floor area of 30 inches by 60 inches. No more than 6 inches of the required clear floor space may extend under another seat so long as the lowest part of the seat overhanging the space is no less than 9 inches from the floor. Note that Figure 15 depicts a typical arrangement.
**TS 79.4 Reach Requirements**

The bus will comply with all reach requirements per 2010 ADA Standards section Section 308 Reach Ranges or superseded standard. For example, the all stop request button and wheelchair release buttons will be a maximum of 48 in from the securement of the wheelchair back wheel as shown in Figure 16. The contractor will provide models to the agency for the Securement Area to ensure accessible design.
SIGNAGE AND COMMUNICATION

TS 80. Destination Signs

All signs will be controlled via a single human-machine interface (HMI). The HMI will be conveniently located for the bus driver within reach of the seated driver.

An automatic electronic LED destination sign system will be furnished on the front, on the right side near the front door, and on the rear of the vehicle. Display areas of destination signs will be clearly visible in direct sunlight and/or at night.

The sign system will provide optimum visibility of the message display units for passengers and will meet applicable ADA requirements defined in 49 CFR, Part 38.39. Destination signs will be installed in such a manner as to facilitate easy access for replacement of the entire sign assembly, or components such as LED’s and electronic control modules, from inside the bus within 30 minutes. Lamps and associated parts will be commercially available. The sign located near the front door will not block the driver’s critical horizontal line of sight.

The Operator Display and Keyboard (ODK) will be used to view and update display messages. The system control console will utilize a multiple function keyboard with tactile response, designed especially for the harsh transit environment.

The system control console will contain a 4.3” color LCD touch screen display. Programmable multifunction keys will be used for basic operation while the touch screen can be used for more advanced operations. The system control console will provide audible feedback to alert the operator to view the display for a message, or beeps indicating that a key is depressed. The system control console will continuously display the complete message associated with the selected destination code.

The ODK will be capable of accepting single point logon information by interfacing to other on board systems via J-1939 for automated destination code and public relations code selection.

The system will be capable of wireless message listing updates using ‘store and forward’ through an on board computer.
Destination messages, route designations, and public relations messages will be independently selectable via a single ODK. The rear route number sign will be controlled by the same ODK that operates the destination signs. The ODK display monitor readout will show the exact information displayed on the destination signs and route number sign. The ODK will be conveniently located for the bus operator and mounted in such a manner that will not pose any safety hazard. The ODK will utilize a durable weatherproof keypad with tactile feel for destination message control functions.

The destination sign system will be capable of programming 10,000 message lines. The number of public relations messages will be limited only by the remaining number of message lines not used for destination purposes. Sign displays will have alternating message capability with programmable blanking time between message lines as may be required. Variable blanking times will be programmable between 0.5 to 25 seconds in duration. Each line message or blanking time for each message will be individually programmable. The message display units will incorporate an automatic blanking feature that will cause the display area to blank within 30 seconds of the bus master power switch being turned off.

The LED’s will be surface mounted, allowing for the greatest visibility and readability. Signs will incorporate a monitoring system whereby information and diagnostics are broadcast to the AVM via J1939.

Destination Sign Programming
The electronic sign system will be programmable via an integral connector located in the front destination sign area. Software will be furnished for programming the sign system via an IBM-compatible, laptop computer. Software will be capable of providing a high degree of flexibility to create, or select preprogrammed, fonts and graphic displays. The sign will have the capability of being programmed in the field using a PC, jump drive or field programmer. The sign system will allow for wireless downloading of destination sign reading through the Clever Devices system.

All destination signs will have displays consisting entirely of Light Emitting Diodes (LED). The LED’s will not fade or discolor for the life of the coach and will have a rated life of 100,000 hours.

The front destination sign will have a minimum display matrix of 16 rows x 160 columns with a minimum message display area of 8.0 inches high by 64 inches wide and no less than 2500 LED’s.

The front, dash mounted Run Number Sign will be input directly into the destination sign system’s System Control Console and will be independent of any destination sign messages. The run number sign display will have a minimum 480 LED’s, 12 rows by 40 columns, with a message display of not less than 4 inches high by not less than 15 inches wide.

The side destination sign will have a minimum display matrix of 14 rows X 112 columns with a minimum message display of 4.2 inches high by 42 inches wide and no less than 1560 LED’s.

The rear destination sign will have a minimum display matrix of 16 rows X 48 columns with a minimum message display of 5.25 inches high by 17 inches wide and no less than 765 LED’s.

The rear route number sign will be located a minimum of 90 inches above ground on the rear of the bus, approximately mid-way or closer to curbside, between the center and curb side of the bus.

The bus “Master Run” switch will control power to the sign system. The sign system will be operable in all switch positions except "Off".

The destination sign compartments will be designed to prevent condensation and entry of moisture and dirt. In addition, the front destination sign compartment will have provisions to prevent fogging of both compartment window and glazing on unit itself. Access will be provided to allow cleaning of inside of destination sign compartment window and unit glazing.

All destination sign compartment glazing will be clear and not tinted. The front destination sign glazing will be equipped with a defroster grid which will operate on a timed cycle controlled through the multiplex system whenever the climate control system is in heat mode.

Complete message program information will be transferable via a jump/flash drive.
The destination sign system will allow message listing database updates via USB stick from the face of the keypad, and also through the on board vehicle computer interface. A combination of J1708/J1587 and an Ethernet connection will be provided between the Clever Devices IVN system and the sign system for this purpose.

The IVN system will manage the deployment of new head sign databases. The ODK will respond with the current database version on startup or when queried by the IVN. If the database version in the ODK does not match the version in the IVN, the IVN will initiate the database transfer over the Ethernet connection. The total time required for the IVN to transfer the file, and for the ODK to start using the new database will be less than three (3) minutes.

The Clever Devices system will provide a report of vehicles that have not received the database update.

A complete listing of destination sign readings for initial sign programming by the manufacturer will be provided by the CTA after award.

**TS 81. Passenger Information and Advertising (Transit Coach)**

**TS 81.1 Interior Displays**
Provisions will be made on the rear of the driver's barrier or equipment box located on the wheel well for a frame to retain information such as routes and schedules.

Advertising media 11 in. high and 0.09 in. thick will be retained near the juncture of the bus ceiling and sidewall. The retainers may be concave and will support the media without adhesives. The media will be illuminated by the interior light system.

Contractor will provide a bottom loading public service message rack on the passenger side of driver's barrier to hold a card of size 11 inches by 17 inches wide.

One (1) bottom loading sign frame to accommodate a 10-9/16 inch by 15 inch by 5/32 inch maximum fare schedule sign card will be furnished and installed above the driver's side window or in a mutually agreed upon location in close proximity.

Three (3) timetable/map dispensers will be furnished and installed by the Contractor to hold timetable/maps up to eight (8) inches tall. The dispenser inside dimensions will be 4-1/4"-4-1/2" wide by 1-1/2" deep. The height of the dispenser will be 5" tall on the front side and 7" tall on the back side. The bottom side of the dispenser will consist of two pins spaced to prevent debris from collecting and at the same time retain the timetable/maps. The dispenser will be of sturdy metal construction with provision on the front side to view the dispenser contents. The dispenser will be in a location accessible to the passenger in the interior of the bus.

**TS 81.2 Exterior Displays**
Provisions will be made to integrate advertising into the exterior design of the bus. Advertising media, frames or supporting structures will not detract from the readability of destination signs and signal lights, and will not compromise passenger visibility. Advertising provisions will not cause pedestrian hazards or foul automatic bus washing equipment, and will not cover or interfere with doors, air passages, vehicle fittings or in any other manner restrict the operation or serviceability of the bus.

The Contractor will provide on the engine compartment rear door, one (1) bottom loading advertising sign frame with proper spacers to accommodate a 21-inch by 72-inch advertising copy. The sign frame will be anodized extruded aluminum.

The Contractor will provide on each side of the bus, one (1) double end loading advertising sign frame with proper spacers to accommodate a 30-inch by 144-inch advertising copy. The sign frame will be anodized extruded aluminum.
TS 82. Passenger Stop Request/Exit Signal

TS 82.1 Transit Coach

Pull Cord Passenger Signal

A passenger “stop requested” signal system that complies with applicable ADA requirements defined in 49 CFR, Part 38.37, will be provided. The system will consist of a heavy-duty pull cable, chime and interior sign message. The pull cable will 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, then the height of the pull cable will approximate this transom level and will be no greater than 63 in. as measured from the floor surface. It will be easily accessible to all passengers, seated or standing. Pull cable(s) will activate one or more solid state or magnetic proximity switches. At each wheelchair passenger position and at priority seating positions, additional provisions will be included to allow a passenger in a mobility aid to easily activate the “stop requested” signal.

An auxiliary passenger “stop requested” signal will be installed at the rear door to provide passengers standing in the rear door/exit area a convenient means of activating the signal system. The signal will be a heavy-duty push button type located in the rear door vicinity. Button will be clearly identified as “passenger signal.”

Vertical pull cords should be available at every possible locations as shown in Figure 17.

![Figure 17. Vertical Pull Cords](image)

Heavy “Stop request” signal buttons will be installed on every vertical stanchion pole in bus and on the luggage rack stanchions bars for seat passengers as shown in Figure 18.
Figure 18. Stop Signal Request on Luggage Rack

TS 82.2 Signal Chime

Transit Coach

A single “stop requested” chime will sound when the system is first activated. A double chime will sound anytime the system is activated from wheelchair passenger areas.

Exit signals located in the wheelchair passenger area will be no higher than 4 ft above the floor. Instructions will be provided to clearly indicate function and operation of these signals.

A "Stop Requested" message in red letters will be illuminated on the Annunciator LED sign when the passenger "Stop Requested" signal system is activated. The "Stop Requested" message will remain visible until one or both passenger doors are opened. The message will be visible to the seated operator and seated passengers. The operator will be able to deactivate the signal system from the operator's area.

TS 83. Communications

TS 83.1 Camera Surveillance System

The bus will be equipped with a sufficient number of cameras (See Figure 19 for 40 ft Bus) and associated wiring provisions to allow continuous monitoring of bus interior and exterior for purposes of security. An indicating light will be mounted in the driver's area to show that the system is functioning properly. The cameras will be a digital, color recording type, appropriately mounted to provide a clear view of entire passenger compartment and protected to prevent tampering and vandalism. The data will be stored on a removable hard drive with a minimum of storage capacity of at least 8 terabytes or 720 hours of recording capacity at 1080p resolution. Images recorded and stored are to be digitally encrypted and have a resolution no less than 1080p. The system will be capable of recording capacity of no less than 720 hours at a resolution of, at least, 30 frames per second per camera. System will be programmable to automatically tag events, such as a panic button activation or a hard deceleration/impact. A signal from remote event data recorder impact sensor will trigger an event of hard deceleration/impact in the system via J1939. Tagged events will be stored on the hard drive. The system will record correct time, GPS coordinates, and various configurable J1939 CAN events such as Odometer, Braking, Speed, Turn Signal, etc.. The stored video images will be searchable by time and/or GPS coordinates.
The system will be capable of downloading tagged events automatically when bus returns to garage/depot. The system will also be capable of real-time video monitoring from a remote site through the communications system outlined in TS 84.4.5 Mobile Communications & Antenna. The programmable parameters, including corresponding resolution for such events, will be reviewed and finalized with the manufacturer during pre-production. When retrieved, the tagged events will be easily identifiable. The cameras and surveillance system will continue recording for 10 minutes after run power is shutdown or 12/24 volt power is removed at main disconnect switch. In order to protect the camera system from voltage spikes during startup, a time delay will be incorporated to allow the system to power-on only after the powertrain is running and generating conditions have stabilized.

The system module will be located in a secured, sealed compartment with adequate provisions for easy removal/replacement of hard drive for downloading of recorded information. A provision will be included to allow bus operator to electronically flag events recorded. In addition, wiring, suitably routed and terminated will be provided to allow future connection of the security camera system to the emergency alarm switch. This is in order to provide the capability of automatically flagging and saving recorded images prior and subsequent to emergency alarm activation. Adequate number of decals/signs notifying passengers of surveillance cameras on-board will be installed in plain view throughout the bus.

Figure 19 shows the layout of the latest CTA buses with the respective Digital Camera models. The following is info for each of the views corresponding to the Figure:

1. Forward Facing (Facing out windshield)
   - One camera will be mounted in the interior, forward-facing to provide view through windshield of outside area immediately in front of the bus. This camera will be able to quickly adjust to light changes due to head lights or driving through viaducts.
   - This Camera will be mounted in the functional area of the wiper in order to ensure a clear view out of the front
2. Driver/Farebox Area (Facing towards front curbside)
   - Camera will be placed to ensure maximum viewing due to any obstruction caused by the driver’s barrier.
3. Driver/Farebox Area (Facing towards driver)
4. Front Passenger Area (Facing rear)
   - The Authority prefers this to be mounted in the front section of the bus close to Camera 1.
5. Mid Passenger Area (Facing front)
6. Mid Passenger Area (Facing rear)
7. Mid Passenger Area (Facing Curbside)
   - This camera will be positioned to view the Rear Door Area.
8. Front Streetside, Exterior Mount (Facing rear)
   - This camera will be position to non-interfere with a high mount camera position.
9. Front Curbside, Exterior Mount (Facing rear)
10. Rear Camera, Exterior Mount (Facing rear)
11. TBD camera location
12. TBD camera location
Figure 19. Reference Camera Location for 40 ft Bus

Placement of cameras (and camera angles) will need to be approved by the agency; and the cameras will not hinder the view of the operator.

All Cameras will be Vandal Resistant and capable of recording high resolution under low-light settings.

Camera system will be equipped with UPS (uninterruptible power supply) to ensure buffer time isn’t lost during a crash.

Camera system will be capable of transmitting data via Wi-Fi and/or cellular networks.

The Authority requires Apollo Video Technology Camera systems or an Approved Equal due to existing Authority Service Contracts.

TS 83.2 Public Address System
A public address system will be provided on each bus for facilitating radio system and driver-originated announcements to passengers. A public address system that complies with the ADA requirements of 49 CFR, Part 38.35 and enables the operator to address passengers either inside or outside the bus. The public address system will be integrated with the AVAS (TS 84.2) Inside speakers will broadcast, in a clear tone, announcements that are clearly perceived from all seat positions at approximately the same volume level. A speaker will be provided so announcements can be clearly heard by passengers standing outside the bus near the front door. An operator-controlled switch will select inside or outside announcements. A separate volume control will be provided for the outside system if volume adjustment would otherwise be necessary when switching from inside to outside. The system will be muted when not in use. The microphone will be vandal resistant, mounted on a heavy-duty, flexible gooseneck, which is secured with tamper-proof fasteners and will allow the operator to comfortably speak into it without using his hands. A provision will be provided to secure the microphone in a stored position when not in use. An input jack and mounting clip will be provided in the operator’s area for a hand held microphone.
Clip-on Microphone (with jack) CTA Lot# 8300114 or equal will be provided in addition to the gooseneck. The P/A system microphone operation, both gooseneck and clip-on, will be controlled via foot switch.

**Speakers**
Interior loudspeakers will be provided, semi-flush mounted, on alternate sides of the bus passenger compartment, installed with proper phasing. Total impedance seen at the input connecting end will be 8 Ohms. Mounting will be accomplished with riv-nuts and machine screws. A speaker will be provided so announcements can be clearly heard by passengers standing outside the bus near the front door. An operator-controlled switch will select inside or outside announcements. This speaker will require the Authority’s Approval.

**TS 83.3 Automatic Passenger Counter (APC)**
An automatic counter passenger system will be provided to accurately record and report the number of passengers that enter the vehicle whenever the bus is in service. The system will conform to the protocol as specified in SAE J1939 and will be Clever Devices certified. APC sensors will be provided in both the front and rear doorways. Two sets of APC sensors are required, for the 60ft bus, at the rear doorway which is dual stream and one set of APC sensors are required, for the 40ft bus. Where Slide-Glide (In-swinging) Door are utilized, the Authority requires an overhead mounted APC sensor or approved equal. If the clear width as noted in TS 78.4 is greater than 40 in, then overhead sensors must be used.

**TS 83.4 Radio Handset and Control System**
A radio handset and bus radio compatible with the on-board Clever Devices system will be provided. Either direct output (DO) or the Clever Devices Universal Radio Logic Controller (URLC) will be provided. Preference is given to radios that are inexpensive and of a standard design.

Radios at CTA are supported by Radicomm and integration and handsets are supported by Clever Devices.

**Drivers Speaker**
Each bus will have a recessed speaker in the ceiling panel above the driver. This speaker will be the same component used for the speakers in the passenger compartment. It will have 8 Ohms of impedance.
Note: The Driver’s speaker will not be required if the handset has an integrated speaker.

**Handset**
Contractor will install a handset for driver use. A location convenient to the operator will be provided for the radio control head, speaker, handset, and cradle. The location will conform to SAE Recommended Practice J287 “Driver Hand Control Reach.”

**Driver Display Unit (DDU)/Transit Control Head (TCH)**
Contractor will install a Clever Devices compatible driver display unit/transit control head (TCH) as close to the driver’s instrument panel as possible. The Authority will approve the mounting location.

**Emergency Alarm**
Contractor will install an emergency alarm that is accessible to the driver but hidden from view. Emergency Alarm Switch Otto Controls P3-90226 or equal with wiring. To be placed on side wall by Operator’s left knee.

**Mobile Communications & Antenna**
Technical Specification: See Spec 8433-17
Mounting for Router: Installation of unit and all associated wiring will conform to applicable SAE standards and is subject to CTA approval. The communications system will be securely mounted to the street side front wheelhouse compartment and will be approximately 20 inches wide by 20 inches deep and will extend to the ceiling. Compartment will have two (2) separate locking compartments. Slide-out shelves will be provided to house the radio system, AVAS and camera system. Panels/closeouts will be provided if necessary to prevent dirt traps and ensure functionality as an operator’s barrier. Window directly behind box will be blocked off to eliminate need for cleaning/maintenance or can be eliminated/reduced in size. The compartment will be fabricated in a durable fashion out of stainless steel or heavy-duty plastic material.
Mounting for Antenna: Provisions for attaching an antenna to the roof and routing an antenna lead to the radio compartment will include a 3/4-inch inside diameter conduit with a pull wire. The antenna mounting and lead termination will be accessible from the bus interior. A compartment will be provided to accommodate a communication system. It will be located within 8 feet of the operator’s seat and will be connected to the operator’s area by waterproof, 2-1/4 inch inside diameter, metallic conduit. The radio compartment will be supplied with a 30-amp, 12-volt, DC, protected service with positive and negative leads.

The contractor shall furnish and install the following Bus Emergency Communications System (BECS). Electronic equipment on bus shall be compliant to SAE J1708 and J1939. Contractor shall furnish and install the following provisions:

1. Radio Antenna Specialists ASP772L or equal with wire and connector
2. Radio mounting bracket MAICOM part number 19B802672PI
3. Handset (ACS #TSM-004495), Handset cable and mounting provision
4. Radio cable to be used for the BECS (orbital W3 type) designed for specific vehicle
5. Run Power and Battery Ground
6. Filtered 12-volt power shall be supplied to the radio whenever the MDT is on.
7. Voice Page Speaker Motorola RSN4001A, or equal with wiring Emergency Alarm Switch Otto Controls P3-90226 or equal with wiring. To be placed on side wall by Operator’s left knee.
8. Wiring from the following shall be provided and routed to the radio compartment entrance door signal, exit door signal, ramp power and deploy signal, odometer signal, 24V run power (20A), 24V battery power (IOA).
9. GPS antenna with wiring to Mobile Data Terminal (MDT) location
10. In dash mounting provisions for MDT with interconnecting J1708 cable routed from the MDT to the radio compartment device access boxes.
11. Mounting provisions in radio compartment for radio/MDT interface box, MAICOM part no. E101554VI.
12. Filtered power supply and wiring - 20A/12V filtered power to radio, controlled by MDT. (relay coil should be fed 12V by the MDT and the coil ground should be fed via PLC, to be integrated when the starter is engaged.
13. J1708/J 1939 drivetrain data link

The exact location of components, wire/cable routing and connectors may vary on vehicle design. Details will be reviewed and agreed upon during the pre-production meeting phase.

**TS 84. Clever Devices Integration**

The Contractor should supply CTA’s Buses with the IVN-based Onboard ITS system which is provided by Clever Devices. Clever Devices will provide the Contractor a quote to procure, install and test the ITS system. Clever Devices can be contacted at:

Clever Devices Ltd
300 Crossways Park Drive
Woodbury, NY 11797
516-433-6100
Attention:
Craig Lang (CLang@CleverDevices.com)
Robert Manaseri (RManaseri@cleverdevices.com)
Ryan Flintom (RFlintom@CleverDevices.com)

The following sections are some of the features provided by Clever Devices for the Authority’s Buses.

**TS 84.1 Hard Braking**

There are four (4) types of reports that may be created and viewed using this application:

- **Hard Brake** – This event is recorded on a vehicle when its deceleration exceeds a set limit. The deceleration value is arrived at by measuring the changes in the vehicle’s speed, regardless of whether or not the operator has engaged the vehicle’s brakes. There is a default threshold deceleration (15 ft/sec²), a default event duration (300 ms), and a minimum speed (10 mph) that must be met to trigger a hard brake event.

- **Last Stop** – This is any occasion when the vehicle’s speed falls to 0 mph. When a full stop takes place, an event is created and its data stored in a file that can be viewed using this application.
• **EDR (Event Data Recorder) Last Stop** – This combines the vehicle’s reaching 0 mph with the simultaneous detection of an event by the vehicle’s event data.

• **Incident** – This indicates unusual movement of the vehicle in any direction (backwards, forwards, right-left, up-down).

**TS 84.2 Automatic Voice Annunciation System (AVAS)**

The bus will be equipped with automatic voice annunciation system. The voice annunciation system will automatically make next stop announcements for all fixed bus routes. A suitably sized digital LED sign will be provided to display the next stop information which will be visible and readable from all seated locations on a forty foot bus. A second, identical LED sign is required, rear of the turntable, for an articulated bus. An operator control panel will be provided and located at the front of the vehicle to allow the operator to easily input his badge, route and run number information. Control of the exterior destination sign displays will also be through this panel.

The AVAS will be capable, via a GPS antenna to be provided as part of this system, of determining the vehicle’s location and, along with route and run number input, announce and display appropriate “next stop” information. The system will be able to recognize when the bus has traveled outside its pre-determined route and display the message, “OFF ROUTE,” to the operator on the operator control panel. During this time no messages will be displayed or announced on the AVAS. Once the system has determined that the bus has resumed its route, the AVAS will return to normal function. In cases where the GPS cannot pickup satellite signals to accurately determine its position, the AVAS will temporarily revert to a bypass system, such as through use of a compass and number of stops counter.

The AVAS display will meet the applicable requirements of 49 CFR, Part 38, Subpart B: ADA Accessibility Specifications for Transportation Vehicles - Buses, Vans and Systems. The display will be able to display messages that are, at least, 20 characters in length. The AVAS sign will display “STOP REQUESTED” whenever the passenger stop requested signal system is activated.

Automatic voice announcements will be made through the vehicle’s public address system. For the interior and exterior announcements, volume levels will be separately and automatically adjusted within a limited range to compensate for ambient noise. The voice annunciator will have priority over the operator’s gooseneck microphone.

The AVAS will be able to monitor, acquire and report bus maintenance information. The CTA will select the specific bus maintenance data to be monitored and recorded for the Automatic Vehicle Monitoring.

In addition, the AVAS will support integrated or supply interoperability of other non-proprietary optional features as follows:

1. Automatic Passenger Counting
2. Automatic Vehicle Location Reporting
3. Automatic Fare Collection
4. Wireless data communications
5. Bus Stop Information System
6. Next Bus Information
7. Multiplex System

All necessary interconnecting cables and brackets will be provided by the Contractor or the system supplier. The central processing unit and associated equipment for the AVAS will be contained in a locked compartment. The necessary application software for data acquisition and management will be provided along with all required hardware. Bus maintenance information will be available through the vehicle's electronic communication system, including drivetrain and climate control system data. This data will be communicated through the appropriate protocols (J1708, J1939) to the AVAS from which it can then be downloaded thru the infrared system.

The Contractor will work with the CTA and its current supplier of AVAS equipment to ensure proper integration and compatibility with their existing equipment. The AVAS used by the Chicago Transit Authority is the Clever Device Intelligent Vehicle Network® (IVN) which includes to the following components:

1. central processing unit
2. the operator’s control panel with display
3. the interior LED display
4. automatic passenger counter system
5. public address amplifier
6. ambient volume control microphones
7. interconnecting cables
8. bus maintenance information system

The central processing unit and associated equipment for the AVAS will be contained in the same locked compartment as the radio equipment.

The necessary application software for data acquisition and management will be provided along with all required hardware.

Bus maintenance information will be available through the vehicle’s multiplex system, including drivetrain and climate control system data. This data will be communicated through the appropriate protocols to the AVAS from which it can then be downloaded thru the infra-red system.

The AVAS clock will be pre-set to the satellite for Central Daylight Savings Time.

**TS 84.3 Automatic Vehicle Monitoring (AVM)**
The vehicle will be equipped with a central monitoring system that will receive, record and report diagnostic and operational data from the bus’s electronically controlled components and systems. This will utilize the SAE J1939 communication data link. The diagnostic data for each vehicle will be automatically offloaded to a server when it returns to its designated depot/garage via an 802.11G LAN antenna to be provided as part of this system. Features of this system will include time synchronization, roll-call reporting and software revision level reporting. The contractor will work with the AVM system supplier to ensure and certify proper interface with and reporting of all systems which will include, but not limited to the following:

- Electric drive
- HVAC
- ABS/ATC
- Auxiliary coolant heater
- Vehicle multiplex system
  - Headlamps
  - Air restriction indicator
  - Wheelchair hydraulic fluid
  - Air dryer malfunction
  - Rear door actuation system
  - Hydraulic (power steering) fluid level
  - Door interlock malfunction
  - Coolant level
- Brake monitoring system
- Tire pressure monitoring system
- Security cameras
- Events data recorder
- Battery equalizer

Other optional program features/parameters, such as recording number of brake applications, hard deceleration, odometer, etc., will be finalized with the engine manufacturer during pre-production. The propulsion diagnostics, as well as the output from these optional program features stated will be communicated through the vehicle electronics communication system to allow interface with the Automatic Vehicle Monitoring System.

**TS 84.4 Real Time Bus Arrival Prediction System**
The bus will be equipped with a real time bus arrival prediction system.
TS 85. Specialty Tools And Diagnostics

The Contractor is responsible to identify and provide a list of all special tools (software, hardware, accessories, diagnostic cables and electronic devices) that are required to service and overhaul the bus for agency to review and approve. Any tools missed would be the responsibility of the Contractor to procure for the Authority.

This requirement will apply to all systems, which require any specialized electronic, electrical or mechanical device that is not readily and commercially available, to inspect, repair, troubleshoot and diagnose.

The contractor will provide System Test/ Diagnostic Equipment for their proposed multiplex system in compliance with the quantity identified in the Contract Terms and Conditions.

All Software licenses will be good for the life of the bus. Additionally, the Authority prefers fleet licenses that are not tied to a specific computer.

TS 86. Parts File

Vendor must include the information from Table 6 so that the agency can support the supply chain of the vehicle.

<table>
<thead>
<tr>
<th>Noun</th>
<th>Description</th>
<th>Bus OEM Part Number</th>
<th>Vendor Supplier Name</th>
<th>Vendor Part Number</th>
<th>Lead time (Days)</th>
<th>Cost ($)</th>
<th>Recommended Stocking Levels</th>
<th>Warranty (New Bus/Aftermarket)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSEMBLY</td>
<td>CONTROL BOX, LIFT-U W/C RAMP REP NOVA L47 PARTS BOOK, PAGE N800084, ITEM #34</td>
<td>Bus Supplier Name</td>
<td>Ramp Supplier Name</td>
<td>XXXXX</td>
<td>##</td>
<td>IXXXX</td>
<td>#</td>
<td>3 years/60 days</td>
</tr>
</tbody>
</table>

Table 4. Parts File Spreadsheet Sample

Vendor will provide updates to the parts file on a monthly basis to ensure the agency has most up-to-date parts information in the system.

TS 87. 3D Model Software Requirements

The Contractor will provide a 3D model of the bus with the applicable software thirty days after the delivery date of the final production bus, as specified below:

Four copies of a 3D model of the bus on CD-ROM.

- 3D models must include, but not limited to, interior and exterior panels/doors, windows, mirrors, all window and door seals, rub rails (if provided), flooring, wheel rims with tires, bus frame, stanchions, seats, all bolts and rivets and on panels, battery trays/covers/support, electrical wiring, engine assembly, transmission assembly, hoses, traction batteries (if applicable) and traction motor (if applicable).
- Two copies of the 3D model in Autodesk inventor format (.ipt, .iam, .ipn and/or .idw) and two copies in step file format (.stp).
- 3D model cannot be shrink-wrapped. Models must be shown as parts/assemblies.
- Any updates done to part files, assemblies and/or drawings must be sent to CTA.

Alternative access to the bus builders’ 3D model in 3DXML format may be provided as an equivalent, as approved by the Authority.
**TS 88. Photographs**

**TS 88.1 Exterior**
Exterior photographs must be taken with the following bus positions: full frontal, ¼ front to back from the right and left and full rear.

**TS 88.2 Interior**
Photographs must be taken of the driver’s area, passenger seats, stanchions and the interior advertising areas. Interior overview photographs from the front looking back and from the back looking forward are to be included with no advertising media removed and passenger annunciators operating.

**TS 88.3 Frame**
Photographs of the bus structure from various angles should provide location and orientation of various structural members.

**TS 88.4 Inspection Visual Aid**
Photographs must be supplied for the use of inspection purposes. Photographs must capture the assembly of the bus by station at the various production locations. Photos must capture the various systems, components and subsystems. The photographs should detail the configuration of the various components to allow the agency’s personnel to easily identify any deviation from the correct configuration. Photographs of the components should be taken from various angles to detail configuration and orientation of the components and subsystems.

**TS 89. Bus Info Screens**
Two 29” super ultra-wide screen LCD or OLED vehicle rated screens will be supplied for passenger information. The screen graphical user interface and software requirements are attached as reference document BUSINFOSCREENSPEC.

The screens will be center line mounted and flush (or near flush) mounted to the vehicle ceiling. The screens shall provide a minimum of 78” of vertical clearance to the vehicle floor. The screens shall match with the interior design of the vehicle. A rendering of the screen installation design must be submitted with the bid proposal. The Contractor’s proposed solutions must meet the validation criteria set forth in the BUSINFOSCREENSPEC. The CTA reserves the authority to request demonstration of the validation criteria by live vehicle testing and / or a route simulating scripted test input file.

The Contractor will include their recommended system as part of their base submission. Additional manufacture pricing / offerings may be requested by the CTA.

**TS 90. Optional Equipment**

**TS 90.1 Events Data Recorder (EDR)**
Event data recorders (EDR) will be installed on the bus, one at the front and the other at the rear. These units are to be installed as low as possible. The EDR's will be able to communicate over the J1939 CAN line and will each be equipped with 3-axis accelerometers. Settings are to be finalized with the CTA during pre-production. EDR's will broadcast via the J1939 data communication link severe impact events to the vehicle monitoring system and also trigger an event in the camera system. The EDR will also tag an event from a signal received over the J1939 CAN line from the silent alarm switch signal and the camera event button and in turn broadcast these events to the vehicle monitoring system. The EDR will also record the following operational data: head lights on or off, turn signals and hazard lights on or off, ignition on or off, low air pressure warning, whether moving in forward or reverse, idling, and if parking brake is on or off.

**TS 90.2 Brake Sensor**
An electronic brake stroke/wear indicating system will be provided. This system will broadcast diagnostic and operating parameters through the J1939 communication data link to the vehicle automatic monitoring system. Critical brake stroke/wear conditions will cause "Brake Alert" indicating light on dash to illuminate.

**TS 90.3 Camera Views Integrated into TCH Screen**
Camera Views will be viewable on the Clever Transit Control Head (TCH) screen for the purposes of checking camera views without the use of a laptop. Additionally, the screen will be configured so that the following views can be reviewed in real-time:

1. Curb Side & Street side.
These should be able to be viewed in split screen mode. Additionally when a turn signal is activated, the respective camera view will be maximized on the TCH. For example, the left turn signal will show the street side camera.

2. Rear Camera.
This will turn on when the gear selection is in reverse.

**TS 90.4 Camera Views for Blind Spots**
Camera Views will be viewable on the separate screens to allow for supplement the curbside and street side mirrors as shown in Figure 20. The Screens will be viewable in real-time and in HD quality. Additionally, the screens will be a minimum screen size of 10 in. diagonally. The Authority requests that the buses be installed with Setup 2. However, Provisions should be added to allow for Viewing with any of the Set-ups in Figure 20.

Note: If option from TS90.2 is exercised, only one screen might be needed if the TCH locations corresponds to one of the locations from Figure 19. Reference Camera Location for 40 ft Bus Figure 19.

**TS 90.5 Collision Warning System**
Systems must be fully configurable to reduce nuisances (e.g. sensitivity of warning activation) and noise pollution. For example, the system will be easily configurable by the agency but not limited to the following:

- Audible Warnings/Alerts must be adjustable (e.g. volume, frequency) and customizable sound file (e.g. spoken, beep, etc.). Audible sounds should also adjust based on the external noise level and require no intervention by the operator.
- Light Warnings/Alerts must be adjustable (e.g. dimmable, strobing, etc.)
- Warnings/Alerts will be selected to be Audible and Visual,
- Warnings/Alerts will be configurable to allow for variations based on time and GPS locations.
- Warnings/Alerts will be configurable based on vehicle speed, turning angle, blinker, etc., or a combination of factors.
- Warnings/Alerts will be configurable when an imminent collision is predicted.

System will work in both day-time and night-time operation.

The GPS location will based on the GPS location from Clever; and any licenses requirements would be based on the life of the bus. Operational data (e.g. time, GPS, warning activation information) and faults from the systems will be communicated across the J1939 to be read by the Clever Devices. The faults in the system should indicate when the system requires maintenance.
In the event that the agency decides to discontinue usage permanently or temporarily, the decommissioning of the system will require no removal of parts and be turned off easily by the agency. If agency decides to utilize more than one system for testing, the agency will be able to easily switch from one system to the other on the same bus. Additionally, the system should be able to collect data without providing alerts/warnings. The data should assist in configuring the bus to reduce nuisance warnings.

All systems will be integrated so that the agency doesn’t have to maintain additional redundant parts. For example, the driver’s speaker from Radio Handset and Control System TS 83.4 will be utilized for interior audible alerts.

Roscoe Mobileye Shield+, or Approved Equal will be used.

**TS 90.6 Pedestrian Warning**
The system will activate a configurable exterior warning light and sound when the bus is making a turn.

Turn will be configurable to be based either on activation of blinker, turning of steering wheel, or both. Additionally to remove noise pollution, the system will be configurable to sense for a pedestrian and/or cyclist presence and warn appropriately.

**Operator Warning**
The system will activate a configurable interior warning light and sound when a pedestrian and/or cyclist is in a blind spot.

The System will have the ability to vary sound (intensity and/or frequency) and/or light (frequency, intensity and/or color) based on a caution or critical approach to a pedestrian and/or cyclist.

System will indicate the speed limit and warn driver of any operation over the posted speed limit. The system will record instances (duration, average speed, etc.) when the operator goes over the posted speed limit.

**TS 90.7 Interior Electronic Displays (i.e. Infotainment)**

**Interior Electronic Displays**
The Contractor will provide and install 2 Liquid Crystal Display (LCD) signs in each bus. The location will be approved by the agency. The display of the LCD signs will be approximately 36 inches wide by 10 inches high. The sign will have the appropriate aspect ratio and resolution to provide the greatest definition and use of display area.

The housing will have a lockable, top-hinged access panel to facilitate necessary maintenance. The signs will be housed in protective casing constructed of lightweight, rugged fire-retardant material compliant to FTA Docket 90-A, Recommended Fire Safety Practices for Transit Bus and Van Materials Selection. The color of the housing will be white to match the ceiling panel on the bus, color-impregnated or powder-coated as appropriate.

Wiring harness and cables will be routed and secured using rubber insulated P-clamps to minimize any exposed portions. All wiring harnesses will have protective convoluted loom.

The openings required for the harnesses to pass through on the vehicle and housing will have protective grommets. The sign display will be equipped with a protective, non-glare cover.

The signs will be mounted securely to prevent rattling and vibration. Mounting of the signs will not present any safety hazard to passengers and will not impede any access to and/or maintenance of other equipment on the vehicle.

If mounted over center aisle or passenger seats, height clearance of no less than 78 inches above the floor will be maintained. Contractor will provide mounting details to CTA for review and concurrence.

The signs will be mounted using stainless steel hardware and tamperproof fasteners.
The minimum display brightness of 800 cd/m² and a minimum contrast ratio of 400:1. These will need to be finalized once signs are installed in the vehicle and tested over range of ambient light conditions encountered in service. The signs will be powered through 24 volt Run switch power.

The signs will have built-in electric circuit protection and be able to withstand ambient temperatures ranging from -20° F to 110° F.

The signs will be equipped with electronic on-board diagnostics to record and report out-of-parameter conditions. These diagnostics will be broadcast through the vehicle’s J1939 chassis data link to the Automated Vehicle Monitoring (AVM) system.

**Provisions Only**

The contractor will provide the provisions (e.g. wiring, mounting, etc) for future addition of the infotainment system by the agency.

**TS 90.8 Rear Door Fare Collection**

Contractor will provide Ventra provisions for fare collection at the rear exit doors.

**TS 90.9 Induction Loop System**

Provide an Induction Loop System integrated to speaker system of the bus. It will be capable of using audio input from Automatic Voice Annunciation System (AVAS) or the Public Address System on the bus. It will meet IEC 60118-4 and any other relevant federal, state, local, and/or international standard.

**TS 90.10 Bike Rack Counter System**

System should be capable of communicating the following on the CAN line via the Bus’s Multiplex system.

- The bicycle counter system will be capable of sensing the independent use of each bicycle position on the bike rack
- The bicycle counter system will include the ability to sense deployment of the bicycle rack.

The Bus will be capable of provide audible or visual feedback to the operator when a bike rack is deployment and/or immediately after a bike rack is removed from the bike rack. If required by the agency, a brake and/or accelerator interlock can be configured for time-delay immediately after a bike rack is removed. Their will be appropriate logic to prevent a faulty sensor from preventing revenue service of the vehicle. A faulty sensor will be communicated across the CAN line.

**TS 90.11 18 Year Design Life**

Proposal for bus to last a minimum design life of eighteen (18) years or 750,000 miles. (Replaces Life in TS 5.3)

**TS 90.12 Skid Plate**

The front door post and under frame components will be protected from striking against the curb with a heavy duty metal skid plate that will withstand striking of the curb and other surfaces without being dislodged. The plate will be installed on the bus under frame such that it will not be prone to dragging debris. Protection will be effective in cases when the bus kneels.

**TS 90.13 Extended Warranty Options**

- Extension of Complete Bus Warranty from one year or 50,000 miles to two years or 100,000 miles. (See W1.1.2)
- Extension of Complete Bus Warranty from one year or 50,000 miles to three years or 150,000 miles. (See W1.1.2)
- Extension of Complete Bus Warranty from one year or 50,000 miles to four years or 200,000 miles. (See W1.1.2)
- Extension of Complete Bus Warranty from one year or 50,000 miles to five years or 250,000 miles. (See W1.1.2)
TS 90.14 Diagnostic Equipment/Tool Options/Spares

1. Panasonic 54 Toughbook or approved equal that meets or exceeds the following specifications:
   - Intel Core i7-6600U 2.6 GHz
   - Windows 7 or newer operating system
   - 14.0 inch screen
   - 16 GB Ram
   - 256 GB SSD

2. Complete Diagnostic Tool / Software /Cable Kit
   - Additional complete diagnostic tool kit for all vehicle systems / sub systems that includes and is not limited to:
     o At least one of every cables / adapters required to interface with every system / subsystem on the bus
     o At least and one (1) media copy and one (1) license for every each software application required to interface with every system / subsystem on the bus
     o All required cables and hardware
     o At least one (1) GL1000 CAN Data loggers
     o At least one (1) Nexiq USB-Link 2 Vehicle interface devices
     o Complete CAN database files (Vector .dbc format or equivalent) with parameter definitions for all signals communicated in the vehicle through J1939.

3. CANalyzer Single User License
   - Single CANalyzer license for the latest CANalyzer release version at the time of proposal.

4. CANoe Single User License
   - Single CANoe license for the latest CANoe release version at the time of proposal.

5. Camera System Docking Workstation
   - Work station compatible with the bus camera system. The workstation will be complete and include a display, mouse, keyboard, and any other required peripherals.

6. Camera System Hard Drive Spares
   - Spare 8 GB hard drives compatible with the bus camera system. Provide a Unit Cost per hard drive.

7. Towing Adapter
   - Towing adapter to use with a slinger.

8. Preventative maintenance
   - Spare parts consumables kit covering 36,000 miles, or one year of operation per bus.

TS 90.15 Full Driver Enclosure
Provide a driver barrier that fully encloses the driver to address safety and comfort concerns. The enclosure will extend as close to the front windshield as possible but there should be no more than a 4 inch gap. The enclosure will also allow for ease of ingress/egress for the driver. The enclosure will need to meet the same basic requirements as standard barrier door as detailed in TS73.1. Complete details of the requirements will be finalized with successful bidder according to available technology and capabilities.

TS 90.16 Coolant Loop Pressure Sensor
Provide a coolant loop pressure sensor at or near the pressure relief cap or valves for each independent coolant loop. The pressure sensor data will be broadcasted on J1939 and will trigger tiered fault codes (caution and warning levels) for pressure levels outside the acceptable operating range.
**TS 90.17 Heated Driver Seat**

Provide a heated seat module, engineered and integrated by the seat manufacturer. The heated seat element shall be independently replaceable and serviceable. The seat will have adjustable heat levels to provide a range of heat outputs.
SECTION 5: WARRANTY REQUIREMENTS

WR 1. Basic Provisions

WR 1.1 Warranty Requirements

WR 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 Authority each complete bus and specific subsystems and components as described in this Section. Performance requirements based on design criteria will not be deemed a warranty item.

The Contractor will be solely responsible for the administration of all warranties provided under this Contract. The Contractor will insure in its procurement arrangements that the warranty requirements of this Contract are enforceable through and against the Contractor's suppliers, vendors, material men and subcontractors. Any inconsistency or difference between the warranties extended to the Authority by the Contractor and those extended to the Contractor by its suppliers, vendors, material men and subcontractors will be at the risk and expense of the Contractor. Such inconsistency or difference will not excuse the Contractor's full compliance with its obligations under the Contract Documents.

The Contractor will promptly provide to the Authority with complete copies of all written warranties or guarantees and of documentation of any other arrangement relating to such warranties or guarantees extended by the Contractor's suppliers, sub suppliers, vendors, material men and subcontractors covering parts, components, and systems utilized in the Work. Such documents must be provided no later than the start of production and at any time upon request. In the event that any such warranty, guarantee or other documentation is changed or amended, the Contractor will promptly provide the Authority with a copy of such change or amendment within seven (7) days of such change or amendment.

WR 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 date of revenue service but not longer than 15 days after acceptance under “Inspection, Testing and Acceptance.” The warranty is based on regular operation of the bus under the operating conditions prevailing in the Authority’s locale.

WR 1.1.3 Body and Chassis Structure

Body, body structure, structural elements of the suspension and engine cradle are warranted to be free from Defects and Related Defects for three years or 150,000 miles, whichever comes first. Primary load-carrying members of the bus structure, including structural elements of the suspension, are warranted against corrosion failure and/or Fatigue Failure sufficient to cause a Class 1 Failure or Class 2 Failure for the Vehicle Service Life per TS5.3 (15 years). Structure must be comprised of Stainless Steel or Composite Materials (No Carbon Steel).

WR 1.1.4 Propulsion System

Propulsion system components, including the engine, transmission or drive motors, and generators (for hybrid technology), traction motors, and drive and non-drive axles will be warranted to be free from Defects and Related Defects for the standard two years or 100,000 miles, whichever comes first. An Extended Warranty to a maximum of five years or 300,000 miles, whichever comes first, may be purchased at an additional cost. The propulsion system manufacturer’s standard warranty, delineating items excluded from the Extended Warranty, should be submitted in accordance with the Request for Pre-Offer Change or Approved Equal or with the Form for Proposal Deviation.

WR 1.1.5 Emission Control System (ECS)

The Contractor warrants the emission control system for five years or 100,000 miles, whichever comes first. The ECS will include, but is not limited to, the following components:

- complete exhaust system, including catalytic converter
- after treatment device
• components identified as emission control devices

WR 1.1.6 Subsystems
Other subsystems will be warranted to be free from Defects and Related Defects for three years or 150,000 miles, whichever comes first. Other subsystems are listed below:

• Brake system: Foundation brake components, including advancing mechanisms, as supplied with the axles, excluding friction surfaces.
• Destination signs: All destination sign equipment for the front, side and rear signs, power modules and operator control.
• Heating, ventilating: Roof and/or rear main unit only, excluding floor heaters and front defroster.
• AC unit and compressor: Roof and/or rear main unit only, excluding floor heaters and front defroster.
• Door systems: Door operating actuators and linkages.
• Air compressor.
• Air dryer.
• Wheelchair lift and ramp system: Lift and/or ramp parts and mechanical only.
• Starter.
• Alternator/DC-DC Converter: Alternator/Conventor only. Does not include the drive system.
• Cooling package
• Charge air cooler: Charge air cooler including core, tanks and including related surrounding framework and fittings.
• Fire suppression: Fire suppression system including tank and extinguishing agent dispensing system.
• Hydraulic systems: Including radiator fan drive and power steering as applicable.
• Propulsion cooling systems: Radiator including core, tanks and related framework, including surge tank. Transmission cooler.
• Passenger seating excluding upholstery.
• Fuel and delivery system.
• Surveillance system including cameras and video recorders.

WR 1.1.7 Extended Warranty
The Authority requires the following additional subsystems to be warranted to be free from Defects and Related Defects for three years or 150,000 miles, whichever comes first.

• Automatic Voice Announcement System
• Automatic Passenger Counter System
• Multiplex System

WR 1.1.8 Serial Numbers
Upon delivery of each bus, the Contractor will provide a complete electronic list of serialized units installed on each bus to facilitate warranty tracking. The list will include, but is not limited to the following:

• Engine
• Transmission
• Alternator
• DC-DC Convertor
• Starter
• A/C compressor and condenser/evaporator unit
• Drive axle
• Power steering unit
• Fuel cylinders
• Air compressor
• Wheelchair ramp
The Contractor will provide updated serial numbers resulting from warranty campaigns. The format of the list will be approved by the Authority prior to delivery of the first production bus.

**WR 1.1.9 Extension of Warranty**

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

**WR 1.1.10 Voiding of Warranty**

The warranty will 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 also will be void if the Authority fails to conduct normal inspections and scheduled preventive maintenance procedures as recommended in the Contractor’s maintenance manuals and if that omission caused the part or component failure. The Authority will maintain documentation, auditable by the Contractor, verifying service activities in conformance with the Contractor’s maintenance manuals.

Contractor will be responsible for any component failure that is derived from improper maintenance associated with incorrect manuals or failure to train the agency on a component in a timely manner.

**WR 1.1.11 Exceptions and Additions to Warranty**

The warranty will not apply to the following items:

- scheduled maintenance items
- normal wear-out items
- items furnished by the Authority

Should the Authority require the use of a specific product and has rejected the Contractor’s request for an alternate product, then the standard Supplier warranty for that product will be the only warranty provided to the Authority. This product will not be eligible under “Fleet Defects,” below. The Contractor will not be required to provide warranty information for any warranty that is less than or equal to the warranty periods listed.

**WR 1.1.12 Pass-Through Warranty**

Should the Contractor elect to not administer warranty claims on certain components and wish to transfer this responsibility to the sub-suppliers, or to others, the Contractor will request this waiver in writing. Contractor will state in writing that the Authority’s warranty reimbursements will not be impacted. The Contractor also will state in writing any exceptions and reimbursement including all costs incurred in transport of vehicles and/or components. At any time during the warranty period, the Contractor may request approval from the Authority to assign its warranty obligations to others, but such requests will be approved only on a case-by-case basis approved in writing by the Authority. Otherwise, the Contractor will be solely responsible for the administration of the warranty as specified. Warranty administration by others does not eliminate the warranty liability and responsibility of the Contractor.

**WR 1.1.13 Superior Warranty**

The Contractor will pass on to the Authority any warranty offered by the Contractor or component Supplier that is superior to that required herein. The Contractor will provide a list to the Authority noting the conditions and limitations of the Superior Warranty not later than the start of production. The Superior Warranty will not be administered by the Contractor unless the Contractor is the supplier of the superior warranty.
WR 1.2 Fleet Defects

WR 1.2.1 Occurrence and Remedy

A Fleet Defect is defined as cumulative failures of twenty-five (25) percent of the same components in the same or similar application in a fleet and a minimum number of 4 failures are covered by warranty. A Fleet Defect will apply only to the base warranty period in sections entitled “Complete Bus,” “Propulsion System” and “Major Subsystems.” When a Fleet Defect is declared, the remaining warranty on that item/component stops. The warranty period does not restart until the Fleet Defect is corrected.

For the purpose of Fleet Defects, each option order will be treated as a separate bus fleet. In addition, should there be a change in a major component within either the base order or an option order, the buses containing the new major component will become a separate bus fleet for the purposes of Fleet Defects.

The Contractor will correct a Fleet Defect under the warranty provisions defined in “Repair Procedures.” After correcting the Defect, the Authority and the Contractor will mutually agree to and the Contractor will 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 will include redesign and/or replacement of only the defectively designed and/or manufactured part(s). In all other cases, the work program will include inspection and/or correction of all the buses in the fleet via a mutually agreed-to arrangement. The Contractor will update, as necessary, technical support information (parts, service and operator’s manuals) due to changes resulting from warranty repairs. The Authority may immediately declare a Defect in design resulting in a safety hazard to be a Fleet Defect. The Contractor will be responsible to furnish, install and replace all defective units.

WR 1.2.2 Exceptions to Fleet Defect Provisions

The Fleet Defect warranty provisions will not apply to Authority-supplied items, such as radios, fare collection equipment, communication systems and tires. In addition, Fleet Defects will not apply to interior and exterior finishes, hoses, fittings and fabric.

WR 1.3 Repair Procedures

WR 1.3.1 Repair Performance

The Contractor is responsible for all warranty-covered repair Work. To the extent practicable, the Authority will allow the Contractor or its designated representative to perform such Work. At its sole discretion, the Authority may choose to perform warranty-covered repair Work if it determines it needs to do so based on transit service or other requirements. Such Work, performed by the Authority, will be reimbursed by the Contractor. The Authority is under no obligation to perform warranty repair work for the purpose of reducing any liquidated damages due to the Authority under "Maximum Buses out of Service for Warranty."

WR 1.3.2 Maximum Buses out of Service for Warranty

At any given time, the number of buses pulled out of service for warranty repair work will not exceed the following maximums:

1. In a fleet size of 20 buses or less, no more than 2 buses
2. In a fleet size of 21 to 100 buses, no more than 5 buses;
3. In a fleet size of 100 buses or more, no more than 5% of buses.

It is mutually understood and agreed by and between the parties to the Contract that in case of any failure on part of the Contractor to limit the number of buses pulled out of service for warranty repair work in accordance with the established maximums; the Authority 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 to the Authority will be fixed as follows.
If the number of buses pulled out of service for warranty repair work exceeds the maximums established in this section, liquidated damages will be charged at a rate of $296.87 per calendar day per bus out of service in excess of the established maximums if less than 20 buses, or if 20 or more buses are out of service, then liquidated damages will be charged at a rate of $1250 per calendar day per bus. Contractor agrees that any liquidated damages due to the Authority pursuant to this section may be deducted from any unpaid contract funds, including any retainage amounts.

**WR 1.3.3 Repairs by the Contractor**

If the Authority detects a Defect within the warranty periods defined in this section, it will, within thirty (30) days, notify the Contractor’s designated representative. No later than 5:00 PM on the business day after receipt of such notification, the Contractor’s designated representative will either agree that the defect is covered by warranty or reserve judgment until the defective subsystem or component can be inspected. Contractor’s failure to respond to the Authority’s notification by the time specified herein will constitute agreement that a given defect is covered under warranty. If Contractor elects to reserve judgment pursuant to an inspection, such inspection must take place within 24 hours of such election or on the next business day. If after inspection, the Authority and the Contractor cannot reach agreement as to whether a particular defect is covered under warranty; such disagreement will be resolved pursuant to the dispute provisions contained herein.

The Contractor or its designated representative will, if requested, begin Work on warranty-covered repairs within five calendar days after receiving notification of a Defect from the Authority. The Authority will make the bus available to complete repairs timely with the Contractor’s repair schedule.

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

**WR 1.4 Warranty Reporting**

Starting when the first bus is put into service by the Authority and continuing until the expiration of all warranties provided under this Contract, Contractor will, on the first Monday of each month, submit a report to both the Authority’s Senior Manager of Quality Improvement ("QI") and the Authority's Manager of Warranty, which summarizes all warranty activity that took place in the previous month (the "Warranty Report").

The Warranty Report will include at minimum (1) a list of all new warranty claims, (2) a list of all outstanding warranty claims, (3) a list of all warranty claims that were closed or resolved in the prior month, (4) an excel invoice list detailing all parts used for repairs on the buses, what parts were replaced, and the costs of such repairs, and (5) a list of the monthly trends of failure seen on the buses.

**WR 1.5 Repairs by the Authority**

**WR 1.5.1 Parts Used**

If the Authority performs warranty-covered repairs, then it will correct or repair the Defect and any Related Defects utilizing parts supplied by the Contractor specifically for this repair. At its discretion, the Authority may use Contractor-specified parts available from its own stock if deemed in its best interests.

**WR 1.5.2 Contractor-Supplied Parts**

The Authority may require that the Contractor supply parts for warranty-covered repairs being performed by the Authority. Those parts may be remanufactured but will have the same form, fit and function, and warranty. The parts will be shipped prepaid to the Authority from any source selected by the Contractor within fourteen (14) days of receipt of the request for said parts and will not be subject to an Authority handling charge.

**WR 1.5.3 Defective Component Return**

The Contractor may request that parts covered by the warranty be returned to the manufacturing plant within five (5) days of the receipt claim. The freight costs for this action will be paid by the Contractor. Materials should be returned in accordance with the procedures outlined in “Warranty Processing Procedures.”
WR 1.5.4 Failure Analysis
The Contractor will, upon specific request of the Authority, 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 will be delivered within 60 days of the receipt of failed parts.

In addition, the Contractor will also provide a failure analysis report on any component, or sub-component experiencing a failure rate at or above 5% during the warranty period, or before the expiration of the scheduled preventive maintenance schedule, or replacement schedule due mileage/date, the Contractor will address design-related failures via a product improvement that should supersede and replace the older design. Failure rate will be calculated based on the following:

1. In a fleet size of 50 buses or less, 4 buses
2. In a fleet size of 50 to 100 buses, 5 buses
3. In a fleet size of 100 buses or more, 5% of buses

Within six (6) months of delivery of the failure analysis report, the Contractor will present to the Authority a remediation plan addressing the repair, replacement, redesign or other manner of addressing the remediation of the failure. If Contractor does not present the plan, or commence remediation as may be agreed by the parties based on the remediation plan, then the Contractor will be liable for all interim repair and/or replacement costs arising from or related to the failure, and which the Authority incurs from the earlier of either: (i) the date that the remediation plan was to be presented but was not; or (ii) the date that remediation was to begin but was not. Thereafter, the Contractor will be responsible for repair and/or replacement costs until the Contractor complies with this clause.

WR 1.5.5 Reimbursement for Labor and Other Related Costs
The Authority will be reimbursed by the Contractor for labor. The amount will be determined by the Authority for a qualified mechanic at a straight time wage rate of $142.54, per hour, which includes fringe benefits and overhead adjusted for the Authority’s most recently published rate in effect at the time the Work is performed, plus the cost of towing the bus if such action was necessary and if the bus was in the normal service area. These wage and fringe benefit rates will not exceed the rates in effect in the Authority’s service garage at the time the Defect correction is made.

Note: Wage Rate is current at the time of the contract. The rate may change throughout the contract period. However, it will be the rate paid by the agency.

WR 1.5.6 Reimbursement for Parts
The Authority will be reimbursed by the Contractor for defective parts and for parts that must be replaced to correct the Defect. The reimbursement will be at the current price at the time of repair and will include taxes where applicable, plus fourteen and one-half (14.5) percent handling costs. Handling costs will not be charged if parts are supplied by the Contractor and shipped to the Authority.

WR 1.5.7 Reimbursement Requirements
The Contractor will respond to the Authority’s claims for reimbursement with an accept/reject decision no later than thirty (30) days after the Authority submits the claim. Reimbursement for all accepted claims will occur no later than thirty (30) days from the date of acceptance.

If a claim for reimbursement is rejected in whole or in part for any reason, copies of such rejection must be sent to CTA’s Warranty Manager and Senior Manager of Ql. The Authority may dispute such rejected claim(s) for which the Contractor did not reimburse the full amount pursuant to the Dispute provisions contained herein. The parties agree to review disputed warranty claims during the following quarter to reach an equitable decision to permit the disputed claim to be resolved and closed. The parties also agree to review all claims at least once per quarter throughout the entire warranty period to ensure that open claims are being tracked and properly dispositioned.

In the event that the Contractor fails to pay approved or partially approved warranty claims within 60 days of submission, the Authority may send the Contractor written notice seeking immediate
payment of the outstanding claims. If the Contractor fails to pay the outstanding claims within five (5) days of the Contractor's receipt of such written notice, the Authority, at its discretion, deduct the Authority's costs from 1) any unpaid contract funds, 2) any contract retainage amounts or 3) performance bond. If the deductions do not fully satisfy the outstanding claims, the Authority may seek additional remedies. All remedies will be inclusive of applicable interest payments.

**WR 1.5.8 Warranty after Replacement/Repairs**

If any component, unit or subsystem is repaired, rebuilt or replaced by the Contractor or by the Authority with the concurrence of the Contractor, then the component, unit or subsystem will have a warranty of three (3) months or the unexpired warranty period of the original, whichever is longer. Repairs will 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 “Repairs by the Contractor.”

If an item is declared to be a Fleet Defect, then the warranty stops with the declaration of the Fleet Defect. Once the Fleet Defect is corrected, the item(s) will have three (3) months or remaining time and/or miles of the original warranty, whichever is greater. This remaining warranty period will begin on the repair/replacement date for corrected items on each bus if the repairs are completed by the Contractor or on the date the Contractor provides all parts to the Authority.

**WR 1.5.9 Warranty Processing Procedures**

The following list represents requirements by the Contractor to the Authority for processing warranty claims. One failure per bus per claim is allowed.

- bus number and VIN
- total vehicle life mileage at time of repair
- date of failure/repair
- acceptance/in-service date
- Contractor part number and description
- component serial number
- description of failure
- all costs associated with each failure/repair (invoices may be required for third-party costs):
  - towing
  - road calls
  - labor
  - materials
  - parts
  - handling
  - troubleshooting time

**WR 1.5.10 Forms**

The Authority's forms will be accepted by the Contractor if all of the above information is included. Electronic submittal may be used if available between the Contractor and the Authority.

**WR 1.5.11 Return of Parts**

When returning defective parts to the Contractor, the Authority will tag each part with the following:

- bus number and VIN
- claim number
- part number
- serial number (if available)
WR 1.5.12 Timeframe
Each claim must be submitted no more than thirty (30) days from the date of failure and/or repair, whichever is later. All defective parts must be returned to the Contractor, when requested, no more than forty-five (45) days from the date of repair.

WR 1.5.13 Reimbursements
Reimbursements are to be transmitted to the following address:

Chicago Transit Authority
567 West Lake Street
Chicago, IL 60661-1498
Attn.: Treasury Cashier Facility

WR 1.5.14 Warranty Tracking
For the duration of the warranty period, Contractor will provide a weekly warranty tracking report in an excel spreadsheet format to the CTA warranty department, the tracking report at minimum will include the CTA bus number, failure date, mode, mileage, engine hours, correction date and the correction taken to remedy to that failure

WR 1.5.15 On-site Quality & Warranty Representative
For the duration of the warranty period, Contractor will provide a full time on-site resident quality and warranty representative.
SECTION 6: QUALITY ASSURANCE

QA 1. Contractor’s In-Plant Quality Assurance Requirements

QA 1.1 Quality Assurance Organization

QA 1.1.1 Organization Establishment

The Contractor will establish and maintain an effective in-plant quality assurance organization. It will be a specifically defined organization and should be directly responsible to the Contractor’s top management.

QA 1.1.2 Control

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

QA 1.1.3 Authority and Responsibility

The quality assurance organization will 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.

QA 1.2 Quality Assurance Organization Functions

QA 1.2.1 Minimum Functions

The quality assurance organization will include the following minimum functions:

- **Work instructions:** The quality assurance organization will verify inspection operation instructions to ascertain that the manufactured product meets all prescribed requirements.
- **Records maintenance:** The quality assurance organization will maintain and use records and data essential to the effective operation of its program. These records and data will be available for review by the resident inspectors. Inspection and test records for this procurement will be available for a minimum of one year after inspections and tests are completed.
- **Corrective action:** The quality assurance organization will 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.

QA 1.2.2 Basic Standards and Facilities

The following standards and facilities will be basic in the quality assurance process:

- **Configuration control:** The Contractor will 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 will verify that each transit bus is manufactured in accordance with these controlled drawings, procedures and documentation.
- **Measuring and testing facilities:** The Contractor will 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 will be calibrated at established periods against certified measurement standards that have known, valid relationships to national standards.
- **Production tooling as media of inspection:** When production jigs, fixtures, tooling masters, templates, patterns and other devices are used as media of inspection, they will be proved for accuracy at formally established intervals and adjusted, replaced or repaired as required to maintain quality.
- **Equipment use by resident inspectors:** The Contractor’s gauges and other measuring and testing devices will 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 will be made available to operate the devices and to verify their condition and accuracy.
QA 1.2.3 Maintenance of Control

The Contractor will maintain quality control of purchases:

- **Supplier control:** The Contractor will require each Supplier to maintain a quality control program for the services and supplies that it provides. The Contractor’s quality assurance organization will inspect and test materials provided by Suppliers for conformance to specification requirements. Materials that have been inspected, tested and approved will be identified as acceptable to the point of use in the manufacturing or assembly processes. Controls will be established to prevent inadvertent use of nonconforming materials. Suppliers will be required to confirm the supplied material conforms to specification requirements listed on Contractors’ engineering drawings. In the event non-conforming materials are discovered, the Contractor’s quality assurance organization will be responsible for rejecting non-conforming material for further disposition within the Contractor’s organization.

- **Purchasing data:** The Contractor will verify that all applicable specification requirements are properly referenced in purchase orders of articles to be used on transit buses.

QA 1.2.4 Manufacturing Control

- **Controlled conditions:** The Contractor will ensure that all basic production operations, as well as all other processing and fabricating, are performed under controlled conditions. Establishment of these controlled conditions will be based on the documented Work instructions, adequate production equipment and special working environments if necessary.

- **Completed items:** A system for final inspection and test of completed transit buses will be provided by the quality assurance organization. It will measure the overall quality of each completed bus.

- **Nonconforming materials:** The quality assurance organization will monitor the Contractor’s system for controlling nonconforming materials. The system will include procedures for identification, segregation and disposition.

- **Statistical techniques:** Statistical analysis, tests and other quality control procedures may be used when appropriate in the quality assurance processes.

- **Inspection status:** A system will 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.

QA 1.2.5 Inspection System

The quality assurance organization will establish, maintain and periodically audit a fully documented inspection system. The system will prescribe inspection and test of materials, Work in process and completed articles. As a minimum, it will include the following controls:

- **Inspection personnel:** Sufficient trained inspectors will be used to ensure that all materials, components and assemblies are inspected for conformance with the qualified bus design.

- **Inspection records:** Acceptance, rework or rejection identification will be attached to inspected articles. Articles that have been accepted as a result of approved materials review actions will be identified. Articles that have been reworked to specified drawing configurations will not require special identification. Articles rejected as unsuitable or scrap will be plainly marked and controlled to prevent installation on the bus. Articles that become obsolete as a result of engineering changes or other actions will be controlled to prevent unauthorized assembly or installation. Unusable articles will be isolated and then scrapped. Discrepancies noted by the Contractor or resident inspectors during assembly will 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 will 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 will verify the corrective actions and mark the discrepancy record. If discrepancies cannot be corrected by replacing the nonconforming materials, then the Authority will approve the modification, repair or method of correction to the extent that the Contract specifications are affected.

- **Quality assurance audits:** The quality assurance organization will establish and maintain a quality control audit program. Records of this program will be subject to review by the Authority.
QA 2. Inspection

QA 2.1 Inspection Stations
Inspection stations will be at the best locations to provide for the Work content and characteristics to be inspected. Stations will provide the facilities and equipment to inspect structural, electrical, hydraulic and other components and assemblies for compliance with the design requirements.

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

QA 2.2 Resident Inspectors

QA 2.2.1 Resident Inspector’s Role
The Authority will be represented at the Contractor’s plant by resident inspectors, as required by FTA. Resident inspectors may be Authority employees or outside contractors. The Authority will provide the identity of each inspector and will also identify his or her level of authority in writing. They will monitor, in the Contractor’s plant, the manufacture of transit buses built under the procurement. The presence of these resident inspectors in the plant will not relieve the Contractor of its responsibility to meet all the requirements of this procurement. The Authority will designate a primary resident inspector, whose duties and responsibilities are delineated in “Pre-Production Meetings,” “Authority” and “Pre-Delivery Tests” below. Contractor and resident inspector relations will be governed by the guidelines included as Attachment A to this section.

QA 2.2.2 Pre-Production Meetings
The primary resident inspector may participate in design review and Pre-Production Meetings with the Authority. At these meetings, the configuration of the buses and the manufacturing processes will be finalized, and all Contract documentation provided to the inspector.

No less than thirty (30) days prior to the beginning of bus manufacture, the primary resident inspector may meet with the Contractor’s quality assurance manager and may conduct a pre-production audit meeting. They will 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.

QA 2.2.3 Authority
Records and data maintained by the quality assurance organization will be available for review by the resident inspectors. Inspection and test records for this procurement will be available for a minimum of one year after inspections and tests are completed.

The Contractor’s gauges and other measuring and testing devices will 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 will be made available to operate the devices and to verify their condition and accuracy.

Discrepancies noted by the resident inspector during assembly will 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 will 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 will verify the corrective actions and mark the discrepancy record. If discrepancies cannot be corrected by replacing the nonconforming materials, then the Authority will approve the modification, repair or method of correction to the extent that the Contract specifications are affected.
The primary resident inspector will remain in the Contractor’s plant for the duration of bus assembly. The resident inspectors will be authorized to approve the pre-delivery acceptance tests. Upon request to the quality assurance supervisors, the resident inspectors will have access to the Contractor’s quality assurance files related to this procurement. These files will include drawings, assembly procedures, material standards, parts lists, inspection processing and reports, and records of Defects.

**QA 2.2.4 Support Provisions**

The Contractor will provide office space for the resident inspectors in close proximity to the final assembly area. This office space will be equipped with desks, outside and interplant telephones, Internet access, file cabinet and chairs.

**QA 2.2.5 Compliance with Safety Requirements**

At the time of the Pre-Production Meeting, the Contractor will provide all safety and other operational restrictions that govern the Contractor’s facilities. These issues will be discussed and the parties will agree which rules/restrictions will govern the Authority’s inspector(s) and any other Authority representatives during the course of the Contract.

**QA 3. Acceptance Tests**

**QA 3.1 Responsibility**

Fully documented tests will be conducted on each production bus following manufacture to determine its acceptance to the Authority. These acceptance tests will include pre-delivery inspections and testing by the Contractor and testing by the Authority after the buses have been delivered.

**QA 3.2 Pre-Delivery Tests**

The Contractor will conduct acceptance tests at its plant on each bus following completion of manufacture and before delivery to the Authority. These pre-delivery tests will include visual and measured inspections, as well as testing the total bus operation. The tests will be conducted and documented in accordance with written test plans approved by the Authority.

Additional tests may be conducted at the Contractor’s discretion to ensure that the completed buses have attained the required quality and have met the requirements in “Technical Specifications.” The Authority may, prior to commencement of production, demand that the Contractor demonstrate compliance with any requirement in that section if there is evidence that prior tests have been invalidated by the Contractor’s change of Supplier or change in manufacturing process. Such demonstration will be by actual test, or by supplying a report of a previously performed test on similar or like components and configuration. Any additional testing will be recorded on appropriate test forms provided by the Contractor and will be conducted before acceptance of the bus.

The pre-delivery tests will be scheduled and conducted with thirty (30) days’ 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, will be filed with the assembly inspection records for each bus. The underfloor equipment will be available for inspection by the resident inspectors, using a pit or bus hoist provided by the Contractor. A hoist, scaffold or elevated platform will be provided by the Contractor to easily and safely inspect bus roofs. Delivery of each bus will require written authorization of the primary resident inspector. Authorization forms for the release of each bus for delivery will be provided by the Contractor. An executed copy of the authorization will accompany the delivery of each bus.

**QA 3.2.1 Visual and Measured Inspections**

Visual and measured inspections will be conducted with the bus in a static condition. The purpose of the inspection testing includes verification of overall dimension and weight requirements, that required components are included and are ready for operation, and that components and subsystems designed to operate with the bus in a static condition do function as designed.
QA 3.2.2 Total Bus Operation

Total bus operation will 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 will be driven for a minimum of fifteen (15) miles during the road tests. If requested, computerized diagnostic printouts showing the performance of each bus will be produced and provided to the Authority. Observed Defects will be recorded on the test forms. The bus will be retested when Defects are corrected and adjustments are made. This process will continue until Defects or required adjustments are no longer detected.

QA 4. Authority-Specific Requirements

Guide For Inspection The Contractor will perform the following detailed/instrumented tests on at least one (1) production bus to demonstrate compliance to acceptable requirements of the Technical Specifications: (a) Exterior Sound Level Test, (b) Interior Sound Level Test, (c) Interior Light Level Test, (d) Heating, Ventilating and Air Conditioning Test, (e) Maneuverability Test, (f) Acceleration/Jerk Test, and (g) Ground Clearance Test.

Test plans are to be provided to the Authority by the Contractor during Pre-production Meetings.

Attachment A: New Bus Manufacturing Inspection Guidelines

Pre-Production Meeting Responsibilities

Authority

- Provides conformed copy of technical requirements.
- Recommended staff to be involved may include the following:
  - Project manager
  - Technical engineer
  - Contract administrator
  - Quality assurance administrator
  - Warranty administrator
    - Process for inspector’s role (to deal with Authority) for negotiated changes after freeze date.
    - Contractual requirements:

Milestones

Documentation

Title requirements

Deliverables

Payments

Reliability tracking

Manufacturer

- Identifies any open issues.
- Recommended staff to be involved may include the following:
  - Project manager
  - Technical engineer(s)
  - Contract administrator
  - Quality assurance administrator
  - Warranty administrator
    - Production flow (buses/week, shifts).
    - Delivery schedule and offsite component build-up schedule.
    - Bus QA documentation (including supplier application approvals and/or any certifications required for the specific production).
    - Communication flow/decision making.

Inspector

- Agree on decisions inspectors can and cannot make.
- Primary contact for problems, etc.
- Production flow process (description of manufacturing by station).
• Factory hours (manage inspection schedule based on production hours).
• Plant rules.
• Safety requirements.
• Orientation requirements.
• Work environment.
• Inspector’s office space (per contract).

NOTE: As a result of this meeting, documentation should be produced detailing final production requirements and the planned configuration of the bus.

Build Schedule
The bus manufacturer’s contract administrator will supply a fleet build production schedule based on the dates in the Notice to Proceed, and a description of the manufacturer’s schedule for plant operations.

The production schedule should contain specific milestone dates, such as the following:

• First vehicle on production line (date on which any work will begin).
• First vehicle off production line.
• First vehicle through manufacturer’s quality assurance inspections.
• First vehicle shipped to the Authority.
• Last vehicle on production line.
• Last vehicle off production line.
• Last vehicle shipped to the Authority.

Plant Tour (if Meeting at OEM's Location)
The Authority will review the entire process from start to finish and review the work completed at each line station, including quality control measures.

Prototype/Pilot Vehicle Production (if Applicable)
The Contractor will conduct acceptance tests at its plant on each bus following completion of manufacture and before delivery to the Authority. These pre-delivery tests will include visual and measured inspections, as well as testing the total bus operation. The tests will be conducted and documented in accordance with written test plans approved by the Authority. The underfloor equipment will be available for inspection by the resident inspectors, using a pit or bus hoist provided by the Contractor. A hoist, scaffold or elevated platform will be provided by the Contractor to easily and safely inspect bus roofs. Delivery of each bus will require written authorization of the primary resident inspector. Authorization forms for the release of each bus for delivery will be provided by the Contractor. An executed copy of the authorization will accompany the delivery of each bus.

Additional tests may be conducted at the Authority’s discretion to ensure that the completed buses have attained the required quality and have met the requirements in “Technical Specifications.” The Authority may, prior to commencement of production, demand that the Contractor demonstrate compliance with any requirement in that section if there is evidence that prior tests have been invalidated by the Contractor’s change of Supplier or change in manufacturing process. Such demonstration will be by actual test, or by supplying a report of a previously performed test on similar or like components and configuration. Any additional testing will be recorded on appropriate test forms provided by the Contractor and will be conducted before acceptance of the bus.

The pre-delivery tests will be scheduled and conducted with 30 days' 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, will be filed with the assembly inspection records for each bus.

Visual and Measured Inspections
Visual and measured inspections will be conducted with the bus in a static condition. The purpose of the inspection testing includes verification of overall dimension and weight requirements, that required components are included and are ready for operation, and that components and subsystems designed to operate with the bus in a static condition do function as designed.
**Total Bus Operation**

Total bus operation will 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 will be driven for a minimum of 15 miles during the road tests. If requested, computerized diagnostic printouts showing the performance of each bus will be produced and provided to the Authority. Observed defects will be recorded on the test forms. The bus will be retested when defects are corrected and adjustments are made. This process will continue until defects or required adjustments are no longer detected.

**Post-Delivery Tests**

The Authority will conduct acceptance tests on each delivered bus. These tests will be completed within 15 days after bus delivery and will be conducted in accordance with the Authority’s 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 the Authority. The post-delivery tests will include visual inspection and bus operations. No post-delivery test will apply new criteria that are different from criteria applied in a pre-delivery test.

Buses that fail to pass the post-delivery tests are subject to non-acceptance. The Authority will record details of all defects on the appropriate test forms and will notify the Contractor of acceptance or non-acceptance of each bus, after completion of the tests. The defects detected during these tests will be repaired according to procedures defined in the contract.

**Prototype/Pilot Vehicle Acceptance**

In order to assess the Contractor’s compliance with the Technical Specifications, the Authority and the Contractor will, at the Pre-Production Meeting, jointly develop a Configuration and Performance Review document for review of the pilot vehicle. This document will become part of the official record of the Pre-Production Meeting.

Potential dimensional/performance tests that may be included in the Configuration and Performance Review include the following:

- Complete electrical system audit
- Dimensional requirements audit
- Seating capacity
- Water test
- Water runoff test
- Function test of systems/subsystems and components
- Sound/noise level tests
- Vehicle top speed
- Acceleration tests
- Brake stop tests
- Airflow tests
- PA function tests
- Air/brake system audit
- Individual axle weight
- Standee capacity
- Body deflection tests
- Silent alarm function test
- Interior lighting
- Exterior lighting
- Gradability test
- Kneeling system function
- HVAC pull down/heat
- Speedometer
- Outside air infiltration (smoke)
- Wheelchair ramps
• Engine or propulsion system performance qualification

This test will be jointly conducted by the Contractor and the propulsion system manufacturer (including but not limited to charge air cooler performance, air to boil test, loss of coolant, fuel system electrical inputs and propulsion protection system).

• Transmission performance qualifications

This test will be jointly conducted by the Contractor and the transmission manufacturer (including but not limited to retarder operation, heat exchanger, interface with ABS and electrical inputs).

**Buy America Audit**

A post-delivery Buy America audit is required for federally funded bus procurements (see 49 CFR Part 663 for additional information). The onsite resident inspectors are to monitor the production processes to verify compliance with final assembly requirements identified by the Buy America pre-award audit. This audit is to verify compliance with final assembly requirements and final documentation of Buy America compliance and must be completed prior to title transfer.

**NOTE:** If there is not a pilot/prototype bus, then the Buy America post-delivery audit should be performed following completion of the first serial production bus. In addition to monitoring of the production processes, the Authority must verify compliance that more than 65 percent of the costs of all components are produced in the United States. Finally, the Authority must execute the required certificates.

**Resident Inspection Process for Serial Production**

At the discretion of the Authority, a decision is made to perform resident inspection using the Authority’s personnel, a contract inspector, or a combination of both. The decision is based on factors such as the availability of personnel, knowledge/expertise in bus build project management, the size of the bus order, etc.

**Inspector Responsibilities**

The resident inspection process for the serial production of the buses begins following the completion and acceptance of the prototype or pilot vehicle if required, or according to the serial bus production schedule. Resident inspectors should represent the Authority for all build-related issues (quality, conformance, etc.). Resident inspectors can also address contractual type issues but should only do so under the consult of the Authority’s contracts administrator. Resident inspectors are sent to the manufacturer’s facility according to a Resident Inspection Schedule. Typically, one or two inspectors arrive onsite at the manufacturing facility about one week prior to actual production to setup the resident inspection process and to begin preliminary quality assurance inspections for items such as power plant build-up and wire harness production, and to inspect incoming parts, fasteners, fluids, etc., that will be used in the production of the buses.

During the serial production of the buses, the resident inspectors should monitor the production of each bus, verifying the quality of materials, components, sub-assemblies and manufacturing standards. In addition, the configuration of each vehicle should be audited using the vehicle manufacturer’s Build Specification and other documents to ensure contract compliance and uniformity.

**Inspector Rotation/Scheduling**

During the resident inspection phase, a single inspector or multiple inspectors could be used. If it is decided to use multiple inspectors, then the inspectors could be rotated on a biweekly to monthly basis as required. During the rotation of inspectors, a sufficient period of overlap should be provided to guarantee the consistency of the resident inspection process.

**Resident Inspector Orientation**

A resident inspector orientation by the bus manufacturer should take place upon the arrival of the initial inspection team. The orientation should include expectations for the use of personal protective equipment (safety shoes, safety glasses, etc.), daily check-in and check-out requirements, lines of communication, use of production documents such as speed memos and line movement charts, inspector/production meetings, inspector office arrangements, and anything else pertinent to the inspection team’s involvement during the build. Many of the above items should already be formalized during the Pre-Production Meeting.
Audits, Inspections and Tests
The resident inspection process monitors the production of each vehicle. Inspection stations should be strategically placed to test or inspect components or other installations before they are concealed by subsequent fabrication or assembly operations. These locations typically are placed for the inspection of underbody structure, body framing, electrical panels and harnesses, air and hydraulic line routings, installation of insulation, power plant build-up and installation, rust inhibitor/undercoating application, floor installation, front suspension alignment, and other critical areas.

Vehicle Inspections
Each bus is subjected to a series of inspections after the bus reaches the point of final completion on the assembly line. Typically, the vehicle manufacturer performs its own quality assurance inspections following assembly line completion before releasing each bus to the resident inspectors. The inspections for each vehicle are documented, signed off upon passing and included in the vehicle record.

These are the typical inspections performed on each bus by the resident inspectors:

- Water test inspection
- Road test inspection
- Interior inspection (including functionality)
- Hoist/undercarriage inspection
- Exterior inspection (including roof)
- Electrical inspection
- Wheelchair ramp/lift inspection

Water Test Inspection
The water test inspection checks the integrity of the vehicle’s body seams, window frame seals and other exterior component close-outs for their ability to keep rainwater, road splash, melting snow and slush, and other exterior water from entering the inside of the vehicle. The vehicle’s interior is inspected for signs of moisture and water leaks. To perform the leak inspection, interior ceiling and side panels are removed, and access doors are opened. If any moisture or water is detected, then the source of the leak will be located and repaired by the manufacturer, and the vehicle will be tested again.

Road Test Inspection
The road test inspection checks all the vehicle’s systems and subsystems while the vehicle is in operation. Typically, the road test inspection is performed immediately following the water test inspection to reveal any standing water that may be present due to a leak, but was not noticed during the “static” water test. Objectionable vibrations, air leakage and other factors that affect ride quality are recorded and reported to the vehicle manufacturer for resolution. Vehicle stability, performance, braking and interlock systems, HVAC, and other critical areas are checked to ensure that the vehicle is complete and ready to provide safe and reliable service.

The following tests may be performed and recorded during the road test:

- Acceleration test
- Top speed test
- Gradeability test
- Service brake test
- Parking brake test
- Turning effort test
- Turning radius test
- Shift quality (if Applicable)
- Quality of retarder or regenerative braking action

During the road test, a vehicle may be taken to a weigh station to record the vehicle’s front axle weight, rear axle weight and total vehicle (curb) weight.

Interior Inspection
The interior inspection checks the fit and finish of the interior installations.
In addition, the inspection also verifies the installation and function of systems and subsystems according to the Build Specification. All systems and functions accessed from the interior are inspected for functionality, appearance and safety. Examples of systems/functions inspected include the following:

- Interior and exterior lighting controls
- Front and rear door systems
- Flooring installation
- Passenger and operator’s seat systems
- Wheelchair securement and ramp systems
- Fire suppression system
- Electrical installations (multiplex, tell-tale wiring, panels, etc.)
- Window systems and emergency escape portals
- Operator dash/side panel controls/indicators

**Hoist/Undercarriage Inspection**
The hoist/undercarriage inspection checks the installation of components, wiring, air lines, presence of fluid leaks, etc., located under the vehicle. Typically, this inspection is performed following the road test. The vehicle is lifted onto a hoist or pulled over a pit for the inspection. Areas inspected are the front suspension, air bags, airline routings, electrical connections and routings, drivetrain components, linkages and any other system or component that may be prone to early failure due to inadequate installation techniques. All lines, cables, hoses, etc., are inspected for proper securement and protection to prevent rubbing, chafing or any other condition that could result in a failure. The propulsion system and HVAC compartments are also inspected during this time.

**Exterior Inspection**
The exterior inspection checks the fit and finish of components installed on the exterior of the vehicle. Access panels are opened and accessories are inspected for proper installation. In addition, vehicle paint, graphics and proper decals are also inspected. Acceptable paint finish quality (orange peel, adhesion, etc.) should be agreed on with the vehicle manufacturer prior to production to ensure consistency of inspections.

**Electrical Inspection**
The vehicle’s main electrical panels and other subpanels are inspected for proper components, to include relays, fuses, modules, terminal strips, decals, etc. In addition, electrical harnesses are inspected for proper wiring and termination techniques, bulkhead protection, looming and other items that could result in future electrical failure. Onboard vehicle compartment schematics are verified for accuracy.

**Wheelchair Ramp Inspection**
The wheelchair ramp assembly is inspected for proper installation and performance. Clearances critical to the operation of the ramp are verified, and the ramp’s electrical systems are inspected to ensure appropriate wire routings and protection. The successful integration of the ramp assembly into the vehicle is verified, and the vehicle interlocks are checked during automatic and manual ramp operation.

**Audits**
During serial production of the bus’s quality assurance inspection, tests may be performed to ensure that the manufacturer’s quality standards are being followed. These inspection audits could be on items such as torque wrench calibrations, proper techniques for fastener installations, proper use and type of adhesives, use of correct installation drawings on the production line, etc.

**Communications**
The lines of communications, formal and informal, should be discussed and outlined in the Pre-Production Meeting. As previously discussed, resident inspectors should represent the Authority for all bus-build related issues (quality, conformance, etc.). Resident inspectors can relay communications addressing contractual type issues but should do so only under the approval of the Authority’s contract administrator. Actual personnel contacts for the manufacturing facility should be established during resident inspector orientation. These contacts could include quality assurance, production, material handling, engineering and buy-off area personnel.

**Documentation**
The following documents/reports are typically generated during the bus build process:
• Vehicle build specification
• Sales order
• Pre-Production Meeting notes
• Prototype and production correspondence (vehicle build file)
• Manufacturer’s vehicle record (Warranty file)

Vehicle line documents
Serialization documents (Warranty file)
Alignment verification
Brake testing
HVAC testing and checkout
Manufacturer’s QA checklist and signoff
Weight slip (prototype and Warranty file)
Prototype performance tests document (vehicle build file)
  Acceleration Test
  Top Speed Test
  Gradeability Test
  Interior Noise Test A – Stationary
  Interior Noise Test B – Dynamic
  Exterior Noise Test A – Pull Away
  Exterior Noise Test B – Pass-By
  Exterior Noise Test C – Curb Idle
  Turning Radius Test
  Turning Effort Test
  Parking Brake Test
  Service Brake Test

Vehicle acceptance inspections—production (Warranty file)
  Water Test Inspection Report
  Road Test Inspection Report
  Interior Inspection Report
  Hoist/Undercarriage Inspection Report
  Exterior Inspection Report
  Electrical Inspection Report
  Wheelchair Inspection Report

Speed Memos (Warranty file)
Authority Vehicle Inspection record (Warranty file)
Release for delivery documentation (Warranty file)
Post-Production Acceptance – Certificate of Acceptance (Accounting)
Post-Delivery Inspection Report – (Fleet Management & Warranty files)

Vehicle Release for Delivery
Upon satisfactory completion of all inspection, audit and test criteria, and resolution of any outstanding issues affecting
the purchase of any or all buses, proper documentation (the Release for Delivery) is signed by the designated resident
inspector authorizing the bus manufacturer to deliver the vehicle to the Authority’s facility, where it will undergo a post-
delivery inspection process and final acceptance. The satisfactory sign-off of the Release for Delivery should complete the
resident inspector’s duties for each bus. In final preparation for delivery, the bus manufacturer may request the resident
inspector to do a final walk-through of the bus after it has been cleaned and prepped for shipping.

Post-Delivery and Final Acceptance
The Authority will conduct acceptance tests on each delivered bus. These tests will be completed within 15 days after bus
delivery and will be conducted in accordance with the Authority’s 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 the Authority. The post-
delivery tests will include visual inspection, along with a verification of system(s) functionality (including fueling systems)
and overall bus operations. No post-delivery test will apply new criteria that are different from criteria applied in a pre-
delivery test.
Buses that fail to pass the post-delivery tests are subject to non-acceptance. The Authority will record details of all defects on the appropriate test forms and will notify the Contractor of acceptance or non-acceptance of each bus within five days after completion of the tests. The defects detected during these tests will be repaired according to procedures defined in the contract after non-acceptance.

Certificate of Acceptance

• Accepted

• Not accepted: In the event that the bus does not meet all requirements for acceptance, the Authority must identify reasons for non-acceptance and work with the OEM to develop a timeline of addressing the problem for a satisfactory resolution and redelivery.

• Conditional acceptance: In the event that the bus does not meet all requirements for acceptance, the Authority may conditionally accept the bus and place it into revenue service pending receipt of Contractor furnished materials and/or labor necessary to address the identified issue(s).
REQUISITION: C20FT102342998
RFP FOR DIESEL BUSES

Volume 2 - U.S. Employment Plan and Forms

This Exhibit provides instructions for submitting a U.S. Employment Plan, which addresses the U.S. employment that Proposer expects to create and/or retain in association with this requisition.

The purpose of the U.S. Employment Plan is to capture relevant information about the number, description of and access to U.S. jobs created and/or retained by the Proposer. This exhibit explains how Proposers are to submit the U.S. Employment Plan and Forms setting forth their specific commitments for creating and/or retaining employment opportunities in the United States in connection with the production, delivery, acceptance, testing, and warranty coverage requirements for this Request for Proposal (RFP) C20FT102342998 for the Contract Base Order and Option quantities, to the best of the Proposers’ ability, at the time of Proposal Due Date.

The FTA’s Buy America and Transit Vehicle Manufacture (TVM) requirements apply to this requisition as set forth in Attachment G - Buy America Certification, and Attachment M – TVM Certification. This U.S. Employment Plan is in addition to the Buy America and TVM requirements and does not in any way revise or reduce the FTA’s Buy America and TVM requirements.

The U.S. Employment Plan should address the following:

1. **Compensation**: Proposers should submit the U.S. Employment Plan - Jobs Labor Value Form provided in this exhibit.

   The U.S. Employment Plan should provide the number of FTE jobs proposed to be created and/or retained under the U.S. Employment Plan, the direct dollar value of those jobs, the fringe benefit costs for those jobs, and the commitment the Proposer will make to achieve that level of retained jobs and new job creation in the United States. Include an identification of the number, type (by trade or craft), and compensation ranges for each of the employment types, duration and location of the jobs to be created or retained in the U.S.

   Only work performed specifically for the Diesel Bus Contract is to be used to measure FTE jobs. Workers who also work on other projects may only be counted as a percentage of one Full-Time Equivalent (FTE), which percentage reflects the percentage of their time spent working on the Diesel Bus Contract. (For example, if a worker’s work hours are allocated 50% to the Diesel Bus order and 50% to another Bus contract order or other work, a Proposer may count that worker as 1/2 FTE for purposes of its U.S. Employment Plan). Proposers should specify the direct hours to be expended and FTEs to be worked by submitting the certification and forms provided in this exhibit. Proposers should include any Subcontractors/Suppliers participating in their U.S. Employment Plan by submitting the certification provided in this exhibit.
2. **U.S. Production Sites**: The U.S. Employment Plan should identify the locations in the U.S. of final assembly and manufacture of the buses, including any evidence of the Proposer’s commitment to these locations such as a letter of intent, lease, purchase agreement or existing ownership of the site, if available. The U.S. Employment Plan shall also identify any other sites in the U.S. owned or controlled by the Proposer where Proposer anticipates that a significant increase in activities and employment or jobs retention would occur as a result of this requisition. The U.S. Employment Plan shall also describe any investments or upgrades to existing U.S. facilities that would occur as a result of this requisition.

3. **Description of Jobs Created and/or Retained**: The U.S. Employment Plan should describe the quality and range of employment opportunities proposed to be created and/or retained under the U.S. Employment Plan, the minimum requirements for each job/skill category proposed on the Jobs Labor Value Form, including the extent to which the plan is likely to produce or retain long-term employment in skilled or trade labor.

4. **U.S. Employment Plan Certification**: The U.S. Employment Plan should be accompanied by a certification, provided in this exhibit, executed by a corporate officer of the Proposer and of Subcontractors/Suppliers (as applicable), that certifies the information provided in the U.S. Employment Plan is true and correct.

5. **Workforce Training Plans**: Provide the Proposer’s dollar commitment to be made for workforce development, apprenticeship, and training programs.

Proposers should identify applicable, transferrable credentialing opportunities that will be offered to new hires and plans for coordinating with existing programs for workforce development, apprenticeship and training. Proposers are to provide details and plans for coordinating with publicly and privately funded workforce development, apprenticeship and training programs.

Proposers should describe the percentage of jobs by each job category or type that they expect will be filled at the journeyman, apprentice/trainee, untrained entry level, any other skill level, the specialized skills or certifications for each job type, plans to develop skills of new hires or retrained retained workers necessary to meet the basic qualifications of the jobs, and the extent to which such skills would be transferrable to other manufacturing positions after the end of production of the diesel buses.

6. **Outreach and Recruitment Plans for New Hires**: The U.S. Employment Plan should describe strategies and plans for the recruitment of new workers including any special outreach for entry level positions that will include training in contemporary manufacturing skills. The proposer should include the specific strategies for recruiting disadvantaged workers.

7. **Disadvantaged Worker Outreach, Training, and Employment**: The U.S. Employment Plan should describe the specific outreach and/or pre-employment training that will be done to recruit disadvantaged workers for the jobs created by the project. A disadvantaged worker is a worker certified under the Workforce Innovation and Opportunity Act or a worker whose permanent residence is in an economically disadvantaged zip code. The proposer should describe any partnerships or agreements with other parties for this
Volume 2 - U.S. Employment Plan and Forms

outreach, training, and employment. The proposer shall also report the disadvantaged workers working on the project in their Reports.

8. **Proposers and Subcontractors/Suppliers**: Proposers are to describe their approach to encourage subcontractor and supplier participation.

Proposers and any Subcontractors/Suppliers who participate in the U.S. Employment Plan must certify that they have an internal Cost Accounting System that provides for the segregation of direct work hours and costs for this contract that can be utilized by CTA to verify the information provided in the U.S. Employment Plan and Forms. Certification forms are provided in this exhibit.

9. **Plan Administrator**: Provide a description of the duties to be assigned to an employee of the Proposer for the administration of the U.S. Employment Plan (the “Plan Administrator”). No later than Contract Notice-to-Proceed, provide the name of the Plan Administrator and contact information: name, title/position, company, address, city, state, zip, telephone number and email address.

10. **Evaluation of the U.S. Employment Plan**: Failure to provide the U.S. Employment Plan and Forms will not preclude Proposers from participating in the procurement. However, the U.S. Employment Plan is part of the evaluation criteria utilized in the evaluation process. Proposals submitted with or without the U.S. Employment Plan and Forms will be evaluated in accordance with the Instructions to Proposers, Section 4 – Evaluation Process and Basis of Award

A. **OBLIGATIONS OF CONTRACTOR AFTER AWARD**

The Contractor shall implement the U.S. Employment Program (“Employment Program”) as approved by CTA and set forth in the Instructions to Proposers, Exhibit 2 – U.S. Employment Plan and Forms. The Employment Program implemented during the performance of the Contract shall be consistent with the U.S. Employment Plan submitted by the Contractor in response to Requisition C20FT102342998 - RFP to Purchase Diesel Buses and shall contain at least the same level of effort in terms of overall Contractor financial commitment, hours of work, expenditures for training activities, creation and/retention of Full Time Equivalent (FTE) employment positions, and related substantive commitments.

B. **FULL TIME EQUIVALENT (FTE) POSITIONS**

The FTE Positions created and/or retained under the Contractor’s Employment Program shall:

1. Include new and retained Contractor and Subcontractor/Supplier employees who will provide work hours directly allocable to the Diesel Bus Contract. Workers who also work on other projects may only be counted to the extent they perform work allocable to the Diesel Bus Contract. The percentage of time that a worker will work on the Diesel Bus Contract order may be counted as a percentage of one FTE.
C. REPORTS

The Contractor shall submit quarterly progress (reports) to CTA detailing its adherence to the commitments made in its Employment Program. The quarterly report shall summarize the major actions taken during the prior quarter during implementation of the Employment Program, and shall:

1. Specify the total number of Full Time Equivalent (FTE) jobs in that quarter by type (trade or craft), duration, and location, and the annual value of those jobs (expressed in direct Diesel Bus Contract hours expended and people hired and/or retained);
2. Describe any outreach or recruiting activity for the project, including outreach to disadvantaged individuals;
3. Describe the workforce development, apprenticeship and training programs carried out during that quarter, the number of persons trained and type of training they received and the amount expended by the Contractor for such programs related to the CTA’s Diesel Buses; and
4. Describe the extent to which the Employment Program is creating or retaining long-term employment in skilled or trade labor. If any such report indicates that the Contractor has failed to achieve the FTE commitment set forth in its Employment Program for the time period involved, the report shall include a Corrective Action Plan (“CAP”) designed to achieve the required level of FTEs.

D. NON-COMPLIANCE

The Contractor shall implement the Employment Program as approved by CTA. Failure of the Contractor to comply with any material commitment in its Employment Program, reporting or other requirement of this Exhibit may be considered a breach of the Contract. If a CAP has not been provided to and approved by CTA, CTA will notify the Contractor in writing and will provide the Contractor with thirty (30) days to correct such non-compliance or document its Good Faith Efforts. If such non-compliance is not corrected to the satisfaction of CTA or Good Faith Efforts are not approved within such 30-day period (or longer as CTA may in its discretion allow), CTA may exercise any or all remedies available under the contract for Contractor’s failure to perform.

E. AUDIT REQUIREMENTS

In addition to the routine and standard audit requirements included in the Contract, the Contractor and its Subcontractors and Suppliers may be subject to audit at any reasonable time following advance notice for validation of adherence to the Employment Program, including verification of work hours allocated to the Diesel Bus Contract.
## U.S. EMPLOYMENT PLAN
### JOBS LABOR VALUE FORM

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Up to 600 Diesel buses
C20FT102342998  
RFP TO PURCHASE DIESEL BUSES  
BASE PLUS OPTION 1  

U.S. EMPLOYMENT PLAN  
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Up to 600 Diesel buses
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Up to 600 Diesel buses
# RFP TO PURCHASE DIESEL BUSES
## BASE PLUS OPTIONS 1, 2 & 3

### U.S. EMPLOYMENT PLAN

#### JOBS LABOR VALUE FORM

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<td>Work Category</td>
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<td>Hired/Retained Persons</td>
<td>Start Date Working on CTA Buses</td>
<td>End Date Working on CTA Buses</td>
<td>Total Man Months</td>
<td>Hourly Pay Rate</td>
<td>Annual Base Pay per Worker Assumining 2000 Hours</td>
<td>Monthly Direct Full-time Cost Per Employee</td>
<td>Monthly Direct Overtime Cost Per Employee</td>
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<td>Total Monthly Cost Per Employee</td>
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Up to 600 Diesel buses
C20FT102342998
RFP TO PURCHASE DIESEL BUSES
BASE PLUS OPTION 1, 2, 3 & 4

U.S. EMPLOYMENT PLAN
JOBS LABOR VALUE FORM

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<th>A</th>
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<td>End Date Working on CTA Buses</td>
<td>Total Man Months</td>
<td>Hourly Pay Rate</td>
<td>Annual Base Pay per Worker Assuming 2080 hours</td>
<td>Monthly Direct Full-time Cost Per Employee</td>
<td>Monthly Direct Overtime Cost Per Employee</td>
<td>Monthly Fringe Benefits Cost Per Employee</td>
<td>Total Monthly Cost Per Employee</td>
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Up to 600 Diesel buses
# RFP TO PURCHASE DIESEL BUSES
## BASE PLUS OPTIONS 1, 2, 3, 4 & 5

### U.S. EMPLOYMENT PLAN
#### JOBS LABOR VALUE FORM

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<td>Total Man Months</td>
<td>Hourly Pay Rate</td>
<td>Annual Base Pay per Worker Assuming 2060 hours</td>
<td>Monthly Direct Full-time Cost Per Employee</td>
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**C20FT102342998**

Up to 600 Diesel buses
<table>
<thead>
<tr>
<th>COLUMN</th>
<th>TITLE</th>
<th>REFERENCE INFORMATION</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>City/State</td>
<td>Physical work location of hired employee</td>
</tr>
<tr>
<td>C</td>
<td>Work Category</td>
<td>Group of one or more work items that contain similar work types are classified into a category. Other Work Categories identified by the Proposer may be added to the items listed on the worksheet</td>
</tr>
<tr>
<td>D</td>
<td>Job/Skill Category</td>
<td>Job/Skill category for the employee's type of work and/or responsibilities</td>
</tr>
<tr>
<td>E</td>
<td>Equivalent Persons</td>
<td>One FTE refers to one full-time employee based on 2,080 hours worked per year</td>
</tr>
<tr>
<td>F</td>
<td>Hired/Retained Persons</td>
<td>Head count of number of persons hired and retained.</td>
</tr>
<tr>
<td>G</td>
<td>Start Date working on CTA buses</td>
<td>Employee's start date</td>
</tr>
<tr>
<td>H</td>
<td>End Date working on CTA buses</td>
<td>Employee's last date</td>
</tr>
<tr>
<td>I</td>
<td>Total Man Months</td>
<td>FTE (Column E) multiplied by the number of months employed (Start date/Column G to End Date/Column H)</td>
</tr>
<tr>
<td>J</td>
<td>Hourly Pay Rate</td>
<td>Employee's Hourly Base Rate</td>
</tr>
<tr>
<td>K</td>
<td>Annual Base Pay Per Worker</td>
<td>Hourly Pay Rate (Column J) multiplied by 2,080 hours</td>
</tr>
<tr>
<td>L</td>
<td>Monthly Direct Full Time Cost of Employee</td>
<td>Direct wages per employee for regular hours worked</td>
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<tr>
<td>M</td>
<td>Monthly Direct Overtime Cost of Employee</td>
<td>Direct wages per employee for overtime hours worked</td>
</tr>
<tr>
<td>N</td>
<td>Monthly Fringe Benefits Cost of Employees</td>
<td>Employers provide group health insurance, paid time off (which includes vacation time, sick leave, etc.) and other forms of supplemental pay</td>
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<tr>
<td>O</td>
<td>Total Monthly Cost of Employees</td>
<td>Total monthly cost per employee (Sum of columns L, M and N)</td>
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<td>P</td>
<td>Project Cost of Employment</td>
<td>Multiply the Total Man Months (column I) by the Total Monthly cost of employee (column O) to obtain the extended costs for local labor and benefits over full term of the project</td>
</tr>
</tbody>
</table>
U.S. EMPLOYMENT PLAN
CONTRACTOR CERTIFICATION

I [name of Corporate Officer] certify that the information provided in the U.S. Employment Plan submitted by [name of Proposer] is true and correct to my knowledge, and that [name of Proposer] has an internal Cost Accounting System that provides for the segregation of work hours and costs that can be utilized to verify the information provided in the U.S. Employment Plan, and reports provided pursuant to the U.S. Employment Program.

Executed on ________________, 2020 at _____________________
Date Location

__________________________  ____________________________  ________________________
Typewritten or Printed Name  Signature of Corporate Officer  Title
U.S. EMPLOYMENT PLAN
SUBCONTRACTOR/SUPPLIER CERTIFICATION

I [name of Corporate Officer] certify that the information provided regarding
[name of subcontractor or supplier] in the U.S. Employment Plan submitted by
[name of Proposer] is true and correct to my knowledge, and that [name of
Subcontractor or supplier] has an internal Cost Accounting System that
provides for the segregation of work hours and costs that can be utilized to
verify the information provided in the U.S. Employment Plan, and reports
provided pursuant to the U.S. Employment Program.

Executed on ________________, 2020 at ____________________
Date Location

__________________________
Typewritten or Printed Name

__________________________
Signature of Corporate Officer

__________________________
Title
VOLUME 3: PRICE PROPOSAL FORMS AND CERTIFICATIONS

Attachment A - Price Proposal and Price Proposal Form
Attachment B – Insurance and Bond Requirements and Form of Performance Bond
Attachment C - Certification of Primary Participant
Attachment D - Certification of Lower Tier Participant
Attachment E - Lobbying Certification (Prime and Subcontractor)
Attachment F - Certification Regarding a Drug Free Workplace
Attachment G - Buy America Certification
Attachment H - Disclosure of Ownership and Interests Affidavit (Prime and Subcontractor)
Attachment I - Affidavit of Minimum Wage Payment
Attachment J - Affidavit of Prompt Payment
Attachment K - RFP Non-Disclosure of Statement (Prime and Subcontractor)
Attachment L - FOIA Notice and Declaration
Attachment M - TVM Certification
Attachment N - Request for Pre-Offer Change or Approved Equal
Attachment O - Contractor’s Service and Parts Support Data
Attachment P - Form for Proposal Deviation
Attachment Q - Pre-Award Evaluation Data Form
Attachment R - Certification of Compliance with Bus Testing Requirements
Attachment S - Federal Motor Vehicle Safety Standards
Attachment T - Location of Principal Points of Engineering and Assembly
Attachment U - Vehicle Questionnaire
Attachment V - Vendor References Form
Attachment W - Table of Exceptions
Attachment X - Acknowledgement of Addenda
Attachment Y – Proposer’s Signature Page and CTA Acceptance Page
C20FT102342998

ATTACHMENT A

PRICE PROPOSAL AND PRICE PROPOSAL FORM
1. Base Proposal and Bus Options

1.1. Base Bus Price

<p>| | |</p>
<table>
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<tr>
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<tbody>
<tr>
<td>A. Base Bus Price / Unit</td>
<td>A</td>
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<tr>
<td>B. Total Base Bus Price (100 Base Buses)</td>
<td>B = (A*100)</td>
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<tr>
<td>C. * Total Option Pricing (500 Additional Buses)</td>
<td>C = (B*5)</td>
</tr>
<tr>
<td>D. Grand Total Price (Base + Options)</td>
<td>D = (B + C)</td>
</tr>
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</table>

Bus Pricing includes all Deliverables, including but not limited to the following items: training, training mock-ups, parts lists, and maintenance manuals.

**Bus Options:**

* Five (5) Options to Purchase up to Five Hundred (500) Additional Buses. Each Option is One Hundred (100) Buses and will be the unit cost of the Base Bus multiplied by the Producer Price Index as described in more detail in the Bus Contract Terms SP 3. Options and Option Pricing. By submitting its proposal, Contractor agrees to sell up to an additional 500 option buses to the CTA at the adjusted price as described in this paragraph and in Bus Contract Terms SP3.
2. Bus (Base & Option Order) Add-On Options

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<th>Description</th>
<th>Cost Per Bus</th>
<th>Comment</th>
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<td>TS 90.1 Events Data Recorder (EDR)</td>
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<td>Pricing Per Bus</td>
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Contractor should provide additional information (e.g. costing and details) on extended warranties Recommended Capital Spare Parts, Recommended Preventive Maintenance SP List.
3. **Sub Component Option List**

BID OPTION PRICING: Provide base and five (5) options of each category below:

### 3.1 Transmission (TS 11)

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### 3.2 Doors (TS 78)

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### 3.3 HVAC (TS 52)

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### 3.4 Auxiliary Heater (TS 53.1)

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### 3.5 E-Fan Cooling System (TS 10)

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### 3.6 Bus Info Screens (TS 89)

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### 3.7 Passenger Seating (TS 76)

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### 3.8 Air Dryer (TS 37.5)

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### 3.9 Ramps (TS 79)

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### 3.11 Driver's Barrier (TS 73.1)

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### 3.12 Drive Axle (TS 33)

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<tr>
<td>Option DA3</td>
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<tr>
<td>Option DA4</td>
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<tr>
<td>Option DA5</td>
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<td></td>
</tr>
</tbody>
</table>

### 3.13 Destination Signs (TS 80)

<table>
<thead>
<tr>
<th>Option</th>
<th>Make</th>
<th>Model</th>
<th>Price Difference</th>
<th>Recon Cost</th>
<th>Base Warranty</th>
<th>Maximum Extended Warranty</th>
<th>Extended Warranty Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>N/A</td>
<td></td>
<td>N/A</td>
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<tr>
<td>Option DS1</td>
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<tr>
<td>Option DS2</td>
<td></td>
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<tr>
<td>Option DS3</td>
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<tr>
<td>Option DS4</td>
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<tr>
<td>Option DS5</td>
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</tr>
</tbody>
</table>

### 3.14 Bike Rack (TS 68.5)

<table>
<thead>
<tr>
<th>Option</th>
<th>Make</th>
<th>Model</th>
<th>Price Difference</th>
<th>Recon Cost</th>
<th>Base Warranty</th>
<th>Maximum Extended Warranty</th>
<th>Extended Warranty Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>N/A</td>
<td></td>
<td>N/A</td>
<td></td>
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<tr>
<td>Option BR1</td>
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<td>Option BR2</td>
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<tr>
<td>Option BR3</td>
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</tr>
<tr>
<td>Option BR4</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Option BR5</td>
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</tr>
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</table>
### 3.15 Exterior Mirrors (EM) (TS 47.8)

<table>
<thead>
<tr>
<th>Option</th>
<th>Make</th>
<th>Model</th>
<th>Price Difference (Delta from Base)</th>
<th>Recon Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td></td>
<td>N/A</td>
<td></td>
<td></td>
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<tr>
<td>Option EM1</td>
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<tr>
<td>Option EM2</td>
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<td>Option EM3</td>
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<tr>
<td>Option EM4</td>
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<tr>
<td>Option EM5</td>
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</tbody>
</table>

- Contractor shall supply dimensions and dynamic range of the mirror and mirror housing assembly for the base mirror and all options.
Price Proposal Form

NOTE: The following is an example of a Proposal form to be modified as appropriate by the Agency and included in the RFP.

Proposer shall complete the following form and include it in the price Proposal.

PROPOSAL
By execution below by a duly authorized representative(s) of the Proposer, the Proposer hereby offers to furnish equipment and services as specified in its Proposal submitted to Chicago Transit Authority in response to Request for Proposal No. C20FT102342998 - MANUFACTURE AND DELIVERY OF A BASE ORDER OF ONE HUNDRED (100) DIESEL ENGINE TRANSIT BUSES; WITH FIVE (5) OPTIONS TO PURCHASE UP TO FIVE HUNDRED (500) ADDITIONAL BUSES AND ASSOCIATED SPARE PARTS.

Proposer: ____________________________________________________________

Street address: ______________________________________________________

City, state, ZIP: ______________________________________________________

Name and title of Authorized Signer(s): _________________________________

Name and title of Authorized Signer(s): _________________________________

Phone: __________________________________________________________________

_________________________________________________________

Authorized signature                                           Date

_________________________________________________________

Authorized signature                                           Date
C20FT102342998

ATTACHMENT B

INSURANCE AND BOND REQUIREMENTS

AND FORM OF PERFORMANCE BOND
PART I. GENERAL INSTRUCTIONS AND REQUIREMENTS

A. WAYS TO COMPLY WITH CTA INSURANCE REQUIREMENTS.

1. HOW TO COMPLY IF CGL, AUTOMOBILE LIABILITY, OWNERS PROTECTIVE LIABILITY, BUILDER’S RISK INSURANCE, CONTRACTORS POLLUTION LIABILITY, WORKERS COMPENSATION AND/OR PROFESSIONAL LIABILITY ARE REQUIRED BY PART III OF THIS DOCUMENT.

Contractors must provide the CTA with the following documents:

a) CTA Certificate of Coverage on the CTA approved form. The CTA Certificate of Coverage may be completed only by an authorized representative of the insurance company, an agent, broker, or underwriter. Certificates of Insurance must disclose all deductibles and/or self insured retentions.

b) Certified copy of the insurance policy

Methods (a) is a temporary method that is valid only for 90 days. Policies must be furnished prior to the expiration of this 90 day period. Failure to provide policies before expiration of this 90 day period is a material breach of the Contract which may result in default and, if uncured, termination for default.

2. HOW IS RAILROAD PROTECTIVE LIABILITY INSURANCE SATISFIED? THE CTA’s RAILROAD PROTECTIVE LIABILITY PROGRAM PROVIDES $2,000,000 PER OCCURRENCE/$6,000,000 AGGREGATE LIMITS. TO BE IN COMPLIANCE WITH THE RAILROAD PROTECTIVE REQUIREMENTS, SEE PART III.B OF THIS DOCUMENT.

- For work performed within fifty (50) feet of rail right-of-way, the work of the Contractor is covered through the Blanket Railroad Protective policy.
- The contractor must provide evidence that the CGL policy exclusion for work within fifty (50) feet of rail right of way has been deleted by endorsement to their CGL policy.

The CTA may cancel the Blanket Railroad Protective Liability Policy prior to the expiration of coverage. If cancelled, The CTA agrees to provide the contractor with 30 days prior written notice.

If any portion or all of the need for or cost of such insurance shall result from Contractor’s breach of this Contract, such insurance costs shall be a non-reimbursable cost to Contractor CTA reserves the right to review the remaining project scope and to determine if the work to be performed within fifty (50) feet of rail right of way requires Railroad Protective Liability Insurance. The CTA further agrees that for premium expenses incurred by the Contractor for Railroad Protective Liability Insurance will be a reimbursable expense.
B. DEADLINE FOR INITIAL SUBMITTAL OF CONTRACTOR’S INSURANCE AND BOND DOCUMENTS.

The Contractor must furnish all required insurance and performance and payment bond documents within fourteen days of the date that the Contractor receives a letter (the “Insurance Submittal Letter”) from the CTA’s Director of Purchasing requesting the Contractor to submit the documents required by these Insurance and Bond Requirements. CTA will not execute the Contract until the required insurance and bond documents are delivered to CTA and approved by CTA. Failure to deliver the required documents within fourteen days of receipt of the Insurance Submittal Letter is a material failure to comply with the specifications and may result in any or all of the following at the CTA’s sole discretion:

1. debarment or suspension, and
2. determination of Contractor non-responsibility.

C. CTA ADDRESS.

All notices and documents must be mailed to the CTA at:

Chicago Transit Authority
Risk Compliance – Law Department
567 W. Lake St.
Chicago, IL  60661

D. OBLIGATION TO MAINTAIN CONTINUOUS COMPLIANCE

1. The Contractor expressly agrees that failure to comply and maintain compliance with all insurance and bond requirements shall constitute a material breach of the Contract which may result in default and, if uncured, termination for default under the contract. In addition, such failure, if uncured, may result in debarment and suspension.

2. The Contractor is prohibited from performing any work if Contractor has allowed any of the required insurance policies to expire.

PART II. INSURANCE REQUIREMENTS

A. The CTA must be named as an Additional Insured and Certificate Holder on all policies except Workers Compensation and Professional Liability. When the CTA is an additional insured, the coverage shall be primary.

B. The CTA must be the Named Insured on the Owners Protective Liability and Builders Risk Insurance policies.

C. The Commercial General Liability and Owners Protective Liability, General Aggregate Limit of Liability, if any, must apply on a per occurrence basis.

D. All insurance carriers must be acceptable to the CTA. All insurance companies shall have at least an A VII POLICY HOLDER RATING, or better, by the A.M. Best Co., Inc. Insurance companies with lower ratings will not be accepted. Carriers licensed to do business in the State of Illinois must issue all insurance, with the exception of Railroad Protective.

E. All insurance policies required by the CTA require the Contractor and its insurers to waive all rights of subrogation against the CTA.

F. The insurance to be carried shall in no way be subject to limitations, if any, expressed in the indemnity section of the General Conditions (or any statutory, judicial or common law limitations).
PART III. INSURANCE COVERAGE

A. WORKERS COMPENSATION

Coverage A: In form and in accordance with the laws of the State of Illinois.

Coverage B: Employers Liability:

- $1,000,000 Bodily Injury by Accident
- $1,000,000 Bodily Injury by Disease, Policy Limit

B. COMPREHENSIVE OR COMMERCIAL GENERAL LIABILITY:

- $3,000,000 General Aggregate
- $3,000,000 Products/Completed Operations Aggregate
- $3,000,000 Personal Injury and Advertising Injury
- $3,000,000 Per Occurrence

The Commercial General Liability policy shall include, without limitation: (i) Broad Form Contractual Liability, (ii) Products/Completed Operations to be maintained in full force and effect for a period of two (2) years following final completion of the work under the Contract, (iii) Independent Contractors’ Protective Liability, (iv) Premises/Operations, including deletion of explosion, collapse and underground (XCU) exclusions, (v) Broad Form Property Damage, including Products/Completed Operations, (vi) Bodily Injury and Personal Injury Liability, with employee and contractual exclusions deleted, (vii) Severability of Interest and Cross Liability endorsement and (viii) Contractor expressly agrees to waive, and will require its insurer to waive, its rights, benefits and entitlement under the "Other Insurance" clause of its Commercial General Liability policy, with respect to the CTA.

When work is to be performed within fifty (50) feet of rail right-of-way the Contractor will be enrolled as a participant in the CTA Blanket Railroad Protective program. In addition, Contractors and Sub-contractors are required to provide endorsements to their CGL policy eliminating the exclusion for work within fifty (50) feet of rail right-of-way.

a. Limits must be equal to the Railroad Protective Liability per occurrence limit of $2,000,000 per occurrence.
b. An endorsement must be provided deleting the contractual exclusion for work within 50’ of the rail right of way.
c. A certificate of insurance satisfying (a) and (b) above must be presented.

C. AUTOMOBILE LIABILITY

- $2,000,000 Combined Single Limit (Bodily Injury and Property Damage)
- N/A Uninsured/Underinsured Motorist Including Owned, Non-Owned, Hired and Borrowed Vehicles and Equipment

D. UMBRELLA LIABILITY

- $10,000,000 Each occurrence and in the aggregate, excess of the underlying policies.

The Umbrella Liability Policy shall specifically identify each of the policies described in A, B, and C above on the Schedule of Underlying Coverages, and shall provide coverage at least as broad as each of the underlying policies.
E. OWNERS PROTECTIVE LIABILITY

|                | N/A General Aggregate (Per Location) | N/A Per Occurrence | N/A Combined Single Limit (Bodily Injury and Property Damage Per Location) |

The definition of designated contractor must be amended to include contractors of every tier.

F. THE CTA WILL PROVIDE A BLANKET RAILROAD PROTECTIVE LIABILITY POLICY:

|                | N/A Bodily Injury/Property Damage per Occurrence | N/A Bodily Injury/Property Damage Aggregate |

G. CARGO LIABILITY/INLAND MARINE

$1,500,000 OCC/AGG

H. PROFESSIONAL LIABILITY

N/A PER CLAIM

I. OTHER INSURANCE: CTA NAMED ADDITIONAL INSURED ON THE GENERAL LIABILITY POLICY.

PART IV PERFORMANCE AND PAYMENT BOND REQUIREMENTS

A. The Contractor shall furnish separate Performance and Payment Bonds.

B. The surety or sureties issuing the bond must be acceptable to the Authority and must have a Best's Key Rating Guide of A VII or greater and be listed in the most recently published "Listing of Approved Sureties" of the U.S. Department of the Treasury Circular 570, with underwriting limitations in excess of the Contract Price. The bond must cover the warranty period required by the Contract.

C. The Performance Bond shall be for faithful performance of the Contract.

D. The Payment Bond shall be for security for the payment of all persons for furnishing materials, provisions, or other supplies, or items used in, upon, for, or about the performance of the Work contracted to be done, or for performing any Work or labor thereon of any kind.

E. The Authority reserves the right to require additional security under this Contract if any surety upon any bond furnished with this Contract becomes unacceptable to the Authority.

PART V. PERFORMANCE AND PAYMENT BONDS REQUIRED FOR THIS CONTRACT.

The Contractor must furnish a Performance Bond meeting the requirements in Part IV above equal to:

1. Initially, 10% of the Cost of Bus Manufacture and Delivery Work (including exercised options),
2. Reduced to 5% of the Cost of Bus Manufacture and Delivery Work (including exercised options) upon delivery and acceptance of all applicable buses, and
3. Reduced to zero, two (2) years following the delivery of the last bus.
The insurance policies and endorsements indicated below have been issued to the designated named insured with the policy limits as set forth herein covering the operation described within the contract involving the named insured and the Chicago Transit Authority. The Certificate issuer agrees that in the event of cancellation, non-renewal or material change involving the indicated policies, the issuer will provide at least sixty (60) days prior written notice of such change to the Chicago Transit Authority at the address shown on this Certificate. This certificate is issued to the Chicago Transit Authority in consideration of the contract entered into with the named insured, and it is mutually understood that the Chicago Transit Authority relies on this certificate as a basis for continuing such agreement with the named insured.

<table>
<thead>
<tr>
<th>Type of insurance</th>
<th>Insurer Name</th>
<th>Policy Number</th>
<th>Policy Period</th>
<th>Limits of Liability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial General Liability</td>
<td></td>
<td></td>
<td></td>
<td>All Limits in Thousands</td>
</tr>
<tr>
<td>☐ Occurrence</td>
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<td></td>
<td></td>
<td>Each occurrence</td>
</tr>
<tr>
<td>☐ Premise-Operations</td>
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<td></td>
<td></td>
<td>General</td>
</tr>
<tr>
<td>☐ Explosion/Collapse</td>
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<td></td>
<td>Aggregate</td>
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<tr>
<td>☐ Underground</td>
<td></td>
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<td></td>
<td>Products/Completed Operations</td>
</tr>
<tr>
<td>☐ Products/Completed Operations</td>
<td></td>
<td></td>
<td></td>
<td>Aggregate</td>
</tr>
<tr>
<td>☐ Blanket Contractual</td>
<td></td>
<td></td>
<td></td>
<td>Deductible and/or</td>
</tr>
<tr>
<td>☐ Broad Form Property Damage</td>
<td></td>
<td></td>
<td></td>
<td>Self Insured Retention</td>
</tr>
<tr>
<td>☐ Personal Injury</td>
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<tr>
<td>☐ Pollution</td>
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<td>☐ Automobile Liability (Any Auto)</td>
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<td>Each occurrence</td>
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<td>☐ Excess Liability</td>
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<td>General</td>
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<tr>
<td>☐ Umbrella Liability</td>
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<td>Aggregate</td>
</tr>
<tr>
<td>☐ Workers’ Compensation and Employer’s Liability</td>
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<td>WC $</td>
</tr>
<tr>
<td>☐ Builders’ Risk/Course of Construction</td>
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<td></td>
<td></td>
<td>Employers Liability $</td>
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<tr>
<td>☐ Professional Liability</td>
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<tr>
<td>☐ Owner Contractors Protective</td>
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<tr>
<td>☐ Other</td>
<td></td>
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</tbody>
</table>

a) Each insurance policy required by this agreement, except policies for workers’ compensation and professional liability, will read: “The Chicago Transit Authority is an additional insured as respects to operations and activities of, or on behalf of the named insured, performed under contract with or permit from the Chicago Transit Authority’.

b) The General, Automobile and Excess/Umbrella Liability Policies described provide for separation of insureds applicable to the named insured and the CTA.

c) General Liability, Auto Liability, Workers Compensation and Property insurers shall waive all rights of subrogation against the Chicago Transit Authority.

d) The General Liability policies, including excess and umbrella will insure all liabilities assumed under the provisions of the Hold Harmless and Indemnity Clause contained in the Contract and not exclude any construction and/or demolition work performed within 50 feet of railroad track. Commercial General Liability must be written on the ISO Occurrence Form CG 00 01 12 04 (or a substitute form providing equivalent coverage) and include the following endorsement: Contractual Liability Railroads ISO Form CG 24 17 10 01 (or a substitute form providing equivalent coverage). The Contractor shall be responsible for arranging that all subcontractors maintain the necessary insurance requirements.

e) The receipt of this certificate by the CTA does not constitute agreement by the CTA that the insurance requirements in the contract have been fully met, or that the insurance companies indicated by this certificate are in compliance with all contract requirements.

Name and Address of Certificate Holder and Receipt of Notice: ____________________________

Signature of Authorized Representative: _____________________________________________

Agent/Company Address: ____________________________________________________________

Telephone: ____________________________
FORM OF PERFORMANCE BOND

PERFORMANCE BOND

CONTRACT: ____________

KNOW ALL PERSONS BY THESE PRESENTS, that

______________________________________________________________

of______________________________________________________________

(hereinafter called the “Contractor”) and _____________________________________________

_______________________________________________ (hereinafter called the “Surety”), are

held and firmly bound unto the Chicago Transit Authority, (hereinafter called the “Authority”),

in the sum of ________________________________________________________ dollars

($ ____________), lawful money of the United States of America, to be paid to the Contracting

Party and the Authority, for which payment well and truly to be made, the Contractor and the

Surety do hereby bind themselves jointly and severally and their, and each of their executors,

administrators, successors and assigns firmly by these presents.

* Insert Contractor’s name. If a corporation, give the State of incorporation, also using the phrase
  “a corporation organized under the laws of ______________________________.” If a
  partnership, give full names of partners, also using the phrase, “co-partners, doing business under
  the firm name of _______________________________________.” If a joint venture, give the
  name of the joint venture or the names of the joint venturers, also using the phrase “a joint
  venture formed under the laws of ___________. If an individual using a trade name, give
  individual name, using also the phrase, “an individual doing business under the trade name of
  _________________________________.”
FORM OF PERFORMANCE BOND

WHEREAS, the Contractor is seeking to enter, or has entered, into a contract known as Contract No._____________, (the “Contract”) a copy of which Contract is annexed to and hereby made a part of this bond as though herein set forth in full:

NOW, THEREFORE, the conditions of this obligation are such that if the Contractor, its representatives or assigns, shall well and faithfully perform the said Contract and all modifications, amendments, additions and alterations thereto that may hereafter be made, according to its terms and its true intent and meaning, including repair and/or replacement of defective work and guarantees of maintenance for the periods stated in the Contract, and shall fully indemnify and save harmless the Authority from all cost and damage which it may suffer by reason of failure so to do, and shall fully reimburse and repay the Authority for all outlay and expense which the Authority may incur in making good any such default, and shall protect the Authority against, and pay any and all amounts, damages, costs and judgments which may or shall be recovered against the Authority or its officers or agents or which the Authority may be called upon to pay any person or corporation by reason of any damages arising or growing out of the doing of said work, or the repair or maintenance thereof, or the manner of doing the same, or the neglect of the said Contractor, or its agents or servants, or the infringement of any patent rights by reason of the use of any materials furnished or work done as aforesaid or otherwise, then this obligation shall be null and void, otherwise to remain in full force and effect.

The Surety, for value received, hereby stipulates and agrees, if requested to do so by the Authority, to fully perform and complete the Project to be performed under the Contract, pursuant to the terms, conditions, and covenants thereof, if for any cause, the Contractor fails or neglects to so fully perform and complete such Project. The Surety further agrees to commence such work of completion within twenty (20) days after written notice thereof from the Authority and to complete such Project within such time as the Authority may fix.

The Surety, for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of said Surety and its bond shall be in no way impaired or affected by any extension of time, modification, omission, addition, or change in or to the said Contract or the Project to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or by any assignment, subletting or other transfer thereof or of the Project to be performed or any monies due or to become due thereunder; and said Surety does hereby waive notice of any and all of such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to assignees, subcontractors, and other transferees shall have the same effect as to said Surety as though done or omitted to be done by or in relation to said Contractor.
FORM OF PERFORMANCE BOND

IN WITNESS WHEREOF, the Contractor and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereunto affixed and these presents to be signed by their proper officers, this ______ day of ______________________, 20___.

(Seal)

_______________________________
Contractor’s Name

By ________________________________
Contractor’s Authorized Signature*

_______________________________
Print Name

_______________________________
Title

Attest: ________________________________
Secretary

(Seal)

By ________________________________
Surety’s Name

_______________________________
Authorized Signature

* If the Contractor is a partnership, the bond should be signed by one of the partners in the firm name.

If the Contractor is a corporation, the bond should be signed in its correct corporate name by a duly authorized officer, agent, or attorney-in-fact.

If the Contractor is a joint venture, the bond should be signed by an individual duly authorized by the parties of the joint venture to act for the joint venture.

The number of original bonds to be executed should correspond with the number of originals of the Contract to be executed.
ACKNOWLEDGMENT FOR CONTRACTOR

STATE OF )
COUNTY OF ) SS.: )

On this _____ day of _________________ 20___, before me personally appeared
________________________________________, known to me to be the person who executed
the foregoing instrument, who, being duly sworn by me did depose and say that s/he resides at
________________________________________, in the City of ____________________, in
the County of ________________________, in the State of _______________; and
further that s/he:

[Mark an X in the appropriate box and complete the accompanying statement.]

☐ (If an individual): executed the foregoing instrument in her/his name and on her/his own behalf.

☐ (If a corporation): is the
___________________________________________ of
___________________________________________, the corporation in said
instrument; that, by authority of the Board of Directors of said corporation, s/he is
authorized to execute the foregoing instrument on behalf of the corporation for the
purposes set forth therein; and that, pursuant to that authority, s/he executed the foregoing
instrument in the name of and on behalf of said corporation as the act and deed of said
corporation.

☐ (If a partnership): is the
___________________________________________ of
___________________________________________, the partnership described
in said instrument; that, by the terms of said partnership s/he is authorized to execute the
foregoing instrument on behalf of the partnership for the purposes set forth therein; and
that, pursuant to that authority, s/he executed the foregoing instrument in the name of and
on behalf of said partnership as the act and deed of said partnership.

☐ (If a limited liability company): is a duly authorized member or manager of
___________________________________________ LLC, the
limited liability company described in said instrument; that, s/he is authorized to execute
the foregoing instrument on behalf of the limited liability company for the purposes set
forth therein; and that, pursuant to that authority, s/he executed the foregoing instrument
in the name of and on behalf of said limited liability company as the act and deed of said
limited liability company.

________________________________________ [seal]
Notary Public
C20FT102342998

ATTACHMENT C

CERTIFICATION OF PRIMARY PARTICIPANT REGARDING DEBARMENT
CERTIFICATION OF PRIMARY PARTICIPANT
REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS

___________________________________, certifies to the best of our knowledge and belief that it and its principles:

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

2. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.

3. Are not presently indicted for or otherwise criminally or civilly charged by charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

4. Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

THE PRIMARY PARTICIPANT (APPLICANT OR POTENTIAL CONTRACTOR FOR A MAJOR THIRD PARTY CONTRACT) ____________________________________________________ CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTAINS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET SEQ. ARE APPLICABLE THERETO.

__________________________________________________________
(Signature and Title of Authorized Official)

If you are unable to certify to any of the statements in this certification, the participant shall attach an explanation to this certification.
C20FT102342998

ATTACHMENT D

CERTIFICATION OF LOWER TIER PARTICIPANT REGARDING DEBARMENT
CERTIFICATION OF LOWER TIER PARTICIPANT REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS

_____________________________________, certifies to the best of our knowledge and belief that it and its principles:

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

2. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of frauds or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.

3. Are not presently indicted for or otherwise criminally or civilly charged by charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

4. Have not within a three-year period preceding this application/ proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

THE LOWER TIER PARTICIPANT (APPLICANT OR POTENTIAL CONTRACTOR FOR A MAJOR THIRD PARTY CONTRACT) ___________________________________________ CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET SEQ. ARE APPLICABLE THERETO.

________________________________________________________
(Signature and Title of Authorized Official)

If you are unable to certify to any of the statements in this certification, the participant shall attach an explanation to this certification.
C20FT102342998

ATTACHMENT E

LOBBYING CERTIFICATION (PRIME AND SUBCONTRACTOR)
Certification for Contracts, Grants, Loans
and Cooperative Agreements

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

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

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with 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.

(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 section 1352, title 31, U.S. Code. 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.

Executed this ____________________ day of _____________________, 20______.

By: ___________________________________________________________________
    (Type or print name of contractor)

___________________________________________________________________
    (Signature of authorized officer)

___________________________________________________________________
    (Title of authorized officer)
Certification for Contracts, Grants, Loans and Cooperative Agreements

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

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

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with 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.

(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 section 1352, title 31, U.S. Code. 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.

Executed this ___________________ day of _____________________, 20______.

By: ___________________________________________________________________
    (Type or print name of contractor)

___________________________________________________________________
    (Signature of authorized officer)

___________________________________________________________________
    (Title of authorized officer)
CERTIFICATION REGARDING A DRUG FREE WORKPLACE
CERTIFICATION REGARDING A DRUG FREE WORKPLACE

Pursuant to the definitions regarding a Drug Free Workplace provided in the Drug-Free Workplace Act of 1988, the Illinois Drug Free Workplace Act, 30 ILCS 580/1 et seq., the Illinois Substance Abuse Prevention on Public Works Projects Act, 820 ILCS 265/1 et seq., the Federal Acquisition Regulation System ("FAR"), Procedures for Transportation Workplace Drug & Alcohol Testing Programs, 49 CFR 40, and Prevention of Alcohol Misuse & Prohibited Drug Use in Transit Operation, 49 CFR 655, ________________________________ ("Contractor") certifies to the best of its knowledge and belief that it and its principals:

1. Maintain a workplace(s) (i.e. the site(s) for the performance of work done by the Contractor in connection with this contract) safe and free from "controlled substances" as described in the Controlled Substances Act (21 U.S.C. 812) and as further described in regulations 21 CFR 1308.11 - 1308.15.

2. Have neither been convicted, including entering a plea of 'nolo contendere,' nor had sentence imposed by any judicial body charged with the responsibility to determine violations of Federal or State criminal drug statutes.

3. Publish and give notice to its employees and sub-contractors that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the Contractor's workplace, and also that actions will be taken against any and all employees and sub-contractors found to be violation of same.

4. Provide that all employees engaged in the performance of the contract receive a copy of the above statement, that the employee will abide by the terms of this statement, and that the employee will notify the employer in writing of the employee's conviction no later than five (5) calendar days after such conviction.

5. Provide for appropriate action against an employee for violation of any and all of these rules and that an employee convicted of drug abuse must satisfactorily participate in a drug abuse assistance or rehabilitation program approved for such purposes by Federal, State, or local health or law enforcement or other appropriate agency.

6. Comply with all drug and alcohol policies, testing programs and reporting requirements set forth in 49 CFR 40 and 49 CFR 655 whenever the Contractor, its employees, or sub-contractor(s) perform one or more of the following functions considered "safety-sensitive", as defined in 49 CFR 655:
   a. Operating a revenue service vehicle, including when not in revenue service;
   b. Operating a non-revenue service vehicle, when required to be operated by a holder of a Commercial Driver's License;
   c. Controlling dispatch or movement of a revenue service vehicle;
   d. Maintaining (including repairs, overhaul and rebuilding) a revenue service vehicle or equipment used in revenue service; or
   e. Carrying a firearm for security purposes.

7. Have in place a written program which meets or exceeds the program requirements of the Substance Abuse Prevention on Public Works Projects Act (820 ILCS 265/1 et seq.) to be filed with the Authority and made available to the general public, or have in place a collective bargaining agreement which deals with the subject matter of the Substance Abuse Prevention on Public Works Projects Act (820 ILCS 365/1 et seq.).

8. Will otherwise comply with all drug and alcohol policies set forth in applicable Federal, State and local laws and regulations, including, but not limited to the Drug-Free Workplace Act of 1988, FAR, Illinois Drug Free Workplace Act, 49 CFR 40 and 49 CFR 655 in such version, prior or subsequent to amendment or revision, as is currently enforced or enforceable at and during the execution and performance of this Contract.

In addition to other remedies, the Contractor's failure to comply with any part of the requirements of the Drug-Free Workplace Act of 1988, FAR, Illinois Drug Free Workplace Act, the Illinois Substance Abuse Prevention on Public Works Projects Act, 49 CFR 40 or 49 CFR 655, may render the Contractor subject to any or all of the following: suspension of payments, termination of contract for default, suspension or debarment. By executing this Certification, Contractor agrees that the Authority or its designated representatives may audit Contractor's records and procedures as necessary to ensure compliance with the foregoing requirements.

Signature and Title of Authorized Official ________________________________ Date __________________

REV January 2018
C20FT102342998
ATTACHMENT G
BUY AMERICA CERTIFICATION
BUY AMERICA CERTIFICATION
(For all Contracts in Excess of $150,000)

For all contracts involving the purchase of buses, other rolling stock (including train control, communication, and traction power equipment) and associated equipment, one of the following certifications must be completed and furnished with the Bid. Failure to provide the certification will result in your bid being declared non-responsive to the invitation for bids and rejected. Details regarding these certifications may be found in 49 C.F.R Part 661, entitled Buy America Requirements.

CERTIFICATION REQUIREMENT FOR PROCUREMENT OF BUSES,
OTHER ROLLING STOCK AND ASSOCIATED EQUIPMENT

Certificate of Compliance with 49 USC § 5323(j)(2)(C) Regarding Rolling Stock
The Bidder hereby certifies that it will comply with the requirements of 49 USC § 5323(j)(2)(C) and the regulations in 49 CFR 661.11.

Signature __________________________________________ Date ______________________

Title ________________________________ Company Name __________________________

Certificate of Non-compliance with 49 USC § 5323(j)(2)(C) Regarding Rolling Stock
The Bidder hereby certifies that it cannot comply with the requirements of 49 USC § 5323(j)(2)(C), but it may qualify for an exception to the requirements pursuant to 49 USC § 5323(j)(2)(B) or (j)(2)(D) and regulations in 49 CFR 661.7.

Signature __________________________________________ Date ______________________

Title ________________________________ Company Name __________________________
C20FT102342998

ATTACHMENT H

DISCLOSURE OF OWNERSHIP AND INTERESTS AFFIDAVIT
(PRIME AND SUBCONTRACTOR)
Every Bidder or Proposer (referred to as “Bidder”) submitting a Bid or Proposal to the Authority for a Contract shall submit this Disclosure of Ownership and Interests Affidavit (hereafter Disclosure Affidavit or “Affidavit”). If the Bidder is a joint venture, the joint venture and each of the joint venture partners shall complete a Disclosure Affidavit.

Please print or type all responses clearly and legibly. If you need additional space for a response, attach extra pages. Please indicate the question to which you are responding on any extra pages you attach.

For purposes of this Disclosure Affidavit, the term “Contract” refers to the Contract, concession, agreement, modification, amendment, extension, or other section in connection with which you are submitting the Disclosure Affidavit.

Please note that this Disclosure Affidavit requires Bidders to obtain various certifications from their subcontractors before the subcontractors may perform any work under the Contract. The terms of the required subcontractor certifications are set forth below.

After reviewing your completed Disclosure Affidavit, the Authority’s General Counsel or Director, Purchasing may require additional information to achieve full disclosure relevant to the Bid, or other applications.

Requisition Number: _________________________ Bidder Name: _______________________________________
Bidder Business Address: ________________________________________________________________

Authority departments to which you are submitting this form (check one):
[ ] Purchasing [ ] Other: ______________________________

The undersigned _____________________________, as _____________________________, and on behalf of _____________________________________ (“Bidder” or “Contractor”), having been duly sworn under oath certifies as follows:

PART I - DISCLOSURE OF OWNERSHIP INTERESTS

Indicate below whether the Bidder is an individual or a legal entity and, if a legal entity, indicate the type of entity. Then complete Part (B), (C), (D), or (E) below as applicable. All Bidders shall complete Part (A). For Bidders that are individuals or sole proprietorships, Part (A) is the only section of Part I that shall be completed. For Bidders that are joint venturers, the joint venture and each member must complete a separate form. Identify all layers of ownership if the firm has a parent firm.

[ ] Individual [ ] Limited liability company
[ ] Business corporation [ ] Partnership
[ ] Not-for-Profit corporation [ ] Joint Venture
[ ] Sole Proprietorship [ ] Limited Liability Partnership
[ ] Other: _____________________________
A. INFORMATION - TO BE COMPLETED BY ALL BIDDERS

1. Is any ownership interest in the Bidder held by one or more agents or nominees on behalf of another individual or legal entity? [ ] Yes [ ] No

   If Yes, list below each principal’s name, business address, percentage of ownership interest, and the name of the principal’s agent or nominee:

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
<th>Ownership Interest</th>
<th>Agent/Nominee</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________________________</td>
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</tr>
</tbody>
</table>

2. Is the Bidder or any ownership interest in the Bidder, constructively controlled by another individual or legal entity, other than an agent or nominee disclosed above? [ ] Yes [ ] No

   If Yes, list below the name and business address of each individual or entity possessing constructive control, the party whose interest is controlled, and the relationship between the two under which the control is or may be exercised:

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
<th>Name of Party Whose Interest is Controlled</th>
<th>Relationship</th>
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</thead>
<tbody>
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<td>__________________________</td>
<td>__________________________</td>
</tr>
</tbody>
</table>

3. Is any stock or beneficial interest in the Bidder held by a corporation or other legal entity? [ ] Yes [ ] No

   If Yes, each such corporation or other legal entity shall make all disclosures requested in Part I (Disclosure of Ownership Interests) of this Disclosure Affidavit and shall certify all information provided.

4. Is any ownership interest held by a current or former CTA employee? [ ] Yes [ ] No

   If Yes, provide names and amount of ownership interest:

<table>
<thead>
<tr>
<th>Name</th>
<th>Ownership Interest</th>
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<tbody>
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</tbody>
</table>

5. Is any current or former CTA employee employed by the Bidder? [ ] Yes [ ] No

   If Yes, provide name, title and areas of responsibility:

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Areas of Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________________________</td>
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</tbody>
</table>
B. CORPORATIONS (FOR-PROFILE AND NOT-FOR-PROFILE)

This information must be provided for the corporation and for any parent corporation.

1. Incorporated in the State of _________________.

2. List below the name and title of all officers of the corporation:

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
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<tbody>
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</tbody>
</table>

3. List below the name and title of all directors of the corporation:

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<thead>
<tr>
<th>Name</th>
<th>Title</th>
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</tbody>
</table>

**TO BE COMPLETED BY FOR-PROFILE CORPORATIONS ONLY:**

1. Is the Corporation listed on the New York Stock Exchange? [ ] Yes [ ] No

   If the Corporation is listed on an exchange other than the New York Stock Exchange, the name of the exchange is: ________________________________

2. If there are fewer than 100 shareholders, list below the name, business address, and percentage of ownership interest of each shareholder:

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
<th>Ownership Interest</th>
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</thead>
<tbody>
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</tbody>
</table>

3. If there are 100 or more shareholders, list below the name, business address, and percentage of ownership interest for each shareholder who owns shares or options equal to or in excess of 5% of the ownership of the corporation:

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
<th>Ownership Interest</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>
**TO BE COMPLETED BY NOT-FOR-PROFIT CORPORATIONS ONLY:**

List below the name and business address of officers, trustees and board members.

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________________</td>
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</tr>
</tbody>
</table>

**C. PARTNERSHIPS**

List below the name and business address and the percentage of ownership interest for each general, limited, or individual partner entitled to receive 5% or more of the profit derived from partnership activities. The names of all individuals in such partnerships must be listed.

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
<th>Ownership Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________________</td>
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<td>__________ %</td>
</tr>
</tbody>
</table>

**D. LIMITED LIABILITY COMPANIES**

4. List below the names and titles of the officers, if any. If there are no officers, write “none”:

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
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</table>

5. List below the name, business address, and percentage of ownership interest of each (i) member and (ii) manager.

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
<th>Ownership Interest</th>
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<tbody>
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</tbody>
</table>
E. LAND TRUSTS, BUSINESS TRUSTS, ESTATES, AND OTHER SIMILAR ENTITIES

1. Trust name and number, or other information identifying the trust: ______________________

2. List below the name and business address of all trustees:

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
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<tbody>
<tr>
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</table>

3. List below the name, business address, and percentage of ownership interest of all beneficiaries:

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
<th>Ownership Interest</th>
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</table>

NOTE: The information provided in this form, shall be kept current. In the event of material changes, the Bidder shall supplement this Affidavit, up to the time the Authority takes action on the Bid, or other application for which this Affidavit is being submitted.

BIDDER:

By ____________________________________________

(If a corporation and signed by any person other than the President or Vice-President, a certified copy of a resolution or by-law authorizing such person to sign, must accompany this contract)

NOTARIZATION - REQUIRED

State of _____________________

County of ___________________

Signed and Sworn to before me on this ________ day of ________________, 20____

By __________________________

(Signature of Notary Public)

(NOTARY’S SEAL)
DISCLOSURE OF OWNERSHIP AND INTERESTS AFFIDAVIT
(SUBCONTRACTOR)

Every Bidder or Proposer (referred to as “Bidder”) submitting a Bid or Proposal to the Authority for a Contract shall submit this Disclosure of Ownership and Interests Affidavit (hereafter Disclosure Affidavit or “Affidavit”). If the Bidder is a joint venture, the joint venture and each of the joint venture partners shall complete a Disclosure Affidavit.

Please print or type all responses clearly and legibly. If you need additional space for a response, attach extra pages. Please indicate the question to which you are responding on any extra pages you attach.

For purposes of this Disclosure Affidavit, the term “Contract” refers to the Contract, concession, agreement, modification, amendment, extension, or other section in connection with which you are submitting the Disclosure Affidavit.

Please note that this Disclosure Affidavit requires Bidders to obtain various certifications from their subcontractors before the subcontractors may perform any work under the Contract. The terms of the required subcontractor certifications are set forth below.

After reviewing your completed Disclosure Affidavit, the Authority’s General Counsel or Director, Purchasing may require additional information to achieve full disclosure relevant to the Bid, or other applications.

Requisition Number: ____________________________ Bidder Name: ____________________________
Bidder Business Address: ____________________________

Authority departments to which you are submitting this form (check one):

[   ] Purchasing [   ] Other: ____________________________

The undersigned ____________________________, as ____________________________, and on behalf of ____________________________ (“Bidder” or “Contractor”), having been duly sworn under oath certifies as follows:

PART I - DISCLOSURE OF OWNERSHIP INTERESTS

Indicate below whether the Bidder is an individual or a legal entity and, if a legal entity, indicate the type of entity. Then complete Part (B), (C), (D), or (E) below as applicable. All Bidders shall complete Part (A). For Bidders that are individuals or sole proprietorships, Part (A) is the only section of Part I that shall be completed. For Bidders that are joint venturers, the joint venture and each member must complete a separate form. Identify all layers of ownership if the firm has a parent firm.

[   ] Individual [   ] Limited liability company
[   ] Business corporation [   ] Partnership
[   ] Not-for-Profit corporation [   ] Joint Venture
[   ] Sole Proprietorship [   ] Limited Liability Partnership
[   ] Other: ____________________________
### A. INFORMATION - TO BE COMPLETED BY ALL BIDDERS

1. Is any ownership interest in the Bidder held by one or more agents or nominees on behalf of another individual or legal entity? [ ] Yes [ ] No

   If Yes, list below each principal’s name, business address, percentage of ownership interest, and the name of the principal’s agent or nominee:

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
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<th>Agent/Nominee</th>
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</table>

2. Is the Bidder or any ownership interest in the Bidder, constructively controlled by another individual or legal entity, other than an agent or nominee disclosed above? [ ] Yes [ ] No

   If Yes, list below the name and business address of each individual or entity possessing constructive control, the party whose interest is controlled, and the relationship between the two under which the control is or may be exercised:

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
<th>Name of Party Whose Interest is Controlled</th>
<th>Relationship</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

3. Is any stock or beneficial interest in the Bidder held by a corporation or other legal entity? [ ] Yes [ ] No

   If Yes, each such corporation or other legal entity shall make all disclosures requested in Part I (Disclosure of Ownership Interests) of this Disclosure Affidavit and shall certify all information provided.

4. Is any ownership interest held by a current or former CTA employee? [ ] Yes [ ] No

   If Yes, provide names and amount of ownership interest:

<table>
<thead>
<tr>
<th>Name</th>
<th>Ownership Interest</th>
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</thead>
<tbody>
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</tbody>
</table>

5. Is any current or former CTA employee employed by the Bidder? [ ] Yes [ ] No

   If Yes, provide name, title and areas of responsibility:

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Areas of Responsibility</th>
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</table>
B. CORPORATIONS (FOR-PROFIT AND NOT-FOR-PROFIT)

This information must be provided for the corporation and for any parent corporation.

1. Incorporated in the State of ____________________.

2. List below the name and title of all officers of the corporation:

Name: ____________________  Title: ____________________
Name: ____________________  Title: ____________________
Name: ____________________  Title: ____________________

3. List below the name and title of all directors of the corporation:

Name: ____________________  Title: ____________________
Name: ____________________  Title: ____________________
Name: ____________________  Title: ____________________

TO BE COMPLETED BY FOR-PROFIT CORPORATIONS ONLY:

1. Is the Corporation listed on the New York Stock Exchange?  [ ] Yes  [ ] No

   If the Corporation is listed on an exchange other than the New York Stock Exchange, the name of the exchange is: ____________________

2. If there are fewer than 100 shareholders, list below the name, business address, and percentage of ownership interest of each shareholder:

   Name  Business Address  Ownership Interest
   ____________________  ____________________  ____________ %
   ____________________  ____________________  ____________ %
   ____________________  ____________________  ____________ %

3. If there are 100 or more shareholders, list below the name, business address, and percentage of ownership interest for each shareholder who owns shares or options equal to or in excess of 5% of the ownership of the corporation:

   Name  Business Address  Ownership Interest
   ____________________  ____________________  ____________ %
   ____________________  ____________________  ____________ %
   ____________________  ____________________  ____________ %
TO BE COMPLETED BY NOT-FOR-PROFIT CORPORATIONS ONLY:

List below the name and business address of officers, trustees and board members.

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
<th>Title</th>
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</tbody>
</table>

C. PARTNERSHIPS

List below the name and business address and the percentage of ownership interest for each general, limited, or individual partner entitled to receive 5% or more of the profit derived from partnership activities. The names of all individuals in such partnerships must be listed.

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
<th>Ownership Interest</th>
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<tbody>
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</table>

D. LIMITED LIABILITY COMPANIES

4. List below the names and titles of the officers, if any. If there are no officers, write “none”:

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
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</table>

5. List below the name, business address, and percentage of ownership interest of each (i) member and (ii) manager.

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
<th>Ownership Interest</th>
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</tbody>
</table>
E. LAND TRUSTS, BUSINESS TRUSTS, ESTATES, AND OTHER SIMILAR ENTITIES

1. Trust name and number, or other information identifying the trust: _______________________

2. List below the name and business address of all trustees:

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
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</thead>
<tbody>
<tr>
<td>_________________________</td>
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<td>_________________________</td>
<td>___________________</td>
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</tbody>
</table>

3. List below the name, business address, and percentage of ownership interest of all beneficiaries:

<table>
<thead>
<tr>
<th>Name</th>
<th>Business Address</th>
<th>Ownership Interest</th>
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</thead>
<tbody>
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<td>_________________________</td>
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<td>________ %</td>
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<tr>
<td>_________________________</td>
<td>___________________</td>
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</tr>
<tr>
<td>_________________________</td>
<td>___________________</td>
<td>________ %</td>
</tr>
</tbody>
</table>

NOTE: The information provided in this form, shall be kept current. In the event of material changes, the Bidder shall supplement this Affidavit, up to the time the Authority takes action on the Bid, or other application for which this Affidavit is being submitted.

BIDDER:
By _______________________
(If a corporation and signed by any person other than the President or Vice-President, a certified copy of a resolution or by-law authorizing such person to sign, must accompany this contract)  

NOTARIZATION - REQUIRED
State of _______________________
County of _______________________

Signed and Sworn to before me on this ________ day of ________________, 20_____

By _______________________
(Signature of Notary Public)

(NOTARY'S SEAL)
AFFIDAVIT OF MINIMUM WAGE PAYMENT
## AFFIDAVIT OF MINIMUM WAGE PAYMENT

### COMPLETE SECTION (A) OR (B), AS APPLICABLE

(A) The undersigned affirms, to the best of his or her knowledge and belief, that:

The undersigned understands and agrees that the Contractor and its Subcontractors are required to pay certain employees the minimum wage set forth in the CTA Minimum Wage Regulations, available at: https://www.transitchicago.com/procurement/regulations-and-policies/

1. ("Minimum Wage"), for all work that qualifies for Minimum Wage under Section 1.10 of the Authority’s Purchasing Policy & Procedures (“Minimum Wage Policy”).

2. The undersigned understands and agrees that, unless otherwise exempted in the Contract or the Minimum Wage Policy, the Contractor and its Subcontractors, if any, are required to pay Minimum Wage to:
   a) all employees performing work or services on property owned or controlled by the Authority or at any other location specified by the Authority in the Contract as the location for performance of the work or services;
   b) those employees who are directly performing work or services for which the Authority pays the Contractor an hourly rate or per piece work rate for work or services; and
   c) those employees who fulfill the Authority’s requirement for the Contractor to provide specified work hours or a specified number of workers;

3. The undersigned understands and agrees that the Contractor and its Subcontractors, if any, must cooperate in any investigation by the Authority regarding compliance with the Minimum Wage Policy. Failure to comply with the Minimum Wage Policy or to cooperate in such an investigation is grounds for the Authority declaring the Contractor in default of this Contract and exercising such remedies as the Authority deems appropriate.

The undersigned solemnly declares and affirms under penalty of perjury that the above and foregoing are true and correct, and that he or she is authorized on behalf of the Contractor or Subcontractor to sign this affidavit.

________________________________________  
(Name of Contractor/Subcontractor)

________________________________________  
(Signature)

________________________________________  
(Name and Title of Affiant)

________________________________________  
(Date)

(B) The undersigned solemnly declares and affirms under penalty of perjury that, to the best of his or her knowledge and belief, no employees of the Contractor or its Subcontractors meet the criteria set forth above and, as such, the Minimum Wage Policy is not applicable to this Contract. The undersigned further declares that he or she is authorized on behalf of the Contractor or Subcontractor to sign this affidavit.

________________________________________  
(Name of Contractor/Subcontractor)

________________________________________  
(Signature)

________________________________________  
(Name and Title of Affiant)

________________________________________  
(Date)

(rev.6/18)
C20FT102342998

ATTACHMENT J

AFFIDAVIT OF PROMPT PAYMENT
**AFFIDAVIT OF PROMPT PAYMENT**

**Complete either (A) or (B), as applicable**

(A) The undersigned affirms, to the best of his/her knowledge and belief, that:

1. The undersigned understands and agrees that the Contractor is required to pay all Subcontractors for all work that any Subcontractor has satisfactorily completed no later than 14 days after the Contractor has received payment from the Authority for that work.

2. The undersigned understands and agrees that the Contractor is required to pay retainage amounts, if any, to a Subcontractor no later than 14 days after the CTA has released retainage to the Contractor for that portion of the work.

3. The undersigned understands and agrees that any delay in or postponement of payment to any Subcontractor by the Contractor requires the Contractor to demonstrate good cause and to receive prior written approval of the Director, Purchasing.

4. The undersigned understands and agrees that the CTA will not pay the Contractor for Services performed or Deliverables submitted unless and until the Contractor certifies that the Subcontractors have been promptly paid for the work or services they have performed under all previous payment requests, as evidenced by the filing with the CTA the Contractor’s sworn statement that the Contractor has complied with the prompt payment requirements.

The undersigned solemnly declares and affirms under penalty of perjury that the above and foregoing are true and correct, and that he/she is authorized on behalf of the Contractor to sign this affidavit.

________________________________________
(Name of Contractor)

________________________________________
(Signature)

________________________________________
(Name and Title of Affiant)

________________________________________
(Date)

**OR**

(B) The undersigned solemnly declares and affirms under penalty of perjury that no Subcontractors will be used in the performance of the work or services and, as such, the statutory prompt payment requirements are inapplicable. The undersigned further declares that he/she is authorized on behalf of the Contractor to sign this affidavit.

________________________________________
(Name of Contractor)

________________________________________
(Signature)

________________________________________
(Name and Title of Affiant)

________________________________________
(Date)

(Rev 12/17)
C20FT102342998

ATTACHMENT K

RFP NON-DISCLOSURE STATEMENT (PRIME AND SUBCONTRACTOR)
RFP NON-DISCLOSURE STATEMENT PRIME CONTRACTOR

In connection with the Proposal submitted herewith in response to the Chicago Transit Authority’s (“CTA”) Request for Proposal (“RFP”), Requisition No. C20FT102342998 for the Manufacture and Delivery of a Base Order of One Hundred (100) Diesel Engine Transit Buses; with Five (5) Option to Purchase up to Five Hundred (500) additional Buses and Associated Spare Parts

("Company") acknowledges and agrees that the evaluation process conducted by the CTA on all Proposals submitted is confidential and sensitive. Company further agrees not to take any action(s) that would frustrate the process, provide any unfair advantage to itself, or provide any advantage or disadvantage to any other proposer in connection with the RFP.

Therefore, Company states as follows:

1. All substantive details of the Proposal submitted by Company and all materials and information provided, discussed, disclosed or otherwise conveyed, whether in writing or orally, by the CTA or Company or between Company and CTA during demonstrations, presentations, meetings or negotiations in connection with the CTA’s evaluation of Company’s Proposal, including cost or price information, technical information or any other proposal information or conditions with respect to the possible procurement transaction contemplated by the RFP (the “Transaction”), the identity of the CTA’s evaluation committee, the name of the proposers, or any sub-contractor, and the number of proposers are hereby referred to as “Confidential Evaluation Material” for purposes of this Statement. Confidential Evaluation Material shall also include all communications regarding the Transaction with Authorized CTA Personnel, including: (i) requests for additional information, (ii) requests for tours or management meetings, (iii) discussions or questions regarding the Transaction, (iv) the occurrence, existence, or lack thereof, of any such communication, discussion or negotiation, (v) the status of discussions or negotiations and (vi) the fact that any Confidential Evaluation Material has been made available to Company. The term Confidential Evaluation Materials does not include statements informing another of the submission or existence of the Proposal.

2. Company will limit knowledge of and access to the Confidential Evaluation Materials to only those of its principals, directors, officers, employees and representatives, who have a need to know such information (collectively the “Company Parties”) and such Confidential Evaluation Materials shall be used solely in connection with negotiations with Authorized CTA Personnel regarding the Transaction. When the Company discloses Confidential Evaluation Material to any of the Company Parties, it shall be the Company’s responsibility to ensure that all Company Parties recognize the confidential nature of such information, together with the restrictions on use and disclosure contained herein.

3. Company will not disclose any Confidential Evaluation Material to any employee, officer or Board member of the CTA who is not named as Authorized CTA Personnel. Additionally, Company will not contact any employee, officer or Board member of the CTA other than the Authorized CTA Personnel on any matter involving this Transaction. Authorized CTA Personnel shall mean only the CTA Procurement Administrator for the Transaction, the General Manager – Purchasing, the Vice President – Purchasing and Warehousing and any other CTA person or position specifically authorized in writing by either the CTA’s Procurement Administrator, General Manager - Purchasing, or Vice President – Purchasing and Warehousing.

4. The Company shall not disclose any Confidential Evaluation Material to, or use any such information for the advantage or disadvantage of, any third person. The term “third person” shall be broadly interpreted to include without limitation any corporation, company, group, partnership or an individual other than the Company Parties and Authorized CTA Personnel.
5. Notwithstanding the above, the obligations of Company regarding the Confidential Evaluation Material do not apply to information which in the opinion of Company’s counsel is otherwise required to be disclosed by law. In such event, Company shall provide CTA with written notice of such a determination, and a supporting statement from its counsel, prior to disclosure.

6. Company shall advise the CTA in writing if it learns of any unauthorized use or disclosure of Confidential Evaluation Material.

7. The CTA shall be entitled to equitable relief, including injunction, if any provision of this Statement is breached. Additionally, the CTA reserves the right to disqualify the Company from further consideration for the Transaction in the event of a breach of the terms of this Statement.

8. This Statement is governed by the laws of the State of Illinois and any lawsuits involving this Statement shall be filed in courts of competent jurisdiction located in Cook County, Illinois.

9. This Statement shall be effective as of the date signed and shall continue in full force and effect until the date on which a contract award for the Transaction is made by the CTA’s Board.

Agreed to and Accepted:

____________________________________
Company

By: __________________________________

Name: _______________________________

Title: ________________________________

Date: ________________________________

rev jrs 042706
RFP NON-DISCLOSURE STATEMENT SUBCONTRACTOR

In connection with the Proposal submitted herewith in response to the Chicago Transit Authority’s (“CTA”) Request for Proposal (“RFP”) Requisition No. C20FT102342998 for the Manufacture and Delivery of a Base Order of One Hundred (100) Diesel Engine Transit Buses; with Five (5) Option to Purchase up to Five Hundred (500) additional Buses and Associated Spare Parts

(“Company”) acknowledges and agrees that the evaluation process conducted by the CTA on all Proposals submitted is confidential and sensitive. Company further agrees not to take any action(s) that would frustrate the process, provide any unfair advantage to itself, or provide any advantage or disadvantage to any other proposer in connection with the RFP.

Therefore, Company states as follows:

1. All substantive details of the Proposal submitted by Company and all materials and information provided, discussed, disclosed or otherwise conveyed, whether in writing or orally, by the CTA or Company or between Company and CTA during demonstrations, presentations, meetings or negotiations in connection with the CTA’s evaluation of Company’s Proposal, including cost or price information, technical information or any other proposal information or conditions with respect to the possible procurement transaction contemplated by the RFP (the “Transaction”), the identity of the CTA’s evaluation committee, the name of the proposers, or any sub-contractor, and the number of proposers are hereby referred to as “Confidential Evaluation Material” for purposes of this Statement. Confidential Evaluation Material shall also include all communications regarding the Transaction with Authorized CTA Personnel, including: (i) requests for additional information, (ii) requests for tours or management meetings, (iii) discussions or questions regarding the Transaction, (iv) the occurrence, existence, or lack thereof, of any such communication, discussion or negotiation, (v) the status of discussions or negotiations and (vi) the fact that any Confidential Evaluation Material has been made available to Company. The term Confidential Evaluation Materials does not include statements informing another of the submission or existence of the Proposal.

2. Company will limit knowledge of and access to the Confidential Evaluation Materials to only those of its principals, directors, officers, employees and representatives, who have a need to know such information (collectively the “Company Parties”) and such Confidential Evaluation Materials shall be used solely in connection with negotiations with Authorized CTA Personnel regarding the Transaction. When the Company discloses Confidential Evaluation Material to any of the Company Parties, it shall be the Company’s responsibility to ensure that all Company Parties recognize the confidential nature of such information, together with the restrictions on use and disclosure contained herein.

3. Company will not disclose any Confidential Evaluation Material to any employee, officer or Board member of the CTA who is not named as Authorized CTA Personnel. Additionally, Company will not contact any employee, officer or Board member of the CTA other than the Authorized CTA Personnel on any matter involving this Transaction. Authorized CTA Personnel shall mean only the CTA Procurement Administrator for the Transaction, the General Manager – Purchasing, the Vice President – Purchasing and Warehousing and any other CTA person or position specifically authorized in writing by either the CTA’s Procurement Administrator, General Manager - Purchasing, or Vice President – Purchasing and Warehousing.

4. The Company shall not disclose any Confidential Evaluation Material to, or use any such information for the advantage or disadvantage of, any third person. The term “third person” shall be broadly interpreted to include without limitation any corporation, company, group, partnership or an individual other than the Company Parties and Authorized CTA Personnel.
5. Notwithstanding the above, the obligations of Company regarding the Confidential Evaluation Material do not apply to information which in the opinion of Company's counsel is otherwise required to be disclosed by law. In such event, Company shall provide CTA with written notice of such a determination, and a supporting statement from its counsel, prior to disclosure.

6. Company shall advise the CTA in writing if it learns of any unauthorized use or disclosure of Confidential Evaluation Material.

7. The CTA shall be entitled to equitable relief, including injunction, if any provision of this Statement is breached. Additionally, the CTA reserves the right to disqualify the Company from further consideration for the Transaction in the event of a breach of the terms of this Statement.

8. This Statement is governed by the laws of the State of Illinois and any lawsuits involving this Statement shall be filed in courts of competent jurisdiction located in Cook County, Illinois.

9. This Statement shall be effective as of the date signed and shall continue in full force and effect until the date on which a contract award for the Transaction is made by the CTA's Board.

Agreed to and Accepted:

Company

By: ________________________________

Name: ________________________________

Title: ________________________________

Date: ________________________________

rev jrs 042706
For Insertion into Solicitation Documents for all procurements NOT subject to a public bid opening, such as a request for proposals (RFP) or a request for letters of interest and qualification (LIQ):

**FREEDOM OF INFORMATION ACT NOTICE**

Proposer/Respondent must complete the attached Freedom of Information Declaration and affix it to the front of each proposal/letter of interest and qualification that Proposer/Respondent submits to CTA.

CTA is subject to the requirements of the Illinois Freedom of Information Act, 5 ILCS 140/1 et seq. (“FOIA”), which enables the public to request and obtain records from CTA. FOIA requires, upon request, the public disclosure of any non-exempt information in proposals/letters of interest and qualification, contracts, invoices or payment records (among other records). See Section 7 and 7.5 of FOIA, 5 ILCS140/7 and 7.5, for the available FOIA exemptions. If Proposer/Respondent has any questions regarding the FOIA process at CTA, Proposer/Respondent should contact CTA’s Freedom of Information Officer at (312) 681-2809 or via e-mail at FOIA@transitchicago.com.

Please note that proposals/letters of interest and qualification become the property of the CTA when submitted and cannot be returned. All proposals/letters of interest and qualification and any subsequent contract (including any later amendments thereto) will be subject to public disclosure under FOIA upon request after the successful proposer/respondent and CTA have executed a written contract. To the extent that Proposer/Respondent provides records to CTA that contain information exempt from public disclosure under FOIA, such as proprietary trade secrets or confidential commercial or financial information (see Section 7(1)(g) of FOIA, 5 ILCS 140/7(1)(g)), Proposer/Respondent must clearly identify and mark this information in the records. See How to Mark and Identify Proprietary, Privileged or Confidential Information herein.

Any proposals/letters of interest and qualification submitted to CTA in connection with this procurement that are not clearly marked and identified as containing proprietary, privileged or confidential information may be released by CTA with no further notice to Proposer/Respondent.

Proposer/Respondent is solely responsible for the marking and identification of Proposer/Respondent’s proprietary, privileged, or confidential information within a proposal/letter of interest and qualification before it is submitted to CTA. For purposes of this provision, all information provided by Proposer/Respondent in a proposal/letter of interest and qualification is considered by CTA to be Proposer/Respondent’s information, even if the information relates to one or more of Proposer/Respondent’s proposed subcontractors. Proposer/Respondent is solely responsible for marking and identifying any proprietary, privileged, or confidential information of Proposer/Respondent’s subcontractors contained in Proposer/Respondent’s proposals/letters of interest and qualification before the proposals/letters of interest and qualification are submitted to CTA. Proposer/Respondent will be required to indemnify, defend, and hold harmless CTA for any damages, costs, liabilities, and fees (including attorney’s fees) that result from the public disclosure by CTA of information from Proposer/Respondent’s proposal/letter of interest and qualification that is not marked and identified by Proposer/Respondent as proprietary, privileged, or confidential at the time that Proposer/Respondent submits its proposal/letter of interest and qualification to CTA.

In the event that a FOIA request is made for records that contain information that Proposer/Respondent has identified and marked as “proprietary,” “privileged,” or “confidential,” CTA will notify Proposer/Respondent of the request and will allow Proposer/Respondent an opportunity to review the records requested under FOIA so that Proposer/Respondent can confirm that all marked and identified proprietary, privileged or confidential information has been removed. Before allowing information that Proposer/Respondent has identified and marked as “proprietary,” “privileged,” or “confidential” to be redacted from a proposal/letter of interest or qualification (or other record), CTA may require Proposer/Respondent to provide CTA with additional information regarding the materials marked and identified for redaction. CTA will not allow the redaction of any information that does not meet the statutory FOIA exemptions.
Once Proposer/Respondent has reviewed a particular proposal/letter of interest and qualification or contract and has confirmed that all proprietary, privileged and confidential information has been removed, CTA will provide Proposer/Respondent with a redacted copy of the proposal/letter of interest and qualification or contract that will be publicly disclosed by CTA in connection with any pending or future FOIA requests and CTA will provide no further notice to Proposer/Respondent when that particular record is requested or publicly disclosed pursuant to a FOIA request. This redacted copy of the proposal/letter of interest and qualification or contract may also be published in whole or in part on CTA’s website or in any other format by CTA without further notice to Proposer/Respondent.

Please note that Proposer/Respondent may also be required to provide CTA with additional information regarding information redacted from records if any proceeding arises that requires CTA to defend the non-disclosure of the information that Proposer/Respondent has marked and identified as “proprietary,” “privileged,” or “confidential.”

Please also note that, if Proposer/Respondent receives a contract in connection with this procurement, “public records” as defined in Section 2 of FOIA that are in Proposer/Respondent’s possession or control as a result of the contract may be requested under FOIA and the non-exempt portions of those records may be subject to public disclosure under FOIA. See 5 ILCS 140/2 and 7(2). CTA will notify Proposer/Respondent of any FOIA request that will require Proposer/Respondent to review and compile records in its possession or control.

Upon receiving notice from CTA that a FOIA request has been made for Proposer/Respondent’s proposals/letters of interest and qualification, contract or other records provided to CTA or in Proposer/Respondent’s possession or control, Proposer/Respondent must produce and/or complete the review of all records requested pursuant to FOIA within two (2) business days or other time frame indicated in CTA’s notice to Proposer/Respondent. See 5 ILCS 140/3(d) and 3.1 for the statutory deadlines applicable to non-commercial and commercial FOIA requests. If Proposer/Respondent will require additional time to produce and/or review the records being requested, Proposer/Respondent must notify CTA immediately and provide CTA an explanation for the delay and the date when CTA can anticipate the records or the completion of Proposer/Respondent’s review.

If Proposer/Respondent fails to timely comply with any request by CTA to produce or review records necessary for CTA’s compliance with FOIA and Proposer/Respondent’s non-compliance results in any adverse consequences to CTA, including but not limited to, fines or penalties being imposed on CTA, Proposer/Respondent’s non-compliance will be an event of default on the underlying contract, if any, and will further be deemed a loss covered by any such underlying contract’s indemnification provisions.

**HOW TO MARK AND IDENTIFY PROPRIETARY, PRIVILEGED OR CONFIDENTIAL INFORMATION:**

In order to clearly mark and identify a record or portion of any record submitted to CTA in connection with this procurement that contains any Proposer/Respondent proprietary, privileged or confidential information, Proposer/Respondent must complete all of the following steps:

A. To the extent that Proposer/Respondent submits any proprietary, privileged, or confidential information to CTA, Proposer/Respondent must mark the title pages of each proposal/letter of interest and qualification containing such information as follows: “This [insert [Proposal] or [Letter of Interest and Qualification] or [Other Identification]] includes proprietary, privileged, or confidential, that may not be disclosed outside CTA and may not be duplicated, used or disclosed in whole or in part for any purpose other than to evaluate this Proposal/Letter of Interest and Qualification. The pages that contain information subject to this restriction are [insert page numbers or other identification].” For purposes of this provision, “CTA” will include any consultants assisting CTA with respect to CTA’s evaluation of the proposals/letters of interest and qualification submitted in connection with this procurement.
B. Proposer/Respondent must also mark each page or portion of a page containing proprietary, privileged, or confidential information, as specifically as possible, with the following legend: “[Proprietary] or [Privileged] or [Confidential] Information: This page or the portion of the page indicated contains proprietary, privileged or confidential information.”

C. Please note that CTA will not honor any request to redact information from records that does not meet the requirements of FOIA including, for example, a request that CTA redact the entire contents of a proposal/letter of interest and qualification. Excessive or indiscriminate marking of information as proprietary, privileged or confidential will be grounds for CTA to deem no information as being exempt from public disclosure under FOIA and disclosing all contents of the proposal/letter of interest and qualification.
FREEDOM OF INFORMATION DECLARATION

Place an “X” on the appropriate line and fill in the blanks:

_____ There is no information contained in the attached proposal/letter of interest and qualification that is proprietary, privileged or confidential to Proposer/Respondent:

________________________________________________________________________
(Insert the name of your company)
pursuant to the Illinois Freedom of Information Act (“FOIA”), 5 ILCS 140/1 et seq. I acknowledge that the entire contents of the attached proposal/letter of interest and qualification may be publicly disclosed by CTA upon request pursuant to FOIA or may be published in whole or in part on CTA’s website or in any other format without further notice to Proposer/Respondent.

_____ The attached proposal/letter of interest and qualification contains information that is proprietary, privileged, or confidential to Proposer/Respondent:

________________________________________________________________________
(Insert the name of your company)
pursuant to the Illinois Freedom of Information Act (“FOIA”), 5 ILCS 140/1 et seq. To the extent that proprietary, privileged or confidential information is being submitted to CTA in the attached proposal/letter of interest and qualification, the proposal/letter of interest and qualification has been marked as required by CTA’s Freedom of Information Act Notice. I acknowledge that the contents of the attached proposal/letter of interest and qualification that are not identified as containing proprietary, privileged or confidential information may be publicly disclosed by CTA upon request or may be published in whole or in part on CTA’s website or in any other format without further notice to Proposer/Respondent.

If CTA has any questions regarding the contents of the attached proposal/letter of interest and qualification or information marked as proprietary, privileged, or confidential by Proposer/Respondent, CTA’s Freedom of Information Officer should contact (Please Print):

Name: ________________________________________________________________
Title: ________________________________________________________________
Company: _____________________________________________________________
Address: _____________________________________________________________
Telephone: ___________________________________________________________
Facsimile: ___________________________________________________________
E-mail: ______________________________________________________________
C20FT102342998

ATTACHMENT M

TVM CERTIFICATION
TVM CERTIFICATION

Proposer, if a transit vehicle manufacturer, hereby certifies that it has complied with the requirements of 49 CFR Part 26.49 by submitting an annual DBE goal to the Federal Transit Administration (FTA). The goal has either been approved or not disapproved by FTA.

Proposer, if a non-manufacturer supplier, hereby certifies that the manufacturer of the transit vehicle to be supplied has complied with the above-referenced requirement of 49 CFR Section 26.49.

____________________________________
Requisition #

____________________________________
Proposer’s Signature of Authorized Official

____________________________________
Name and Title of the Bidder’s Authorized Official

____________________________________
Date
C20FT102342998

ATTACHMENT N

REQUEST FOR PRE-OFFER CHANGE OR APPROVED EQUAL
Request for Pre-Offer Change or Approved Equal

This form must be used for requested clarifications, changes, substitutes or approval of items equal to items specified with a brand name and must be submitted as far in advance of the Due Date, as specified in “Questions, Clarifications and Omissions.”

Chicago Transit Authority

C20FT102342998 - MANUFACTURE AND DELIVERY OF A BASE ORDER OF ONE HUNDRED (100) DIESEL ENGINE TRANSIT BUSES; WITH FIVE (5) OPTIONS TO PURCHASE UP TO FIVE HUNDRED (500) ADDITIONAL BUSES AND ASSOCIATED SPARE PARTS.

| Request #: |  |
| Proposer: |  |
| RFP Section: |  |
| Page: |  |
| Questions/clarification or approved equal: |  |

<table>
<thead>
<tr>
<th>Agency action:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Approved</td>
<td>□ Denied</td>
</tr>
<tr>
<td>□ See addendum</td>
<td>□ See response below</td>
</tr>
</tbody>
</table>

| Agency response: |  |
Contractor’s Service and Parts Support Data

- Location of nearest Technical Service Representative to Agency:
  Name:
  Address:
  Telephone:
  Describe technical services readily available from said representative:

- Location of nearest Parts Distribution Center to Agency:
  - Name:
  Address:
  Telephone:
  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 Agency:
C20FT102342998
ATTACHMENT P
FORM FOR PROPOSAL DEVIATION
Form for Proposal Deviation

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

Chicago Transit Authority

C20FT102342998 - MANUFACTURE AND DELIVERY OF A BASE ORDER OF ONE HUNDRED (100) DIESEL ENGINE TRANSIT BUSES; WITH FIVE (5) OPTIONS TO PURCHASE UP TO FIVE HUNDRED (500) ADDITIONAL BUSES AND ASSOCIATED SPARE PARTS.

<table>
<thead>
<tr>
<th>Deviation No.:</th>
<th>Contractor:</th>
<th>RFP section:</th>
<th>Page:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Complete description of Deviation:

Rationale (pros and cons):
C20FT102342998

ATTACHMENT Q

PRE-AWARD EVALUATION DATA FORM
# Pre-Award Evaluation Data Form

**NOTE:** This form is to be completed and included in the Qualification Package. Attach additional pages if required.

Chicago Transit Authority

C20FT102342998 - MANUFACTURE AND DELIVERY OF A BASE ORDER OF ONE HUNDRED (100) DIESEL ENGINE TRANSIT BUSES; WITH FIVE (5) OPTIONS TO PURCHASE UP TO FIVE HUNDRED (500) ADDITIONAL BUSES AND ASSOCIATED SPARE PARTS.

| 1. Name of firm: |  |
| 2. Address: |  |
| 3. □ Individual □ Partnership □ Corporation □ Joint Venture |  |
| 4. Date organized: | State in which incorporated: |
| 5. Names of officers or partners: | a. | b. | c. | d. | e. |

6. How long has your firm been in business under its present name?

7. Attach as SCHEDULE ONE a list of similar current contracts that demonstrates your available capacity, including the quantity and type of bus, name of contracting party, percentage completed and expected completion date.

8. Attach as SCHEDULE TWO a list of at least three similar contracts that demonstrates your technical proficiency, each with the name of the contracting party and number and they type of buses completed within the last five years.

9. Have you been terminated or defaulted, in the past five years, on any Contract you were awarded?
   - □ Yes  □ No
   If yes, then attach as SCHEDULE THREE the full particulars regarding each occurrence.

10. Attach as SCHEDULE FOUR Proposer’s last three (3) financial statements prepared in accordance with generally accepted accounting principles of the jurisdiction in which the Proposer is located, and audited by an independent certified public accountant; or a statement from the Proposer regarding how financial information may be reviewed by the Agency (This may require execution of an acceptable non-disclosure agreement between the Agency and the Proposer.)

11. Attach as SCHEDULE FIVE a list of all principal Subcontractors and the percentage and character of Work (Contract amount) that each will perform on this Contract.

12. If the Contractor or Subcontractor is a joint venture, submit PRE-AWARD EVALUATION DATA forms for each member of the joint venture.

The undersigned certifies to the accuracy of all information:

**Name and title:**

**Company:**

Authorized signature __________________________ Date __________________________

The above information is confidential and will not be divulged to any unauthorized personnel.
C20FT102342998

ATTACHMENT R

CERTIFICATION OF COMPLIANCE WITH BUS TESTING REQUIREMENTS
Certificate of Compliance with Bus Testing Requirement

The undersigned certifies that the vehicle offered in this procurement complies and will, when delivered, comply with 49 USC § 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). If multiple buses are being proposed, provide additional bus testing information below or on attached sheet. 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 Proposal. If the configuration or components are not identical, then the manufacturer shall provide with its Proposal a description of the change and the manufacturer’s basis for concluding that it is not a major change requiring additional testing. If multiple buses are being proposed, testing data on additional buses shall be listed on the bottom of this page.

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 Proposal 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 the Agency 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.

Company name:
Name and title of the Proposer’s authorized official:

_______________________________________________________________________________________________

Authorized signature __________________________ Date

NOTE: The OEM needs to include a copy of their Altoona Report with the Technical proposal.
C20FT102342998

ATTACHMENT S

FEDERAL MOTOR VEHICLE SAFETY STANDARDS
Federal Motor Vehicle Safety Standards

The Proposer and (if selected) 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.

Company name:
Name of signer:
Title:

________________________________________
Authorized signature

Date
ATTACHMENT T

LOCATION OF PRINCIPAL POINTS OF ENGINEERING AND ASSEMBLY
Location of Principal Points of Engineering and Assembly

The Proposer shall state the location of the principal point(s) of engineering and assembly for the 40 foot, Diesel Engine Transit Buses.

Engineering Location

________________________________________________________
City, State/Province and Country

Assembly Location

________________________________________________________
City, State/Province and Country

Signature of Authorized Official: ______________________________________________________

Print Name and Title: ________________________________________________________________

Email Address: _________________________________________________________________

Name of Firm: ___________________________ Date: ________________
C20FT102342998
ATTACHMENT U
VEHICLE QUESTIONNAIRE
Vehicle Questionnaire
This form must be completed and included in the Technical Proposal.

General Coach Data Sheet
40 Ft. Diesel Bus

Bus Manufacturer: ______________________________________________________________

Bus Model Number: ____________________________________________________________

Basic Body Construction Type: _________________________________________________

General Dimensions

<table>
<thead>
<tr>
<th>Overall length</th>
<th>Over bumpers</th>
<th>Over body excluding mirrors and lights</th>
<th>Over body</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>feet</td>
<td>feet</td>
<td>inches</td>
</tr>
<tr>
<td>Overall width</td>
<td>Over body</td>
<td>Over body including mirrors</td>
<td>inches</td>
</tr>
<tr>
<td></td>
<td>feet</td>
<td>feet</td>
<td>inches</td>
</tr>
<tr>
<td>Overall height (max)</td>
<td></td>
<td>Over tires</td>
<td>inches</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Angle of approach</th>
<th>degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angle of departure</td>
<td>degrees</td>
</tr>
<tr>
<td>Breakover angle 1</td>
<td>degrees</td>
</tr>
<tr>
<td>Breakover angle 2</td>
<td>degrees</td>
</tr>
</tbody>
</table>

Doorway clear opening (at widest point) __________ inches

<table>
<thead>
<tr>
<th>Width with grab handles</th>
<th>Width without grab handles</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front door</td>
<td>inches</td>
<td>inches</td>
</tr>
<tr>
<td>Rear door</td>
<td>inches</td>
<td>inches</td>
</tr>
</tbody>
</table>

| Front axle floor height above ground | inches |
| Rear axle floor height above ground | inches |
| Step height from ground | inches |

Kneeled

<table>
<thead>
<tr>
<th>Front doorway</th>
<th>Center doorway</th>
<th>Ramp angle</th>
<th>Rear doorway</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches (a)</td>
<td>N/A</td>
<td>degrees (R1)</td>
<td>inches (a)</td>
</tr>
<tr>
<td>Unkneeled</td>
<td>inches (b)</td>
<td>degrees (R2)</td>
<td>inches (b)</td>
</tr>
</tbody>
</table>

Interior head room (floor to ceiling at center of aisle)

<table>
<thead>
<tr>
<th>First axle location</th>
<th>Rear axle location</th>
<th>Rear settee (in front of seat)</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>inches</td>
<td>inches</td>
</tr>
</tbody>
</table>
Aisle width
Minimum width on floor between first axle wheel housings
Minimum width on floor between rear axle wheel housings

Minimum ground clearance (between bus and ground, with bus unkneeled)
Outside axles zones
Inside axles zones

Horizontal turning envelope (see diagram above)
Outside body turning radius, TR0 (including bumper)
Front inner corner radius, TR1
Front wheel inner turning radius, TR2
Front wheel outer turning radius, TR3
Inside Body Turning Radius innermost point, TR4 (including bumper)

Wheel base
First axle to center/rear axle
Center axle to rear axle

Overhang, centerline of axle over bumper
Front
Rear

Floor
Maximum interior floor slope (from horizontal)

Capacity
Total number of passenger sittings
Passenger seating manufacturer/model number
Total number of standing passengers (1 per 1.5 sq. ft.)
Minimum hip to knee space
Maximum hip to knee space
Restraint system type and model number

Bus weight
Curb weight
Curb weight plus seated Load*
GVWR

* Including operator and passengers at 180 lbs per person
### Steering Axles
| Manufacturer | |
| Type and weight rating | |
| Model number | |

### Drive axle
| Manufacturer | |
| Type and weight rating | |
| Model number | |

### Drive axle ratio
| Differential ratio | |
| Hub reduction ratio (if used) | |
| Final axle ratio (if hub reduction is used) | |

### Brake system
| Make/type of fundamental system | |
| First axle brake chamber model | |
| Rear axle brake chamber model | |
| First axle slack adjuster manufacturers | |
| Model number | |
| Rear axle slack adjuster manufacturers | |
| Model number | |
| First axle brake drum/rotor manufacturers | |
| Rear axle brake drum/rotor manufacturers | |

### Air compressor
| Manufacturer | |
| Type | |
| Model number | |
| Rated capacity | |
| Capacity at idle | |
| Maximum warranted speed | |
| Idle speed | |
| Drive type | |
| Governor cut-in pressure | |
| Governor cut-out pressure | |

### Air Reservoir Capacity
<p>| Manufacturer | |
| Supply reservoir number and size | |</p>
<table>
<thead>
<tr>
<th>Vehicle Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary reservoir number and size</td>
</tr>
<tr>
<td>Secondary reservoir number and size</td>
</tr>
<tr>
<td>Parking reservoir number and size</td>
</tr>
<tr>
<td>Accessory reservoir number and size</td>
</tr>
<tr>
<td>Other reservoir number and size</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Air Dryer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
</tr>
<tr>
<td>Model</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cooling System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
</tr>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Model number</td>
</tr>
<tr>
<td>Number of tubes</td>
</tr>
<tr>
<td>Fins per inch</td>
</tr>
<tr>
<td>Fin thickness (inches)</td>
</tr>
<tr>
<td>Fin construction</td>
</tr>
<tr>
<td>Total cooling system capacity (gallons)</td>
</tr>
<tr>
<td>Radiator fan manufacturer</td>
</tr>
<tr>
<td>Fan speed/control type (mech/elect/hyb)</td>
</tr>
<tr>
<td>Surge tank capacity</td>
</tr>
<tr>
<td>Surge tank material</td>
</tr>
<tr>
<td>Overheat alarm temperature</td>
</tr>
<tr>
<td>Shutdown temperature settings</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary interior lighting system</td>
</tr>
<tr>
<td>Manufacturer</td>
</tr>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Model number</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alternator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
</tr>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Model number</td>
</tr>
<tr>
<td>Output at idle</td>
</tr>
<tr>
<td>amps</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage regulator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
</tr>
<tr>
<td>Model number</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage equalizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
</tr>
<tr>
<td>Model number</td>
</tr>
</tbody>
</table>
**Auxiliary inverter (120/240)**
- Manufacturer
- Model number
- Inverter technology
- Output voltage(s)

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Starter motor**
- Manufacturer
- Voltage
- Model number

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Voltage</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Energy storage**
- Batteries – low voltage
- Manufacturer
- Type
- Model number
- Cold cranking amps

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Type</th>
<th>Model number</th>
<th>Cold cranking amps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Engine**
- Manufacturer
- Type
- Model Number
- Net Horsepower
- Net Torque
- Maximum Speed, no load
- Maximum Speed, full load

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Type</th>
<th>Model Number</th>
<th>Net Horsepower</th>
<th>Net Torque</th>
<th>Maximum Speed, no load</th>
<th>Maximum Speed, full load</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Fire Detection**
- Manufacturer
- Model number
- Number of detectors
- Type of detector
- Battery backup

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Model number</th>
<th>Number of detectors</th>
<th>Type of detector</th>
<th>Battery backup</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Thermal  □ Optical</td>
<td>Yes □ No</td>
</tr>
</tbody>
</table>

**Bumpers**
- Manufacturer
- Type

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Fuel and Exhaust System**
- Fuel type
- Operating range and route profile

<table>
<thead>
<tr>
<th>Fuel type</th>
<th>Operating range and route profile</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Vehicle Questionnaire

**Fuel tanks (Liquid fuels)**
- Manufacturer
- Capacity (total and usable)
- Construction material
- Quantity and location of tanks

**DEF tanks**
- Manufacturer
- Capacity (total and usable)
- Construction material
- Quantity and location of tanks

**Exhaust system**
- Diesel particulate filter manufacturer
- Describe DPF electronic interface
- Muffler manufacturer (if applicable)
- SCR manufacturer

**Air Suspension**

<table>
<thead>
<tr>
<th></th>
<th>Front</th>
<th>Middle</th>
<th>Rear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air spring manufacturer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air spring quantity per axle</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Shock absorber manufacturer</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Shock absorber quantity per axle</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

**Steering**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump manufacturer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump model number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steering gear manufacturer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steering gear model number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steering gear type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steering wheel diameter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum effort at steering wheel*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Unloaded stationary coach on dry asphalt pavement

**Transmission or Gearbox**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of forward speeds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traction motor horsepower rating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type ventilation/cooling</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Propshaft**

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
</tr>
</tbody>
</table>
## Vehicle Questionnaire

### Wheels
- Manufacturer
- Type
- Size
- Mounting type
- Bolt circle diameter
- Protective coating

### Tires
- Manufacturer
- Type
- Size
- Load range/air pressure

### Door System

#### Door panels
- Manufacturer
- Type

<table>
<thead>
<tr>
<th>Door panels</th>
<th>Manufacturer</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front door</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rear door</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Actuating mechanism (air, electric, spring, other)
- Manufacturer
- Type

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Manufacturer</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front door</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rear door</td>
<td></td>
<td></td>
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</tbody>
</table>

### Heating and Ventilating Equipment

<table>
<thead>
<tr>
<th>Component</th>
<th>Capacity</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating system capacity</td>
<td>Btu</td>
<td></td>
</tr>
<tr>
<td>Air conditioning system capacity</td>
<td>Btu</td>
<td></td>
</tr>
<tr>
<td>Ventilating capacity</td>
<td>CFM Total</td>
<td></td>
</tr>
</tbody>
</table>

### Driving heater
- Manufacturer
- Type
- Model number
- Capacity

### Auxiliary heater
- Manufacturer
- Type
- Model number
- Capacity
### Floor Heaters

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Type/number</th>
<th>Model number</th>
<th>Capacity</th>
</tr>
</thead>
</table>

### Passenger Loading System

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Type (hydraulic, electric or both)</th>
<th>Model number</th>
<th>Capacity (lbs.)</th>
</tr>
</thead>
</table>

### Dimensions

<table>
<thead>
<tr>
<th>Width of ramp</th>
<th>Length of ramp</th>
</tr>
</thead>
</table>

### Cycle Times

<table>
<thead>
<tr>
<th>Normal idle</th>
<th>Fast idle</th>
</tr>
</thead>
</table>

### Electronics

- Video system manufacturer
- Video system model number
- Number of cameras
- Multiplex system manufacturer
- Multiplex system model number
- Automatic passenger counter system manufacturer
- Automatic passenger counter system model number
- Destination sign manufacturer
- Destination sign model number
- AVL/AVM system manufacturer
- AVL/AVM system model number
- Passenger information system manufacturer
- Passenger information system model number
- Crash Avoidance System Supplier
- Crash Avoidance System model number

### Coach Body Fittings

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Passenger windows manufacturer</th>
<th>Passenger window Light Transmittance %</th>
</tr>
</thead>
</table>

### Curbside Mirror

| Size | Manufacturer |
|------|--------------|-------------|
### Streetside Mirror
- **Size**
- **Manufacturer**
- **Model number**
- **Manufacturer part numbers**

### Center Review Mirror
- **Size**
- **Manufacturer**
- **Model number**
- **Manufacturer part numbers**

### Front Entrance Area Mirror
- **Size**
- **Manufacturer**
- **Model number**
- **Manufacturer part numbers**

### Upper Right-Hand Corner Mirror
- **Size**
- **Manufacturer**
- **Model number**
- **Manufacturer part numbers**

### Rear Exit Area Mirror
- **Size**
- **Manufacturer**
- **Model number**
- **Manufacturer part numbers**

### Barrier Mirror
- **Size**
- **Manufacturer**
- **Model number**
- **Manufacturer part numbers**

### Bike Rack Mirror
- **Size**
- **Manufacturer**
- **Model number**
- **Manufacturer part numbers**
Vehicle Questionnaire

Bicycle racks
Manufacturer
Model number

Paint system
Manufacturer
Type

Operator control layout diagram:

Optional Equipment

Event Data Recorder
Manufacturer
Model
Comprehensive Service Package validity in years

Brake Sensor
Manufacturer
Model

Collision Warning System
Manufacturer
Model

Pedestrian Warning
Manufacturer
Model

Interior Electronic Displays (i.e. Infotainment)
Manufacturer
Model
## Vendor References Form

### Reference Contact Information

<table>
<thead>
<tr>
<th>Reference Name</th>
<th>Initial Date of Work with Contact</th>
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</thead>
<tbody>
<tr>
<td>Contact Name</td>
<td>Original Contract Term</td>
</tr>
<tr>
<td>Address</td>
<td>Any Contract Extensions</td>
</tr>
<tr>
<td></td>
<td>Termination Date of Contract</td>
</tr>
<tr>
<td></td>
<td>Reason for Termination</td>
</tr>
<tr>
<td>Contact Title</td>
<td>Telephone Number</td>
</tr>
<tr>
<td>E-mail</td>
<td>Fax Number</td>
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</table>

### Nature of Relationship with Company

- Approximate $ Size of the Contract
- Services provided/Software Implemented
- Name of Vendor Project Manager and Client Project Manager

### Detailed Description of Your Responsibilities

- **Roles & Responsibilities:**

- **Were you the Prime Contractor?**

- **Subcontractors & Responsibilities:**
C20FT102342998
ATTACHMENT W
TABLE OF EXCEPTIONS
RFP C20FT102342998 – Request for Proposals (RFP) For the Manufacture and Delivery of a Base Order of One Hundred (100) Diesel Engine Transit Buses; with Five (5) Options to Purchase up to Five Hundred (500) Additional Buses and Associated Spare Parts.

**Table of Exceptions**

Vendor must identify the page, section number, provision and the specific exception, non-conformance and/or substitute language proposed. Failure to identify any specific items of non-compliance will result in CTA assuming compliance. The CTA, at its sole discretion may reject any exception or specifications within the proposal.

<table>
<thead>
<tr>
<th>Page Number</th>
<th>Section Number</th>
<th>Provision</th>
<th>Specific Exception, Non-Conformance, and/or Substitute Language Proposed</th>
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</thead>
<tbody>
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</tbody>
</table>
C20FT102342998

ATTACHMENT X

ACKNOWLEDGEMENT OF ADDENDA
Acknowledgement of Addenda

Failure to acknowledge receipt of all addenda may cause the Proposal to be considered nonresponsive to the Solicitation. Acknowledged receipt of each addendum must be clearly established and included with the Proposal.

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

- Addendum No.: [ ] Dated: [ ]
- Addendum No.: [ ] Dated: [ ]
- Addendum No.: [ ] Dated: [ ]
- Addendum No.: [ ] Dated: [ ]
- Addendum No.: [ ] Dated: [ ]

Proposer:

Name: [ ]
Title: [ ]
Phone: [ ]
Street address: [ ]
City, state, ZIP: [ ]

Authorized signature [ ] Date [ ]
C20FT102342998

ATTACHMENT Y

PROPOSER’S SIGNATURE PAGE AND CTA ACCEPTANCE PAGE
REQUISITION NO. C20FT102342998 - RFP FOR THE MANUFACTURE AND DELIVERY OF A BASE ORDER OF ONE HUNDRED (100) DIESEL ENGINE TRANSIT BUSES; WITH FIVE (5) OPTIONS TO PURCHASE UP TO FIVE HUNDRED (500) ADDITIONAL BUSES AND ASSOCIATED SPARE PARTS.

PROPOSER'S SIGNATURE PAGE

The undersigned hereby acknowledges having received a full set of CONTRACT DOCUMENTS (Request for Proposal; General Conditions; Special Provisions; Federal Requirements; Technical Specifications; Price Proposal and all of the forms, certificates, and documents issued with the Specifications) AND ADDENDA NUMBERS:

Proposer Must Insert Addenda Numbers Here

and the undersigned agrees, if awarded the Contract, to perform the Contract in accordance with the terms and conditions of the Contract and Addenda, if any, thereto. Notice to the undersigned may be served by mailing to the address hereinafter set forth.

FURTHER, THE UNDERSIGNED, BEING DULY SWORN, DEPOSES AND STATES ON OATH THAT the undersigned has not entered into any agreement with any other Proposer or prospective Proposer or with any other person, firm, or corporation relating to the price or prices named within the undersigned’s Proposal, or any other Proposal, or any agreement or arrangement under which any person, firm, or corporation is to refrain from submitting a proposal, or any agreement or arrangement for any act or omission in restraint of free competition among Proposers, and has not disclosed to any person, firm, or corporation the terms of the undersigned’s Proposal, or the price or prices named herein. As required by Section 33E-11 of the Illinois Criminal Code of 1961, as amended (the “Act”), the undersigned certifies that the below named Proposer or any agent, partner, employee, or officer of the Proposer is not barred from contracting with any unit of state or local government as a result of engaging in or being convicted of either bid-rigging in violation of Section 3, Article 33E or bid–rotating in violation of Section 4, of Article 33E of the Act, or any similar offenses of any state or the United States that contain the same elements as the offenses of bid-rigging or bid-rotating.

Proposer: ________________________________

(Print or Type Name of Corporation, Limited Liability Co., Sole Proprietor, Partnership, or Joint Venture)

Business Address (Print or Type Street, City, State and Zip Code): ________________________________

By: __________________________________________________________________________________

Signature of Authorized Officer, Managing Member, Proposer, Partner(s) or Joint Venturer(s)

Title and Name of Signatory: __________________________________________________________________________________

(Print or Type Title and Name)

1. Refer to §2-8 of Part I for additional instructions.

2. If signed by any person other than the corporate President or Vice President, a certified copy of a resolution or by-law authorizing such person to sign must accompany this Bid.

3. All Partners or Joint Ventures of the Firm must sign this bid unless one Partner or Joint Venturer is authorized to sign for the Partnership or Joint Venture. Use additional copies of this Attachment if more than one signatory.

State of __________________________________________

County of _________________________________________

Signed and Sworn to before me by the signatory whose name appears above on this:

day of _______________ 20___

(day) (month) (year)

(Signature of Notary Public) ____________________________ (NOTORIAL SEAL)
CTA ACCEPTANCE PAGE

The undersigned, on behalf of Chicago Transit Authority, a Municipal Corporation of the State of Illinois, hereby accepts the foregoing bid items as identified in the Proposal.

Contract Number: C20FT102342998

Dated this ___________ day of ____________, 2020, at Chicago, Illinois

____________________________________
Vice President, Purchasing & Supply Chain

____________________________________
President

Approved as to form and legality, for the sole benefit of CTA. Subject to proper authorization and execution thereof:

____________________________________
Attorney