PUTTING PEOPLE FIRST

Birmingham Bus Rapid Transit (BRT)

REQUEST FOR PROPOSAL

Solicitation #19-16 BRT Vehicle Procurement

Key Dates

RFP Issued: August 30, 2018
Deadline for Questions: September 13, 2018 (5:00 P.M. Central)
Proposal Due Date: October 9, 2018 (5:00 P.M. Central)

City of Birmingham
Finance Department
Purchasing Division
Room P-100 City Hall
710 North 20th Street
Birmingham, AL 35203-2227
Telephone: (205) 254-2265
Fax: (205) 254-2484

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SECTION 1: NOTICE OF REQUEST FOR PROPOSALS

1.1 Description of the Work to be Done

The City of Birmingham, Alabama (City) requests Proposals for the manufacture and delivery of ten (10) 60-ft Low-Floor CNG Articulated Buses and related products and services in accordance with the terms and conditions set forth in this Request for Proposal (RFP). Specifications are provided for up to six (6) buses that will be branded for Bus Rapid Transit (BRT) service and the remaining buses will be used for fixed route service. The BRT vehicles will have distinct design, features, systems, and branding specifications from the fixed route buses. The Contract resulting from this solicitation shall be a firm-fixed-price Contract.

1.2 Obtaining Proposal Documents

Proposal documents may be obtained from the City of Birmingham, Purchasing Division, Room P-100 City Hall, 710 North 20th Street, Birmingham, AL 35203 or by calling (205) 254-2265, fax (205) 254-2482 and requesting a copy to be mailed. Documents requested by mail will be packaged and sent postage paid. Electronic copies may also be downloaded from any of the following websites:

- City of Birmingham: https://www.birminghamal.gov/work/bidding-opportunities/
- Birmingham-Jefferson County Transit Authority: https://maxtransit.org/category/announcements/solicitations/

Any addenda will be available on the internet. Addenda will be mailed to only those vendors who were provided a copy in person or by mail. Proposers are responsible for checking the website for addenda until the Proposal due date.

1.3 Proposal Due Date and Submittal Requirements

1. Proposals must be received no later than **5:00 P.M. Central Time on Tuesday, October 9, 2018** and should be addressed as follows:

   Carmen Jones, MAML
   Purchasing Agent
   City of Birmingham
   710 North 20th Street – Suite P-100
   Birmingham, Alabama 35203

2. Envelopes or boxes containing Proposals shall be sealed and clearly labeled with the City's Proposal number and the solicitation title: Solicitation #19-16 BRT Vehicle Procurement.

3. Proposers are requested to submit to the City one unbound hard copy marked "Original," five (5) additional bound printed copies, and one electronic PDF copy of the Proposal on a portable jump drive. In case of any discrepancies, the hard copy will be considered by the City in evaluating the Proposal, and the electronic version is provided for the City's administrative convenience only. A

Proposal is deemed to be late if it is received by the City after the deadline stated above. Proposals received after the submission deadline will be rejected and kept on file unopened.

1.4 Validity of Proposals

Proposals and subsequent offers shall be valid for a period of one hundred twenty (120) days from the due date specified above.

1.5 Period for Questions

Prospective Proposers are requested to submit written questions via e-mail by **5:00 P.M. Central Time on September 13, 2018** to the Contract Officer/Administrator identified below.

Contracting Officer's Contact Information:

Mrs. Carmen Jones
Purchasing Agent, City of Birmingham
carmen.jones@birminghamal.gov

Responses will be shared with all prospective Proposers on the websites listed above. Prospective Proposers are reminded that any changes to the RFP will be by written addenda only. A copy of any addenda will be mailed to only those vendors who were provided a copy in person or by mail.

Identification of Source of Funding

Financial support of this project is provided through financial assistance from the USDOT FY 2015 TIGER Discretionary Grant (FAIN No. 5822-2017-1) on a fifty percent (50%) matched basis. Additional sources of funds are provided by the City of Birmingham and/or Birmingham-Jefferson County Transit Authority (BJCTA).

SECTION 2: INSTRUCTIONS TO PROPOSERS

2.1 Quantities

The Work under this Solicitation consists of the manufacture and delivery of a base order of ten (10) 60-ft Low Floor Articulated CNG Buses and associated goods and services, including but not limited to, spare parts, training with materials, and, operating and maintenance manuals.

This RFP provides specifications for up to six (6) buses that will be branded for BRT service and the remaining buses that will be used for fixed route service. The BRT branded buses will be distinct from the fixed route buses.

2.2 Proposed Schedule for the Procurement

The following is the solicitation schedule for Proposers:

- RFP Release Date: **August 30, 2018**
- Deadline to submit written questions: **September 13, 2018, 5:00 P.M. Central Time**
- Responses to questions and RFP addenda: **September 17, 2018**
- Proposal Due Date: **October 9, 2018, 5:00 P.M. Central Time**

2.3 Questions, Clarifications, and Omissions

All correspondence, communication and contact in regard to any aspect of this solicitation or offers shall be only with the Contracting Officer identified above. Unless otherwise instructed by the Contracting Officer, Proposers and their representatives shall not make any contact with or communicate with any member of the City, or its employees and consultants, other than the designated Contracting Officer, in regard to any aspect of this solicitation or offers.

At any time during this procurement up to the time specified in "Proposed Schedule for the Procurement," Proposers may request, in writing, a clarification or interpretation of any aspect, 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 shall mean the brand name or approved equal. Such written requests shall be made to the Contracting Officer. The Proposer making the request shall be responsible for its proper delivery to the City 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 shall be provided to all Proposers. Any response that is not confirmed by a written addendum shall not be official or binding on the City.

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 City law, ordinance, rule, regulation or other standard or requirement, then the Proposer shall submit a written request for clarification to the City within the time period specified above.

2.4 Addenda to RFP

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

If the City determines that the addenda may require 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 City determines will allow Proposers sufficient time to revise their Proposals. Any new Due Date shall be included in the addenda.

2.5 DBE Requirements for Transit Vehicle Manufacturers

Pursuant to Title 49, Code of Federal Regulations, Part 26.49, a Proposer, as a condition of being authorized to respond to this solicitation, must certify by completing the form DBE Approval Certification that it has on file with the Federal Transportation Administration (FTA) an approved or not disapproved annual disadvantaged business enterprise (DBE) subcontracting participation goal.

2.6 Buy America Certification

This Contract is subject to the "Buy America" requirements of 49 United States Code (USC) §5323(j) and 49 Code of Federal Regulations (CFR) Part 661, as may be amended from time to time, and applicable federal regulations. Prospective Proposers' attention is directed to 49 CFR §661.11, "Rolling Stock Procurements." Prospective Proposers have the responsibility to comply with the cited and any governing statutes and regulations, including official interpretations.

A Proposer shall submit to the City the appropriate Buy America certification, included in this document, with all offers on FTA-funded contracts. Proposals that are not accompanied by a properly completed Buy America certification are subject to the provisions of 49 CFR 661.13 and will be rejected as nonresponsive.

The two signature blocks on the Buy America certificate are mutually exclusive. Proposers shall sign only one signature block on the certificate. Signing both signature blocks will make the Proposal nonresponsive. A false certification is a criminal act in violation of 18 USC §1001.

A Proposer who has submitted an incomplete Buy America certificate or an incorrect certificate of noncompliance through inadvertent or clerical error (but not including failure to sign the certificate, submission of certificates of both compliance and noncompliance, or failure to submit any certification), may submit to the FTA Chief Counsel within ten (10) days of Proposal opening a written explanation of the circumstances surrounding the submission of the incomplete or incorrect certification in accordance

with 28 USC §1746, sworn under penalty of perjury, stating that the submission resulted from inadvertent or clerical error. The Proposer will also submit evidence of intent, such as information about the origin of the product, invoices, or other working documents. The Proposer will simultaneously send a copy of this information to the City.

The FTA Chief Counsel may request additional information from the Proposer, if necessary. The City may not make Contract award until the FTA Chief Counsel issues his or her determination, except as provided in 49 CFR Part 661.15(m).

Certification based on ignorance of proper application of the Buy America requirements is not an inadvertent or clerical error.

A waiver from the Buy America provisions will be sought by the City from the FTA for the proposed awardee, if the grounds for a waiver exist. All Proposers seeking a waiver must submit to the City a timely request in writing, which shall include the facts and justification to support the granting of the waiver. Such waiver from the Buy America provisions may be granted if the FTA determines the following:

1. Their application would be inconsistent with the public interest;
2. Materials are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or
3. Inclusion of domestic material will increase the cost of the overall Contract by more than 25 percent.

Any party may petition the FTA to investigate a successful Proposer's compliance with the Buy America certification. The procedures are set out in 49 CFR Part 661.15. If the FTA determines that the evidence indicates noncompliance, the FTA will require the City to initiate an investigation. The successful Proposer has the burden of proof to establish compliance with its certification. If the successful Proposer fails to so demonstrate compliance, then the successful Proposer will be required to substitute sufficient domestic materials without revision of the original Contract terms. Failure to do so will be a breach of the Contract and may lead to the initiation of debarment proceedings under 49 CFR Part 29.

2.7 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 sufficiently responding to the requirements of the RFP.

Any and all Deviations must be explicitly, fully and separately stated in the Proposal. Proposal Deviations must be explicitly and fully 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 City. In addition to the Form for Proposal Deviation, deviations made in Section 6 Technical Specifications must be indicated on the Form for Technical Specification Conformance. All Deviations shall 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 and Form for Technical Specification Conformance shall be included in the Technical package.

2.8 Protest Procedures

All protests must be in writing, stating the name and address of protestor, a contact person, Contract number and title. Protests shall specify in detail the grounds of the protest and the facts supporting the protest, and submitted to:

Nicole King
City Attorney Legal Department
710 North 20th Street, Room 600
Birmingham, AL 35203

Protests not properly addressed to the address shown above may not be considered by the City.

Copies of the City's protest procedures and the protest provisions of FTA Circular 4220.1F or its successor may be obtained from Nicole King, City Attorney Legal Department, 710 North 20th Street, Room 600, Birmingham, AL 35203. Proposals will be opened and a Notice of Award will be issued by the City in accordance with the City's protest procedures and the protest provisions of FTA Circular 4220.1F or its successor.

2.8.1 Pre-Proposal Protests

Pre-Proposal protests are protests based upon the content of the solicitation documents. Three copies of Pre-Proposal protests must be received by the City's Purchasing office no later than five (5) calendar days prior to the Due Date. Protests will be considered and either denied or sustained in part or in whole, in writing, in a manner that provides verification of receipt, prior to the Due Date for Proposals. A written decision specifying the grounds for sustaining all or part of or denying the protest will be transmitted to the protestor prior to the Due Date for Proposals in a manner that provides verification of receipt prior to the Due Date for Proposals. If the protest is sustained, then the Proposal Due Date may be postponed and an addendum issued to the solicitation documents or, at the sole discretion of the City, the solicitation may be canceled. If the protest is denied, then Proposals will be received and opened on the scheduled date unless a protest is filed with FTA. See "FTA Review," below.

2.8.2 Protests on the Recommended Award

All Proposers will be notified of the recommended award. This notice will be transmitted to each Proposer at the address contained in its Proposal form in a manner that provides verification of receipt. Any Proposer whose Proposal has not lapsed may protest the recommended award on any ground not specified in "Pre-Proposal Protests," above. Three (3) copies of a full and complete written statement specifying in detail the grounds of the protest and the facts supporting the protest must be received by the City at the appropriate address in "Address," above, no later than five (5) calendar days after the date such notification is received. Prior to the issuing of the Notice of Award, a written decision stating the grounds for allowing or denying the protest will be transmitted to the protestor and the Proposer recommended for award in a manner that provides verification of receipt.

2.8.3 FTA Review

After such administrative remedies have been exhausted, an interested party may file a protest with the Federal Transit Administration of the U.S. Department of Transportation pursuant to the procedures provided in the FTA C 4220.1F or its successor. FTA review is limited to the alleged failure of the City to have written protest procedures, the alleged failure of the City to follow those procedures, the alleged failure of the City to review a protest or the alleged violation of federal law or regulation.

2.9 Preparation of Proposals

2.9.1 Use of Proposal Forms

Proposers are advised that the forms contained in this RFP are required to be used for submission of a Proposal.

2.9.2 Proposal Format Requirements

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

Proposers shall submit one unbound original (marked clearly as such), seven (7) bound hard copies, and one electronic version in Adobe PDF format to the City. In case of any discrepancies, the original will be considered by the City in evaluating the Proposal, and the electronic version is provided for the City's administrative convenience only.

The hard-copy Proposals shall be prepared double-sided on 8½ in. × 11 in. paper in at least 11-point font. The hard copies shall be contained in three-ring binders, the contents of which are identified on the outside. Use of 11 in. × 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.

Package 1: Technical Proposal Requirements

1. Letter of Transmittal
2. Technical Proposal
3. Acknowledgement of Addenda
4. Contractor Service and Parts Support Data
5. Form for Proposal Deviation (without price data)
6. Form for Technical Specification Conformance
7. Vehicle Questionnaire
8. References and Non-Priced Information
9. Engineering organization chart, engineering change control procedure, field modification process
10. Manufacturing facilities plant layout, other contracts, staffing

11. Production and delivery schedule and other Contract commitments for the duration of this Contract
12. Quality Assurance Program
13. Proposed warranty (Table 10)

Package 2: Price Proposal Requirements

Each Price Proposal shall be on the prescribed Proposal form(s) and shall be for the entire Contract, including all Proposal items.

1. Letter of Transmittal
2. Vehicle Pricing Schedule, (including but not limited to such pricing elements as quantity discounts, bus, spare parts package, engineering, manuals, special tools, and test equipment)
3. Training Curriculum Pricing
4. Life Cycle Cost, include the cost and frequency of replacement (in years and/or miles) of the following components: A/C Blower Motor, A/C Condenser Motor, Alternator, Batteries Set, Brake Application Valve, Engine/Transmission PPA, Power Steering Gear Box Assembly, Radiator, Shocks, Starter, and Transmission Unit.
5. Form for Proposal Deviation (with price data)

The Proposer is required to complete and execute the City's Pricing Schedule, contained as part of the Proposal documents, and provide same in the Price Proposal. The Contractor shall be liable for payment of all local taxes applicable to the complete bus as delivered and should add these amounts to the Proposal price.

Package 3: Qualification Package Requirements

1. Pre-Award Evaluation Data Form
2. A copy of the three (3) most recent financial statements audited by an independent third party or a statement from the Proposer regarding how financial information may be reviewed by the City
3. Letter for insurance, indicating the Contractor's ability to obtain the insurance coverage in accordance with the RFP requirements
4. Letter from a surety for a Performance Guarantee, if required, indicating the Contractor's ability to obtain financial guarantees in accordance with the RFP requirements
5. Proposal Form
6. All federal certifications: Buy America Certification, Debarment and Suspension Certification for Prospective Contractor, Debarment and Suspension Certification (Lower-Tier Covered Transaction), Non-Collusion Affidavit, Lobbying Certification, Certificate of Compliance with Bus Testing Requirement, DBE Approval Certification, and Federal Motor Vehicle Safety Standards

In lieu of 4 above, the submission of a Letter from the Parent Company, indicating the willingness of the parent company to provide the financial guarantee upon award for a possible cost reduction is allowed. See also "Qualification Requirements," below.

Package 4: Proprietary/Confidential Information Package Requirements

The Proposer is directed to collect and submit any information it deems to be proprietary or confidential in nature in a separate marked and sealed package. If there is no confidential information, then the Proposer should include a statement to that effect. Subject package shall be submitted in accordance with the terms and conditions governing the submittal of Proposer's Proposal to this RFP. 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 specific proprietary information, trade secrets or confidential commercial and financial information must be clearly identified as such.

The Proposer is advised that the City is public and as such may be subject to certain state and/or local Public Records Act provisions regarding the release of information concerning this RFP. If a request is received by the City for the release of Proposer's proprietary/confidential information, then subject request will be referred to the Proposer for review and consideration. If Proposer chooses to declare the information proprietary/confidential and withhold it from release, then it shall defend and hold harmless the City from any legal action arising from such a declaration.

2.9.3 City Treatment of Proprietary/Confidential Information

Access to government records is governed by the Cody of Alabama 1975, Section 36-12-40. Except as otherwise required to be disclosed by applicable Code of Alabama 1975, Section 36-12-40, the City will exempt from disclosure proprietary information identified in Package 4.

Upon a request for records from a third party regarding this Proposal, the City will notify the Proposer in writing. The Proposer must respond within seven (7) business days with the identification of any and all "proprietary, trade secret or confidential commercial or financial" information. Failure to respond within the allowed period shall be deemed an approval to release. The Proposer shall indemnify the City's defense costs associated with its refusal to produce such identified information; otherwise, the requested information may be released.

The City shall employ sound business practices no less diligent than those used for the City's own confidential information to protect the confidence of all licensed technology, software, documentation, drawings, schematics, manuals, data and other information and material provided by Proposers and the Contractor pursuant to the Contract that contain confidential commercial or financial information, trade secrets or proprietary information as defined in or pursuant to the Cody of Alabama 1975, Section 36-12-40 against disclosure of such information and material to third parties, except as permitted by the Contract. The Contractor shall be responsible for ensuring that confidential commercial or financial information, trade secrets or proprietary information—with such determinations to be made by the City at its sole discretion—bears appropriate notices relating to its confidential character.

2.9.4 Signing of Proposal Forms

Proposals shall 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 City. The Proposer shall submit with its Proposal a copy of the joint venture agreement.

Proposals shall be signed by those individual(s) authorized to bind the Proposer. The Proposer shall 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 shall execute the Proposal. Each joint venture or consortium member is jointly and severally liable for the joint venture or consortium.)

2.9.5 Modification or Withdrawal of Proposals

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

A Proposer may withdraw a Proposal already received prior to the Proposal Due Date by submitting to the City, 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 City fails to award the Contract within the Proposal validity period prescribed in "Duration of the 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.

2.9.6 Ownership and Cost of Proposal Development

All proposals will become the property of the City.

This RFP does not commit the City to enter into a Contract, to pay any costs incurred in the preparation or presentation of a Proposal, nor to procure or contract for the equipment.

2.10 Proposal Evaluation, Negotiation, and Selection

Proposals will be evaluated, negotiated, selected and any award made in accordance with the criteria and procedures described below. The approach and procedures are those applicable to a competitive negotiated procurement whereby Proposals are evaluated to determine which Proposals are within a Competitive Range. Discussions and negotiations may then be carried out with Proposers within the Competitive Range, after which BAFOs may be requested.

However, the City may select a Proposal for award without any discussions or negotiations or request for any BAFOs. Subject to the City's right to reject any or all Proposals, the Proposer whose Proposal is found to be most advantageous to the City will be selected, based upon consideration of the criteria of "Proposal Selection Process," below.

2.10.1 Confidentiality of Proposals

Proposals will not be publicly opened. All Proposals and evaluations will be kept strictly confidential throughout the evaluation, negotiation and selection process, except as otherwise required by applicable law. Only the members of the Selection Committee and Evaluation Team and other City officials, employees and agents having a legitimate interest will be provided access to the Proposals and evaluation results during this period.

2.10.2 Duration of the Validity of Proposals

Proposals and subsequent offers shall be valid for the period stated in "Section 1.4: Notice of Request for Proposals." The City may request Proposers to extend the period of time specified herein by written agreement between the City and the Proposer(s) concerned.

2.10.3 Evaluation Committee

An Evaluation Committee, which will include City staff, BJCTA staff, and one or more outside experts, will be established. The Evaluation Committee will carry out the detailed evaluations of Proposals, including scoring and establishing final scores for a rank order of Proposals representation value to the City from "best" to "lowest", establishing the Competitive Range, and making the recommendation for selection of the Proposer, if any that may be awarded the Contract.

The Evaluation Committee will report its recommendations and findings to the appropriate City individual or body responsible for further negotiations and potentially awarding the Contract.

2.10.4 Review of Proposals for Responsiveness and Proposers for Responsibility

Each Proposal will be reviewed to determine if the Proposal is responsive to the submission requirements outlined in this RFP and if the Proposer is responsible.

A responsive Proposal is one that follows the requirements of this RFP, includes all documentation, is submitted in the format outlined in this RFP, is of timely submission, and has the appropriate signatures as required on each document. Failure to comply with these requirements may result in the Proposal being deemed nonresponsive.

A responsible Proposer is one that demonstrates the capability to satisfy the commercial and technical requirements set forth in the Solicitation. A Proposer's failure to demonstrate that it is responsible may result in the Proposal being rejected.

Any Proposal found to be nonresponsive or Proposer found to be non-responsible will not be considered further for award. Proposals that do not comply with the RFP instructions and requirements or do not include the required information may be rejected as insufficient and may not be further considered. The City reserves the right to request a Proposer to provide additional information and/or to clarify information. The City's determination regarding the responsiveness of a Proposal and the responsibility of a Proposer shall be final.

2.10.5 Proposal Selection Process

The following describes the process by which Proposals will be evaluated and a selection made for a potential award. Any such selection of a Proposal shall be made by consideration of only the criteria set forth below.

"Qualification Requirements" specifies the requirements for determining responsible Proposers, all of which must be met by a Proposer to be found qualified. Final determination of a Proposer's qualification will be made based upon all information received during the evaluation process and as a condition for award.

"Proposal Evaluation Criteria" contains all the evaluation criteria, and their relative order of importance, by which a Proposal from a qualified Proposer will be considered for selection. An award, if made, will be to a responsible Proposer for a Proposal that is found to be in the City's best interests or best value, based on price and other evaluation criteria considered. The procedures to be followed for these evaluations are provided in "Evaluation Procedures," below.

Qualification Requirements

The following are the requirements for qualifying responsible Proposers. All of these requirements should be met; therefore, they are not listed in any particular order of importance. Any Proposal that the Evaluation Committee finds does not meet these requirements, and cannot be made to meet these requirements, may be determined by the Evaluation Committee not to be responsible and the Proposal rejected. The requirements are as follows:

1. Sufficient financial strength, resources and capability to finance the Work to be performed and to complete the Contract in a satisfactory manner, as measured by the following:
    - Proposer's 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; oral statement from the Proposer regarding how financial information may be reviewed by the City.
    - Proposer's ability to secure financial guarantees, if required, as evidenced by a letter of commitment from an underwriter, surety or other guarantor confirming that the Proposer can provide the required guarantee.
    - Proposer's ability to obtain required insurance with coverage values that meet minimum requirements, evidenced by a letter from an underwriter confirming that the Proposer can be insured for the required amount.

2. Evidence that the human and physical resources are sufficient to perform the Contract as specified and to ensure delivery of all equipment within the time specified in the Contract, to include the following:
    - Engineering, management, and service organizations with sufficient personnel and requisite disciplines, licenses, skills, experience and equipment to complete the Contract as required and to satisfy any engineering or service problems that may arise during the warranty period.
    - Adequate manufacturing facilities sufficient to produce and factory-test equipment on schedule.
    - A spare parts procurement and distribution system sufficient to support equipment maintenance without delays and a service organization with skills, experience and equipment sufficient to perform all warranty and on-site Work.

3. Evidence that Proposer is qualified in accordance with the provisions of "Section 8: Quality Assurance."
4. Evidence of satisfactory performance and integrity on contracts in making deliveries on time, meeting specifications and warranty provisions, parts availability and steps Proposer took to resolve any judgments, liens, Fleet Defects history, or warranty claims. Evidence shall be by client references.

Proposal Evaluation Criteria

The following are the complete criteria, listed numerically in their relative order of importance, by which Proposals from responsible Proposers will be evaluated and ranked for the purposes of determining any Competitive Range and to make any selection of a Proposal for a potential award. Any exceptions, conditions, reservations or understandings explicitly, fully and separately stated on the Form for Proposal Deviation, which do not cause the City to consider a Proposal to be outside the Competitive Range, will be evaluated according to the respective evaluation criteria and sub-criteria that they affect.

Proposals will be evaluated using the following principal selection criteria:

1. **Manufacturer's Health and Capabilities:** The Committee will assess the organizational stability of the Proposer. The ownership and organizational structure, length of time in business, financial strength and bonding capacity, training and technical support facilities, parts availability, distribution, and lead times, sales history, number of users, and quality control and assurance will be considered.
2. **Product Design and Options:** The information provided by the Proposer in its technical submittal relating to the buses to be provided will be utilized to evaluate the Proposal in relation to this factor. Conformance to specifications, differentiating design and performance aspects of the Proposed Vehicle, safety and maintenance of the Proposed Vehicle, ability to furnish multiple bus configurations, and training and support services will be used in this evaluation. At a minimum, test results, safety and maintenance factors, and cost of normal operation for the bus design and system components proposed, may be considered in determining a final value for this factor.
3. **Cost Proposal:** The proposed cost as submitted by the Proposer on the City's form will be used to assign points. The Contractor must use the City's form, without alteration, for submittal of its cost Proposal. The Cost Proposal will consider the Pricing Schedule and the Life Cycle Cost of the proposed vehicle. The lowest average Cost Proposal will receive the maximum number of points. Every other Proposal previously found to be in the Competitive Range will be given points proportionately in relation to the lowest price. This point total will be calculated by dividing the lowest price by the total price of the Proposal being evaluated and the result multiplied by the maximum weight for price to arrive at a Cost Proposal score.
4. **Product Performance:** The Committee will consider historic product performance as presented in the Proposal, client references, or other verified, publicly available resources. The evaluation may look at judgements, liens, fleet defect history, warranty claims and the steps that the manufacturer took to resolve these concerns.
5. **Delivery schedule:** The Committee will review the proposed delivery schedule for the City's minimum purchase of buses. Delivery schedules that exceed the delivery requirements, with evidence that the schedule can be accomplished, may receive higher points for this category.
6. **Proposed Warranty, Option for Extended Warranties, and Support**: The Committee will review the warranty acknowledgement and the Proposer's ability to meet or exceed the warranty requirements as stated in Section 7 of this RFP.

Evaluation Methodology

The criteria and sub-criteria of the aforementioned areas can be seen in **TABLE 1.**

TABLE 1
Evaluation Criteria

Manufacturer's Health and Capabilities • Ownership and organization structure • Length of time in business • Financial strength and bonding capacity • Training and technical support facilities • Parts availability, distribution, and lead times • Sales history/number of users • Quality control and assurance
Product Design and Options • Conformance to specifications • Other differentiating design and performance aspects • Safety and maintenance factors • Ability to furnish multiple bus configurations • Training and support services
Cost Proposal • Pricing Schedule • Life Cycle Cost • Other Cost Factors
Product Performance • Manufacturer's list of references • User experience (reference checks) • Documented reliability • Warranty claims and resolution • Fleet defect history
Delivery Schedule
Proposed Warranty, Option for Extended Warranties, and Support

2.10.6 Evaluation Procedures

Proposals will be analyzed for conformance with the instructions and requirements of the RFP and Contract documents. Proposals that do not comply with these instructions and do not include the required information may be rejected as insufficient or not be considered for the Competitive Range. The City reserves the right to request that a Proposer provide any missing information and make corrections. Proposers are advised that the detailed evaluation forms and procedures will follow the same Proposal format and organization specified in "Preparation of Proposals." Therefore, Proposers should pay close attention to and strictly follow all instructions. Submittal of a Proposal will signify that the Proposer has accepted the whole of the Contract documents, except such conditions, exceptions, reservations or understandings explicitly, fully and separately stated on the forms and according to the instructions of the Form for Proposal Deviation. Any such conditions, exceptions, reservations or understandings that do not result in the rejection of the Proposal are subject to evaluation under the criteria set forth in "Proposal Selection Process."

Evaluations will be made in strict accordance with all the evaluation criteria specified in "Proposal Selection Process," above. The City will choose the Proposal that it finds to be most advantageous to the City, based upon the evaluation criteria.

2.10.7 Evaluations of Competitive Proposals

1. **Qualification of responsible Proposers.** Proposals will be evaluated to determine the responsibility of Proposers. A final determination of a Proposer's responsibility will be made upon the basis of initial information submitted in the Proposal, any information submitted upon request by the City, information submitted in a BAFO, and information resulting from City inquiry of Proposer's references and its own knowledge of the Proposer.

2. **Detailed evaluation of Proposals and determination of Competitive Range.** The City will carry out and document its evaluations in accordance with the criteria and procedures set forth in "Proposal Selection Process." Any Proposal deficiencies that may render a Proposal unacceptable will be documented. The City 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 City finds to be within the Competitive Range.

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

3. **Proposals not within the Competitive Range.** Proposers of any Proposals that have been determined by the City 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 City's policies.

4. **Discussions with Proposers in the Competitive Range.** The Proposers whose Proposals are found by the City 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 City to discuss answers to written or oral questions, clarifications and any facet of its Proposal.

   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 City shall 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 City 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.

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

6. **Best and final offers.** After all interviews have been completed, the Proposers in the Competitive Range may be afforded the opportunity to amend their Proposals and make their BAFOs. The Request for BAFOs shall include the following:

   - Notice that discussions and negotiations are concluded.
   - A complete listing of the conditions, exceptions, reservations or understandings that have been approved.
   - A common date and time for submission of written BAFOs, allowing a reasonable opportunity for preparation of the written BAFOs.
   - 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.
   - 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 shall be identified in its BAFO. BAFOs will be evaluated by the City according to the same requirements and criteria as the initial Proposals ("Proposal Selection Process"). The City 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 City and considered according to the relative degrees of importance of the criteria defined in "Proposal Selection Process."

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

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

7. **Debriefing.** Subsequent to the award, the unsuccessful Proposers will be notified and may request a debriefing. Proposers will be debriefed in accordance with City policies, including information regarding the shortcomings of their Proposal.

2.11 Response to Proposals

2.11.1 Single Proposal Response

If only one Proposal is received in response to this RFP and it is found by the City to be acceptable, then a price or cost analysis, or both, possibly including an audit, may be performed by or for the City. The Proposer has agreed to such analysis by submitting a Proposal in response to this RFP.

2.11.2 Availability of Funds

This procurement is subject to the availability of funding. Financial support of this project is provided through financial assistance from the USDOT FY 2015 TIGER Discretionary Grant (FAIN No. 5822-2017-1) on a fifty percent (50%) matched basis. Additional sources of funds are provided by the City of Birmingham and/or Birmingham-Jefferson County Transit Authority (BJCTA).

2.11.3 City Contract Approval Process

Contract will be awarded to most responsive and responsible bidder who meets all bid requirements, has a history of successfully completing like work, and submits the most advantageous or best value Proposal.

2.11.4 City Rights

The City reserves the right to cancel the procurement in whole or in part, at its sole discretion, at any time before the Contract is fully executed and approved on behalf of the City.

The City reserves the right to reject any or all Proposals, to undertake discussions with one or more Proposers, and to accept that Proposal or modified Proposal which, in its judgment, will be most advantageous to the City, considering price and other evaluation criteria. The City reserves the right to determine any specific Proposal that is conditional or not prepared in accordance with the instructions and requirements of this RFP to be nonresponsive. The City reserves the right to waive any Defects, or minor informalities or irregularities in any Proposal that do not materially affect the Proposal or prejudice other Proposers.

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

The City may reject a Proposal that includes unacceptable Deviations as provided in the Form for Proposal Deviation.

2.11.5 Execution of Contract

The acceptance of a Proposal for award, if made, shall be evidenced in writing by a notice of award of Contract delivered to the Proposer whose Proposal is accepted. Upon notice of award of the Contract to a Proposer, the Proposer shall commence performance under the Contract by furnishing any required bonds, and by furnishing copies of the certificates of insurance required to be procured by the Contractor pursuant to the Contract documents within seven (7) calendar days after the date of receipt of the notice of award. Failure to fulfill these requirements within the specified time is cause for termination of the Contract under "Termination for Default" in Section 3.

2.12 Conflicts of Interests and Gratuities

Proposers are prohibited from engaging in any practice that may be considered a conflict of interest under existing City 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.

SECTION 3: GENERAL CONDITIONS

3.1 Definitions

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

City: Birmingham, Alabama

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 City, 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 enroute 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 City as manifested by the Contract documents specified in "Section 10: Contract."

Contracting Officer: The person who is executing this Contract on behalf of the City and who has complete and final authority except as limited herein.

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" shall 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 contractor adversely affects its performance.

Due Date: The date and time by which Proposals must be received by the City as specified in "Section 1: Notice of 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.

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 City 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 City'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 City.

Supplier: Any manufacturer, company or City providing units, components or subassemblies for inclusion in the bus that are installed by the Contractor. Supplier items shall require qualification by type and acceptance tests in accordance with requirements defined in "Section 8: Quality Assurance."

Subcontractor: Any manufacturer, company or City providing units, components or subassemblies for inclusion in the bus that are installed by a Subcontractor. Subcontractor items shall require qualification by type and acceptance tests in accordance with requirements defined in "Section 8: Quality Assurance."

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.

3.2 Materials and Workmanship

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

3.3 Conformance with Specifications and Drawings

Materials furnished and Work performed by the Contractor shall conform to the requirements of the Technical Specifications and other Contract documents. Conformance to the Technical Specifications and any drawings that are included with the Technical Proposal shall be indicated on the Form for Technical Specification Conformance. Notwithstanding the provision of drawings, technical specifications or other data by the City, the Contractor shall have the responsibility of supplying all parts and details required to make the bus complete and ready for service even though such details may not be specifically mentioned in the drawings and specifications. Items that are installed by the City shall 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, shall not relieve the Contractor from performing such omitted Work or inaccurately described details of the Work, and they shall be performed as if fully and correctly set forth and described.

3.4 Inspection, Testing and Acceptance

3.4.1 General

The City's Representative shall at all times have access to the Work, the Contractor and, through the Contractor, its Suppliers. The Contractor and its Suppliers shall 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 shall be subject to the City 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 shall be performed at the Contractor's plant; they shall be performed in accordance with the procedures defined in "Section 8: Quality Assurance"; and they may be witnessed by the resident inspector. When a bus passes these tests and inspections, the resident inspector shall authorize release of the bus.

Within fifteen (15) calendar days after arrival at the designated point of delivery, the bus shall undergo the City tests defined in "Post-Delivery Tests." If the bus passes these tests or if the City does not notify the Contractor of non-acceptance within 15 calendar days after delivery, then acceptance of the bus by the City occurs on the 15th day after delivery. If the bus fails these tests, it shall not be accepted until the repair procedures defined in "Repairs after Non-Acceptance" have been carried out and the bus retested until it passes. Acceptance occurs earlier if the City notifies the Contractor of early acceptance or places the bus in revenue service.

3.4.2 Risk of Loss

The City shall assume risk of loss of the bus on delivery, as defined in "Bus Delivery." Prior to this delivery, the Contractor shall 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 shall keep a maintenance log enroute, and it shall be delivered to the City with the bus. If the bus is released back to the Contractor for any reason, then the Contractor has the risk of loss upon such release.

3.5 Title and Warranty of Title

Adequate documents for registering the bus in Birmingham, Alabama shall be provided to the City not less than 10 business days before delivery to the City. Upon acceptance of each bus, the Contractor warrants that the title shall pass to the City free and clear of all encumbrances.

3.6 Intellectual Property Warranty

The City shall advise the Contractor of any impending patent suit related to this Contract against the City and provide all information available. The Contractor shall defend any suit or proceeding brought against the City based on a claim that any equipment, or any part thereof, furnished under this Contract constitutes

an infringement of any patent, and the Contractor shall pay all damages and costs awarded therein, excluding incidental and consequential damages against the City. 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 shall, at its own expense and at its option, either procure for the City 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 City shall hold the Contractor harmless with respect to the equipment or part if it was specified by the City and all requests for substitutes were rejected, and the Contractor advised the City under "Questions, Clarifications and Omissions" of a potential infringement, in which case the Contractor shall be held harmless.

3.7 Data Rights

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

The City 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.

3.7.2 Access to Onboard Operational Data

The City 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.

3.8 Changes

3.8.1 Contractor Changes

Any proposed change in this Contract shall be submitted to the City for its prior approval. Oral change orders are not permitted. No change in this Contract shall be made without the prior written approval of the Contracting Officer. The Contractor shall be liable for all costs resulting from, and/or for satisfactorily correcting, any specification change not properly ordered by written modification to the Contract and signed by the Contracting Officer.

3.8.2 City Changes

The City may obtain changes to the Contract by notifying the Contractor in writing. As soon as reasonably possible but no later than thirty (30) calendar days after receipt of the written change order to modify the Contract, the Contractor shall submit to the Contracting Officer a detailed price and schedule Proposal for the Work to be performed. This Proposal shall be accepted or modified by negotiations between the Contractor and the Contracting Officer. At that time, a detailed modification shall be executed in writing by both parties. Disagreements that cannot be resolved within negotiations shall be resolved in accordance with "Disputes," below. Regardless of any disputes, the Contractor shall proceed with the Work ordered.

3.9 Legal Clauses

3.9.1 Indemnification

3.9.1.1 The Contractor shall, to the extent permitted by law:(1) protect, indemnify and save the City 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 City 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, agents, Subcontractors and Suppliers; and (2) upon receipt of notice and if given authority, shall settle at its own expense or undertake at its own expense the defense of any such suit, action or proceeding, including appeals, against the City and its officers, employees and agents, including consultants, relating to such injury, death, loss or damage. Each party shall promptly notify the other in writing of the notice or assertion of such claim, demand, lien, encumbrance, judgment, award, suit, action or other proceeding hereunder. The Contractor shall have sole charge and direction of the defense of such suit, action or proceeding. The City shall not make any admission that might be materially prejudicial to the Contractor unless the Contractor has failed to take over the conduct of any negotiations or defense within a reasonable time after receipt of the notice and authority above provided. The City shall at the request of the Contractor furnish to the Contractor all reasonable assistance that may be necessary for the purpose of defending such suit, action or proceeding, and shall be repaid all reasonable costs incurred in doing so. The City shall have the right to be represented therein by advisory council of its own selection at its own expense.

3.9.1.2 The obligations of the Contractor under the above paragraph shall not extend to circumstances where the injury, death or damages are caused solely by the negligent acts, errors or omissions of the City, 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 shall 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 shall have full rights of contribution from the other.

3.9.2 Suspension of Work

3.9.2.1 The City 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.

3.9.2.2 The Contractor shall 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 shall continue the Work that is not included in the suspension and shall continue such ancillary activities as are not suspended. The Contractor shall resume performance of the suspended Work upon expiration of the notice of suspension, or upon direction from the City.

3.9.2.3 The Contractor shall 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 shall 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 shall submit to the Contracting Officer a detailed price and schedule Proposal for the suspension, delay or interruption.

3.9.3 Excusable Delays/Force Majeure

3.9.3.1 If the Contractor is delayed at any time during the progress of the Work by the neglect or failure of the City or by a cause as described below, then the time for completion and/or affected delivery date(s) shall be extended by the City 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, strikes and labor disputes; fires and explosions; war and other hostilities; embargo; or failure of third parties, including Suppliers or Subcontractors, to perform their obligations to the Contractor;
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 City as described in paragraph GC 9.3.4 below.

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

3.9.3.2 None of the above shall relieve the Contractor of any liability for the payment of any liquidated damages owing from a failure to complete the Work by the time for completion that the Contractor is required to pay pursuant to "Liquidated Damages for Late Delivery of the Bus" for delays occurring prior to, or subsequent to the occurrence of an excusable delay.

3.9.3.3 The City reserves the right to rescind or shorten any extension previously granted, if subsequently the City 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 City 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.

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

3.9.4 Termination

3.9.4.1 Termination for Convenience

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

After receipt of a notice of termination, and except as otherwise directed by the Contracting Officer, the Contractor shall do the following:

- Stop Work under the Contract on the date and to the extent specified in the notice of termination.
- Place no further orders or subcontracts for materials, services or facilities, except as may be necessary for completion of such portion of the Work under the Contract as is not terminated.

- Terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the notice of termination; assign to the City in the manner, at the times, and to the extent directed by the Contracting Officer, all of the right, title and interest of the Contractor under the orders and subcontracts so terminated, in which case the City shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts.
- Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, with the approval or ratification of the Contracting Officer, to the extent he or she may require, which approval or ratification shall be final for all the purposes of this clause.
- Transfer title to the City and deliver in the manner, at the times and to the extent, if any, directed by the Contracting Officer the fabricated or unfabricated parts, Work in process, completed Work, supplies and other material produced as part of, or acquired in connection with the performance of, the Work terminated, and the completed or partially completed plans, drawings, information and other property which, if the Contract had been completed, would have been required to be furnished to the City.
- Use its best efforts to sell, in the manner, at the times, to the extent, and at the price(s) directed or authorized by the Contracting Officer, any property of the types referred to above, provided, however, that the Contractor shall not be required to extend credit to any purchaser, and may acquire any such property under the conditions prescribed by and at prices approved by the Contracting Officer, and provided further that the proceeds of any such transfer or disposition shall be applied in reduction of any payments to be made by the City to the Contractor under this Contract or shall otherwise be credited to the price or cost of the Work covered by this Contract or paid in such other manner as the Contracting Officer may direct.
- Complete performance of such part of the Work as shall not have been terminated by the notice of termination.
- Take such action as may be necessary, or as the Contracting Officer may direct, for the protection or preservation of the property related to this Contract that is in the possession of the Contractor and in which the City has or may acquire an interest.

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

3.9.4.2 Termination for Default

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

If the Contract is terminated in whole or in part for default, the City may procure, upon such terms and in such manner as the Contracting Officer may deem appropriate, supplies or services similar to those so terminated. The Contractor shall be liable to the City for any excess costs for such similar supplies or services and shall continue the performance of this Contract to the extent not terminated under the provisions of this clause.

Except with respect to defaults of Subcontractors, the Contractor shall not be liable for any excess costs if the failure to perform the Contract arises out of a cause beyond the control and without the fault or negligence of the Contractor. If the failure to perform is caused by the default of a Subcontractor, and if such default arises out of causes beyond the control of both the Contractor and Subcontractor, and without the fault or negligence of either of them, the Contractor shall not be liable for any excess costs for failure to perform, unless the supplies or services to be furnished by the Subcontractor were obtainable from other sources and in sufficient time to permit the Contractor to meet the required delivery schedule.

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

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

3.9.5 Compliance with Laws and Regulations

The Contractor shall 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 City 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 shall constitute a material breach of this Contract.

3.9.6 Changes of Law

Changes of Law that become effective after the Proposal due date may result in price changes. If a price adjustment is indicated, either upward or downward, it shall be negotiated between the City 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.

3.9.7 Governing Law and Choice of Forum

This Contract shall be governed by the laws of Alabama without regard to conflict of law rules. The Contractor consents to the jurisdiction of the identified state, County of Jefferson.

3.9.8 Disputes

Except as otherwise provided in this Contract, any dispute concerning a question of fact arising under or related to this Contract that is not disposed of by agreement shall be decided in accordance with the following steps. However, by mutual agreement the matter may be taken immediately to any higher step in the dispute resolution process, or a mutually agreed-to alternative dispute resolution process (which may include structured negotiations, mediation or arbitration) or litigation. Pending final resolution of a dispute hereunder, the Contractor shall proceed diligently with the performance of the Contract and in accordance with the Contracting Officer's or Chief Executive Officer's decision, as the case may be.

1. **Notice of dispute.** All disputes shall be initiated through a written dispute notice submitted by either party to the other party within 10 (ten) calendar days of the determination of the dispute.

2. **Negotiation between Contracting Officers.** The parties shall attempt in good faith to resolve any dispute arising out of or relating to this Contract promptly by negotiation between executives who have authority to settle the controversy and who are at a higher level of management than the people with direct responsibility for administration of this Contract. Any party may give the other party written notice of any dispute not resolved in the normal course of business as provided in paragraph 1 above. Within 14 (fourteen) calendar days after delivery of the dispute notice, the receiving party shall submit to the other party a written response. The dispute notice and written response shall include: (a) a statement of the party's position and a summary of the arguments supporting that position, (b) any evidence supporting the party's position and (c) the name of the executive who will represent that party and of any others who will accompany the executive in negotiations. Within 28 (twenty-eight) calendar days after delivery of the dispute notice, the Contracting Officer of both parties shall meet at a mutually acceptable time and place, and thereafter as they reasonably deem necessary to attempt to resolve the dispute. All reasonable requests for information by one party to the other shall be honored.

   If the matter has not been resolved by these people within 42 (forty-two) calendar days of the dispute notice, the dispute may be referred to more senior executives of both parties who have authority to settle the dispute and who shall likewise meet to attempt to resolve the dispute.

3. **Alternatives disputes resolution.** If agreed to by both parties, disputes may be resolved by a mutually agreed-to alternative dispute resolution process that may include structured negotiations.

4. **Arbitration.** Disputes appealed to arbitration involving more than $50,000 but less than $250,000 shall be decided by a qualified and disinterested arbitrator, selected through the American Arbitration Association and mutually agreed to by both parties. The arbitrator shall conduct all proceedings in accordance with the rules of the American Arbitration Association and shall consider the Contract, equity, the prevailing law and established commercial practices in rendering a decision.

   Disputes appealed to arbitration involving $250,000 or more shall be decided by three (3) qualified and disinterested arbitrators selected through the American Arbitration Association. One arbitrator shall be selected by each of the parties, and the two selected arbitrators shall select a third arbitrator within ten (10) calendar days of their selection. The arbitrators shall conduct all proceedings in

accordance with the rules of the American Arbitration Association and shall consider the Contract, equity, the prevailing law and established commercial practice in rendering a decision.

The decision of the arbitrators shall not be binding, and either party shall have the right to remedies provided by law.

3.9.9 Maintenance of Records; Access by City; Right to Audit Records

In accordance with 49 CFR § 18.36(i), 49 CFR § 19.48(d) and 49 USC § 5325(a), provided that the City is the FTA recipient or a sub-grantee of the FTA recipient, the Contractor agrees to provide the City, FTA, the Comptroller General of the United States, the Secretary of the U.S. Department of Transportation, Alabama or any of their duly authorized representatives 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 shall maintain and the Contracting Officer, the U.S. Department of Transportation (if applicable) or the representatives thereof shall have the right to examine all books, records, documents and other cost and pricing data related to the Contract price, unless such pricing is based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the public, or prices set by law or regulation, or combinations thereof. Data related to the negotiation or performance of the Contract shall be made available for the purpose of evaluating the accuracy, completeness and currency of the cost or pricing data. The right of examination shall extend to all documents necessary for adequate evaluation of the cost or pricing data, along with the computations and projections used therein, including review of accounting principles and practices that 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 shall have the right to examine all books, records, documents and other cost and pricing data related to a Contract modification, unless such pricing is based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the public, or prices set by law or regulation, or combinations thereof. Data related to the negotiation or performance of the Contract modification or change order shall be made available for the purpose of evaluating the accuracy, completeness and currency of the cost or pricing data. The right of examination shall extend to all documents necessary for adequate evaluation of the cost or pricing data, along with the computations and projections used therein, either before or after execution of the Contract modification or change order for the purpose of conducting a cost analysis. If an examination made after execution of the Contract modification or change order reveals inaccurate, incomplete or out-of-date data, the Contracting Officer may renegotiate the Contract modification or change order price adjustment, and the City shall 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.

3.9.10 Confidential Information

Access to government records is governed by the Code of Alabama 1975, Section 36-12-40. Except as otherwise required by the Code of Alabama 1975, Section 36-12-40, the City will exempt from disclosure proprietary information, trade secrets and confidential commercial and financial information submitted or disclosed 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 shall 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 specific proprietary information, trade secrets or confidential commercial and financial information must be clearly identified as such.

Upon a request for records from a third party regarding the Contract, the City will notify the Contractor in writing. The Contractor must respond within twenty (20) days with the identification of any and all "proprietary, trade secret or confidential commercial or financial" information, and the Contractor shall indemnify the City's defense costs associated with its refusal to produce such identified information; otherwise, the requested information may be released.

The City shall employ sound business practices no less diligent than those used for the City's own confidential information to protect the confidence of all licensed technology, software, documentation, drawings, schematics, manuals, data and other information and material provided by the Contractor pursuant to the Contract that contain confidential commercial or financial information, trade secrets or proprietary information as defined in or pursuant to the Code of Alabama 1975, Section 36-12-40 against disclosure of such information and material to third parties except as permitted by the Contract. The Contractor shall be responsible for ensuring that confidential commercial or financial information, trade secrets or proprietary information, with such determinations to be made by the City at its sole discretion, bears appropriate notices relating to its confidential character.

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. Likewise, the Recipient agrees that all information developed in connection with the Work under the Contract shall be used solely for the performance of the Work under the Contract, and shall be held in confidence and not disclosed to any third party without the prior written consent of the Discloser.

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

3.9.11 Conflicts of Interest, Gratuities

No member, officer, or employee of the City or of a local public body during his or her tenure, or one year thereafter, shall have any interest, direct or indirect, in this Contract or the proceeds thereof.

Contractor covenants and declares that it has not, and will not acquire any interest, directly or indirectly, in any property acquired by the City during the term of this Agreement. Contractor warrants and covenants that it presently has no interest in, nor shall any interest be hereinafter acquired in, any matter that will

render the services required under this Agreement a violation of any applicable Federal, State, or local law. In the event that any conflict of interest should hereinafter arise, Contractor shall promptly notify the City in writing of the existence of such conflict of interest.

3.9.12 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.

3.9.13 Amendment and Waiver

3.9.13.1 Amendment

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

3.9.13.2 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 shall not limit the waiving party's remedies for any succeeding breach of that or of any other term, covenant or condition of this Contract.

3.9.14 Remedies Not Exclusive

The rights and remedies of the City provided herein shall not be exclusive and are in addition to any other rights and remedies provided by law or under the Contract.

3.9.15 Counterparts

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

3.9.16 Severability

Whenever possible, each provision of the Contract shall 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, shall be ineffective to the extent of such prohibition or invalidity without invalidating the remainder of such provision or the remaining provisions of the Contract.

3.9.17 Third-Party Beneficiaries

No provisions of the Contract shall 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.

3.9.18 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.

3.9.19 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 shall not be considered the agent, employee, partner, fiduciary or trustee of the City.

3.9.20 Survival

The following sections shall survive the nominal expiration or discharge of other Contract obligations, and the City 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"
- "Indemnification"
- "Governing Law and Choice of Forum"
- "Disputes"
- "Confidential Information"
- "Parts Availability Guarantee"
- "Access to Records"
- "Training"

3.10 City-Specific Provisions

Vendor acknowledges and agrees that, consistent with federal law and City's public policy, it will encourage disadvantaged business enterprise (DBE) participation to the extent permitted by law. A "disadvantaged business enterprise" is a for-profit small business concern (i) at least 51% owned by one or more individuals who are both socially and economically disadvantaged or, in the case of a corporation, in which 51% of the stock is owned by one or more such individuals; and (ii) whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it. In accordance with federal law, a "socially and economically disadvantaged individual" includes African-Americans, Hispanic Americans, Native Americans, Asian-Americans, women, and any additional groups designated as socially and economically disadvantaged by the Federal Small Business Administration.

SECTION 4: SPECIAL PROVISIONS

4.1 Inspection, Tests, and Repairs

4.1.1 Repair Performance

4.1.1.1 Repairs by Contractor

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

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

4.1.1.2 Repairs by the City

The City will not take responsibility to correct Defects, except to replace defective parts as instructed by the Contractor.

1. **Parts used.** If the City performs the repairs after non-acceptance of the bus, it shall correct or repair the Defect and any Related Defects using Contractor-specified parts available from its own stock or those supplied by the Contractor specifically for this repair. Reports of all repairs covered by this procedure shall be submitted by the City to the Contractor for reimbursement or replacement of parts monthly, or at a period to be mutually agreed upon. The Contractor shall provide forms for these reports.
    2. **Contractor-supplied parts.** If the Contractor supplies parts for repairs being performed by the City after non-acceptance of the bus, then these parts shall be shipped prepaid to the City.
    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 shall be paid by the Contractor.
    4. **Reimbursement for labor.** The City shall be reimbursed by the Contractor for labor. The amount shall be determined by the City for a qualified mechanic at a straight time wage rate of $33.00 per hour, which includes fringe benefits and overhead adjusted for the City'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 shall not exceed the rates in effect in the City's service garage at the time the Defect correction is made.
    5. **Reimbursement for parts.** The City shall be reimbursed by the Contractor for defective parts that must be replaced to correct the Defect. The reimbursement shall include taxes where applicable and fifteen (15) percent handling costs.

4.1.2 Lead Production Inspection

The Contractor shall provide a Lead Bus for a Lead Production Inspection. The Lead Bus should be as similar as possible to the vehicles that will be purchased through this Contract. The Lead Production Bus Inspection shall demonstrate that the vehicles to be purchased fully meets all requirements of the Contract. In order to assess the Contractor's compliance with the Technical Specifications, the City and the Contractor shall, at the pre-production meeting, jointly develop a Configuration and Performance Review document for review of the Lead Bus. This document shall become part of the official record of the pre-production meeting. The Lead Bus shall be delivered to the City for a minimum of thirty (30) days prior to initiation of any production activities unless otherwise authorized in writing by the City.

Major differences in the Lead Bus and the vehicles to be purchased through this Contract should be identified in a list format. Each item on the list shall be accompanied by specifications, drawings, and/or other relevant documentation that provides sufficient detail to be reviewed by the City to determine compliance with the Technical Specifications.

In the event that noncompliance is identified, the City shall to the extent practicable notify the Contractor of said noncompliance. No later than seven (7) days after the end of the 30-day test, the City shall issue a written report to the Contractor that advises the Contractor of any noncompliance issues and/or any proposed modifications or changes required.

The following documents shall be delivered with the Lead Bus

- Draft preventative maintenance manuals
- Draft diagnostic procedures manuals
- Draft parts manuals
- Draft operators' manuals
- List of OEM component repair manuals

These documents shall be reviewed by the City for a period of ninety (90) days from the date of receipt. The City shall provide written approval of the draft documents prior to publication of final documents.

Maintenance manuals – Ten (10) draft maintenance manuals shall be delivered with the Lead Bus for City Review. The printed draft maintenance manual(s) shall include preventative maintenance procedures, diagnostic procedures or troubleshooting guides, parts manuals, plus a list of all proposed OEM Component Repair manuals. A list of special tools required and mean time to fix, estimated to the nearest 5 minutes, shall be provided for the following service tasks:

Inspection

- 6,600 Mile Inspection
- Daily Inspections
- Brake Inspection

Remove and Replace

- A/C Blower Motor

- A/C Condenser Motor
- Alternator
- Access for Door Motor Adjustment
- Batteries Set
- Brake Application Valve
- Engine/Transmission PPA (2 mechanics)
- Exterior Mirrors
- Headlining Panels
- Power Steering Gear Box Assembly
- PPA Mounts, Complete set
- Radiator (2 mechanics)
- Wheel Change, Front
- Wheel Change, Rear dual
- Window Glazing, Passenger
- Window guard, passenger and door
- Wiper Motor
- Operators seat
- Electric motor, A/C system
- Wheel chair access device
- Electronic Unit (Multiplex module, regulator, relay, fuse, etc)
- Lamps, passenger lights
- Lamps, other than passenger lights

Parts manual – Ten (10) draft parts manuals shall be delivered with the Lead Bus for City Review. Parts manuals shall be specific to the City's bus order. Parts manuals shall include illustrations and data arranged so that part numbers can be readily found and identified in the illustration for each system and subsystem component, assembly, subassembly, or part from an orderly breakdown of the complete bus. An assembly or subassembly is an identifiable portion of a component of a system or subsystem. Parts manuals shall contain a reference part number index, listed in numerical order with descriptions, and page numbers. The comprehensive number index shall include major subsystem parts numbers, which includes the engine, transmission, and air conditioning.

Operator's manual – Ten (10) draft operator's manuals shall be delivered with the Lead Bus for City review. The City will review the draft manuals during the review period, at which time the City reserves the right to accept or return the manuals with required changes. The Contractor shall have a maximum of 15 days to make corrections and return the final draft to City for signoff. Following signoff, the Contractor shall supply one (1) operator's manual per bus.

4.1.3 Configuration and Performance Approval

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

4.1.4 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 City, the Contractor shall 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 shall be conducted at the Contractor or Subcontractor's facility. The Contractor shall furnish to the City prior to each first article inspection a written inspection and demonstration plan for each item for review. The City's inspectors will attend each first article inspection unless the City provides a written waiver of its right to attend any such inspection. The results of each first article inspection shall be documented by the Contractor in a format deemed acceptable by the City, and all documents relating to the inspection shall be forwarded to the City.

4.1.5 Post-Delivery Tests

The City will conduct acceptance tests on each delivered bus. These tests shall be completed within fifteen (15) days after bus delivery and shall be conducted in accordance with written test plans. The purpose of these tests is to identify Defects that have become apparent between the time of bus release and delivery to the City. The post-delivery tests shall include visual inspection and bus operations. No post-delivery test shall apply criteria that are different from the criteria applied in an analogous pre-delivery test (if any).

Buses that fail to pass the post-delivery tests are subject to non-acceptance. The City shall record details of all Defects on the appropriate test forms and shall 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 shall be repaired according to the procedures defined in "Repairs after Non-Acceptance."

4.1.6 Repairs after Non-Acceptance

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

4.2 Deliveries

4.2.1 Bus Delivery

Delivery of buses shall be determined by signed receipt of the City's designated agent(s), BJCTA, 3105 Rev Abraham Woods Jr. Boulevard, Birmingham, AL 35203, at the following point(s) of delivery and may be preceded by a cursory inspection of the bus: 3105 Rev Abraham Woods Jr. Boulevard, Birmingham, AL 35203.

4.2.2 Delivery Schedule

The buses shall be delivered at a rate not to exceed five (5) buses per week. Delivery shall be completed within eighty (80) weeks after delivery of the executed Contract documents. Hours of delivery shall be 8:00 AM to 4 PM Monday through Friday.

4.2.3 Contract Deliverables

Contract deliverables associated with this Contract are set forth in the table below, along with other pertinent information. Contract deliverables shall be submitted in accordance with "Section 6: Technical Specifications." Due dates shown note the last acceptable date for receipt of Contract deliverables. The City 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** below provides a list of Contract deliverables.

TABLE 1
Contract Deliverables

	Deliverable	City Action	Reference Section	Due Date	Format	Quantity Due
1.	Bus Testing— Altoona Test Report	Review		Prior to first bus delivery	Hardcopy	1
2.	List of serialized units installed on each bus	Review		With each delivered bus	Electronic media	1 per bus
3.	Copy of Manufacturers' formal Quality Assurance Program	Review		Pre-award site visit	Hardcopy	1
4.	QA manufacturing certificate	Review		With each delivered bus	Hardcopy	1 per bus
5.	QA purchasing certifications acknowledging receipt of applicable specification	Review		30 days following first Pre-Production Meeting	Hardcopy	1 per major Supplier
6.	Pre-Delivery Bus Documentation Package	Review		With each delivered bus	Hardcopy	1 per bus
7.	Motor Vehicle Pollution Requirements Certificate	Review		With each bus	Hardcopy	1
8.	Engine Emissions Certificate—NOx levels	Review		Prior to completion of first bus	Hardcopy	1
9.	Pre-Production Meeting minutes	Approval		30 days after each meeting	Hardcopy	2 originals
10.	Driver's log and incident report	Review		With each bus delivery if drive-away service is used	Hardcopy	1 per bus
11.	Title documentation	Review		10 days prior to bus delivery	Hardcopy	1 per bus
12.	Performance bond	Review		30 days following execution of Contract	Hardcopy	1
13.	Insurance certificates	Approval		Before Work commences	Hardcopy	1
14.	Engineering support	Review		During Pre-Production Meeting	Contracts	1

TABLE 1
Contract Deliverables

Deliverable		City Action	Reference Section	Due Date	Format	Quantity Due
15.	Training instructor information	Approval		30 days prior to delivery of first bus		
16.	Training curriculum	Approval		30 days prior to delivery of first bus	Electronic media	
17.	Teaching materials	Review		During classroom instruction	Hardcopy	1
18.	Professionally prepared mechanics' "Bus Orientation" training video	Review		30 days prior to first production bus	Electronic Media	20 each
19.	Final preventative maintenance manuals	Review		90 days after City written approval	Hardcopy Electronic media	10 10
20.	Final diagnostic procedures manuals	Review		90 days after City written approval	Hardcopy Electronic media	10 10
21.	Final parts manuals	Approval		90 days after City written approval	Hardcopy Electronic media	10 10
22.	Component repair manuals (City approval/review period of 90 days from date of receipt)	Approval		90 days after City written approval of OEM component repair list	Hardcopy Electronic media	10 10
23.	Draft preventative maintenance manuals (City approval/review period of 90 days from date of receipt)	Approval		Maximum of 30 days prior to start of production	Hardcopy	10
24.	Draft diagnostic procedures manuals (City approval/review period of 90 days from date of receipt)	Approval		Maximum of 30 days prior to start of production	Hardcopy	10
25.	Draft parts manuals (City approval/review period of 90 days from date of receipt)	Approval		Maximum of 30 days prior to start of production	Hardcopy	10
26.	List of OEM component repair manuals	Approval		Maximum of 30 days prior to start of production	Hardcopy	10
27.	Draft operators' manuals (City approval/review period of 90 days from date of receipt)	Approval		Maximum of 30 days prior to start of production	Hardcopy	10

TABLE 1
Contract Deliverables

Deliverable		City Action	Reference Section	Due Date	Format	Quantity Due
28.	Final operators' manuals	Review		30 days following City approval of draft manual	Hardcopy	1 per bus
29.	Recommended spare parts list, including bill of materials	Review		60 days prior to shipment of first bus	Hardcopy	1
30.	Part number index	Approval		60 days prior to shipment of first bus	Hardcopy Spreadsheet	1 1
31.	Current price list	Review		90 days after City written approval of draft parts manual	Hardcopy	20
32.	In-process drawings	Review		30 days prior to production	Scale drawings	1
33.	Electrical and air schematics	Review		30 days prior to production	Hardcopy	1
34.	As-built drawings	Review		Within 60 days after final bus delivery	Electronic media	1
35.	Material samples	Review		By conclusion of Pre-Production Meetings		1
36.	Undercoating system program	Approval		First Pre-Production Meeting	Hardcopy	1
37.	Flooring certificate	Review		First Pre-Production Meeting	Certificate/ copy of purchase order	1
38.	Interior features – fire-resistance certificates	Review		Prior to first bus completion	Certificates	1
39.	Crashworthiness	Review		Pre-award audit	Certificate	1
40.	Technical review of electronic functionality	Approval		Prior to production	Hardcopy	1
41.	Interior security camera layout	Approval		Prior to first bus completion	Copies of interior views	1 each
42.	Technical review of power plant			Prior to production		
43.	Power plant certifications	Review		Prior to first bus completion	Hardcopy	1 each
44.	Striping layout	Approval		Prior to production	Hardcopy	1
45.	Resolution of issues "subject to City approval"	Approval		Prior to production	Hardcopy	1

4.3 Options and Option Pricing

No additional vehicles will be purchased through this contract.

4.4 Payment

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

4.4.1 Payment Terms

Option 1: Payment upon Delivery

All payments shall be made as provided herein, less any additional amount withheld as provided below and less any amounts for liquidated damages in accordance with "Liquidated Damages for Late Delivery of the Bus."

The City shall make payments for buses at the unit prices itemized in the price schedule within thirty (30) calendar days after the delivery and acceptance of each bus and receipt of a proper invoice.

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

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

1. Delivery and acceptance of all Contract deliverables, including manuals and other documentation required by the Contract, excluding training.
2. Contractor provision of any certifications as required by law and/or regulations.
3. Completion of post-delivery audits required under the Contract.

The Contractor may charge interest for late payment if payment is delayed more than ten (10) days after the payment Due Date set forth above. Interest will be charged at a rate not to exceed the prime rate of interest published by The Wall Street Journal on the 10th day.

Option 2: Payment upon Delivery with Retention

All payments shall be made as provided herein, less a specified retention plus any additional amount retained as provided below and less any amounts for liquidated damages in accordance with "Liquidated Damages for Late Delivery of the Bus." Any applicable retainage shall be determined through negotiations and included in the payment section of the awarded contract.

The City shall make payments for buses at the unit prices itemized in the price schedule within thirty (30) calendar days after the delivery and acceptance of each bus and receipt of a proper invoice.

The City shall make payments for spare parts and/or equipment at the unit prices itemized in the price schedule within thirty (3) calendar days after the delivery and acceptance of said spare parts and/or equipment and receipt of a proper invoice.

The City shall make a final payment for all retained funds within thirty (30) calendar days of receipt of a final proper invoice and the following:

1. Delivery and acceptance of all Contract deliverables, including manuals and other documentation required by the Contract, excluding training.
2. Contractor provision of any certifications as required by law and/or regulations.
3. Completion of post-delivery audits required under the Contract.

The Contractor may charge interest for late payment if payment is delayed more than ten (10) days after the payment Due Date set forth above. Interest will be charged at a rate not to exceed the prime rate of interest published by The Wall Street Journal on the 10th day.

4.4.2 Performance Guarantee (Optional)

The Contractor shall furnish, at its own expense, performance guarantee in the form of a cashier's check, a letter of credit in a form approved by the City before Proposal submission, or a performance bond from a surety duly licensed to do business in the state of Alabama having a financial rating from A.M. Best Company of "A VIII" or better. The bond shall equal:

- Fifty percent of the Contract price if the Contract price is not more than $1 million;
- Forty percent of the Contract price if the Contract Price is more than $1 million but not more than $5 million; or
- Two and one half million if the Contract price is more than $5 million.

where there are no progress payments and payment is made upon delivery and acceptance; or in the case of progress payments set at the City's financial exposure for cumulative payments. The bond shall cover all of the Contractor's obligations under the Contract except for the warranty and shall remain in force until said obligations have been fulfilled. The bond amount may be reduced as follows:

1. To sixty-five (65) percent of the original amount when fifty (50) percent of the required number of buses are delivered and accepted;

2. To thirty (30) percent of the original amount when seventy-five (75) percent of the required number of buses are delivered and accepted; and

3. To zero (0) percent of the original amount when one hundred (100) percent of the required number of buses are delivered and accepted.

In the case that a surety becomes insolvent, its license is revoked or suspended, or in the case of a surety approved on the basis that it is listed as an approved federal surety and such federal approval is revoked or suspended, the Contractor, within five (5) days after notice by the City, shall substitute other and sufficient surety or sureties. If the Contractor fails to do so, such failure shall be an event of default.

4.4.3 Payment of Taxes

Unless otherwise provided in the Contract, the Contractor shall 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 shall 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 City asserts that there are no taxes applicable to this Contract. The Contractor will maintain auditable records, subject to the City reviews, confirming that tax payments are current at all times.

4.5 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," except for any excusable delays as provided in "Excusable Delays/Force Majeure" or any extension thereof, the City 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 City shall be fixed at $150 per calendar day per bus not delivered in substantially good condition as inspected by the City 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 City and further authorizes the City 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 shall pay the City 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 shall be in lieu of any damages for any loss of profit, loss of revenue, loss of use, or for any other direct, indirect, special or consequential losses or damages of any kind whatsoever that may be suffered by the City arising at any time from the failure of the Contractor to fulfill the obligations referenced in this clause in a timely manner.

4.6 Service and Parts

4.6.1 Contractor Service and Parts Support

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

4.6.2 Documentation

The Contractor shall provide an electronic copy and ten (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 ten (10) printed current parts manual(s), and an electronic copy and fifteen (15) printed standard operator's manual(s) (one per bus) as part of this Contract. The Contractor also shall 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 shall 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.

4.6.3 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 twelve (12) years after the date of acceptance. Parts shall be interchangeable with the original equipment and shall be manufactured in accordance with the quality assurance provisions of this Contract. Prices shall not exceed the Contractor's then-current published catalog prices.

Where the parts ordered by the City are not received within two (2) working days of the agreed-upon time and date and a bus procured under this Contract is out of service due to the lack of said ordered parts, then the Contractor shall provide the City, within eight (8) hours of the City's verbal or written request, the original Suppliers' and/or manufacturers' parts numbers, company names, addresses, telephone numbers and contact persons' names for all of the specific parts not received by the City.

Where the Contractor fails to honor this parts guarantee or parts ordered by the City are not received within thirty (30) days of the agreed-upon delivery date, then the Contractor shall provide to the City, within seven (7) days of the City'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 City. The Contractor's design and manufacturing documentation provided to the City shall be for its sole use in regard to the buses procured under this Contract and for no other purpose.

4.6.4 City-Furnished Property

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

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

The City retains title to all City-furnished property. Upon receipt of the City-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 shall provide appropriate protection for all such property during the progress of the Work. Should any City-furnished equipment or materials be damaged, such property shall be repaired or replaced at the Contractor's expense to the satisfaction of the City. 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 City shall have the right to take corrective measures itself and deduct the cost from any sums owed to the Contractor.

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

4.7 Federal Motor Vehicle Safety Standards (FMVSS)

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

4.8 Insurance

The Contractor shall maintain in effect during the term of this Contract, including any warranty period, at its own expense, at least the following coverage and limits of insurance:

- Statutory Workers Compensation and Employers Liability insurance and/or qualified self-insurance program covering Supplier's employees while on City property.
    - Employer's liability $500,000
    - All States Endorsement Statutory
    - Voluntary Compensation Statutory
- Commercial General Liability Insurance:
    - Bodily Injury and Property Damage, including Contractual Liability covering the indemnification contained herein, $10,000,000 combined single limits per occurrence, $10,000,000 aggregate, where applicable.
    - Product liability: $5,000,000 per occurrence, for a period of five (5) years after acceptance of the last bus delivered under this Contract (Products Liability coverage may be effected through one or more excess liability policies).
- Automobile Liability Insurance: Bodily Injury and Property Damage, $1,000,000 combined single limits per occurrence.
- Public Liability and Property Damage
    - $100,000 for bodily injuries to or death of one person in any one occurrence.
    - $500,000 for bodily injuries to or death of two or more persons in any one occurrence.
    - $100,000 for damage to or destruction of property in any one occurrence.
- Errors and Omissions Insurance.

Upon the execution of a Contract, the Contractor shall furnish the City with certificates of insurance showing that the City/BJCTA has been listed as an additional insured. All insurance is to remain in full force and effect until all work under the Contract has been satisfactorily completed and accepted by the BJCTA. Contractor shall deliver to the City, within ten (10) days after receiving Notice of Award of this Contract, evidence of the above. Prior to the expiration of any insurance during the time required, the Supplier shall furnish evidence of renewal to the City's Contract Administrator.

4.9 Software Escrow Account

All the Contractor's policies shall contain an endorsement naming the City as an additional insured and providing that written notice shall be given to the City's 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' notice if the termination is due to nonpayment of premium.

Upon execution of the Contract, the Contractor shall provide the City 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 City 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 City with any technical assistance for the duration of the life of the vehicle. It is the City'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."

SECTION 5: FEDERAL REQUIREMENTS

5.1 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 City, 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:

5.1.1 Local Governments

In accordance with 49 CFR 18.36(i), the Contractor agrees to provide the City, 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.

5.1.2 State Governments

In accordance with 49 CFR 633.17, the Contractor agrees to provide the City, 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.

5.2 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 shall be deemed to control in the event of a conflict with other provisions contained in this agreement. The Contractor shall not perform any act, fail to perform any act or refuse to comply with any City of Birmingham requests that would cause the City of Birmingham to be in violation of the FTA terms and conditions.

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

5.3 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.

5.4 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, 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, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.

    (b) **Age:** In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 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.

5.5 No Government Obligation to Third Parties

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

5.6 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 shall not be modified, except to identify the Subcontractor who will be subject to the provisions.

5.7 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.

By signing and submitting its bid or Proposal, the Bidder or Proposer certifies as follows:

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

5.8 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 shall maintain compliance with "DBE Approval Certification" throughout the period of Contract performance.

The Contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this Contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of this DOT-assisted Contract. Failure by the Contractor to carry out these requirements is a material breach of this Contract, which may result in the termination of this Contract or such other remedy as the City of Birmingham deems appropriate. Each subcontract the Contractor signs with a Subcontractor must include the assurance in this paragraph (see 49 CFR 26.13(b)).

5.9 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 City and understands and agrees that the City will, in turn, report each violation as required to ensure notification to FTA and the appropriate EPA Regional Office.
    2. The Contractor also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with federal assistance provided by FTA.

5.10 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 City and understands and agrees that the City will, in turn, report each violation as required to ensure notification to FTA and the appropriate EPA Regional Office.

2. The Contractor also agrees to include these requirements in each subcontract exceeding $100,000 financed in whole or in part with federal assistance provided by FTA.

5.11 Compliance with Federal Lobbying Policy

Contractors who apply or bid for an award of $100,000 or more shall file the certification required by 49 CFR Part 20, "New Restrictions on Lobbying." Each tier certifies to the tier above that it will not and has not used federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any City, 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 shall also disclose the name of any registrant under the Lobbying Disclosure Act of 1995 who has made lobbying contacts on its behalf with non-federal funds with respect to that federal Contract, grant or award covered by 31 USC 1352. Such disclosures are forwarded from tier to tier up to the recipient.

5.12 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) and 49 CFR 661.11. Rolling stock must be assembled in the United States and have a 60 percent domestic content.

A Bidder or Proposer must submit to the City 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.

5.13 Testing of New Bus Models

The Contractor agrees to comply with 49 USCA 5323(c) and FTA's implementing regulation at 49 CFR Part 665 and shall perform the following:

1. A manufacturer of a new bus model or a bus produced with a major change in components or configuration shall provide a copy of the final test report to the recipient at a point in the procurement process specified by the recipient, which will be prior to the recipient's final acceptance of the first vehicle.
2. A manufacturer who releases a report under Paragraph 1 above shall provide notice to the operator of the testing facility that the report is available to the public.

3. If the manufacturer represents that the vehicle was previously tested, the vehicle being sold should have the identical configuration and major components as the vehicle in the test report, which must be provided to the recipient prior to recipient's final acceptance of the first vehicle. If the configuration or components are not identical, the manufacturer shall provide a description of the change and the manufacturer's basis for concluding that it is not a major change requiring additional testing.
4. If the manufacturer represents that the vehicle is "grandfathered" (has been used in mass transit service in the United States before October 1, 1988, and is currently being produced without a major change in configuration or components), the manufacturer shall provide the name and address of the recipient of such a vehicle and the details of that vehicle's configuration and major components.

5.14 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 shall complete and submit a declaration certifying either compliance or noncompliance with Buy America. If the recommended Bidder/Proposer certifies compliance with Buy America, it shall 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 shall submit evidence that it will be capable of meeting the bid specifications.

3. **Federal Motor Vehicle Safety Standards (FMVSS):** The Contractor shall submit (1) manufacturer's FMVSS self-certification, 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.

5.15 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) working days following the date of loading for shipments originating within the United States or within thirty (30) working days following the date of leading for shipments originating outside the United States, a legible copy of a rated, "on-board" commercial ocean bill of lading in English for each shipment of cargo described in the preceding paragraph to the Division of National Cargo, Office of Market Development, Maritime Administration,

Washington, DC 20590 and to the FTA recipient (through the Contractor in the case of a Subcontractor's bill-of-lading.)

- To include these requirements in all subcontracts issued pursuant to this Contract when the subcontract may involve the transport of equipment, material or commodities by ocean vessel.

5.16 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 shall 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 shall, 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.

5.17 Contract Work Hours and Safety Standards Act

1. **Overtime requirements:** No Contractor or Subcontractor contracting for any part of the Contract Work that may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such Work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.
2. **Violation; liability for unpaid wages; liquidated damages:** In the event of any violation of the clause set forth in paragraph 1 of this section, the Contractor and any Subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such Contractor and Subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph 1 of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in paragraph 1 of this section.
3. **Withholding for unpaid wages and liquidated damages:** The City of Birmingham shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any 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.
4. **Subcontracts:** The Contractor or Subcontractor shall insert in any subcontracts the clauses set forth in paragraphs 1 through 4 of this section and also a clause requiring the Subcontractors to include these clauses in any lower-tier subcontracts. The Prime Contractor shall be responsible for

compliance by any Subcontractor or lower-tier Subcontractor with the clauses set forth in paragraphs 1 through 4 of this section.

SECTION 6: TECHNICAL SPECIFICATIONS

GENERAL

6.1 Scope

These technical specifications contain the requirements for ten (10) 60-foot low-floor articulated CNG transit buses that are intended for the widest possible spectrum of passengers, including children, adults, the elderly, and people with disabilities. Buses shall have a minimum expected life of twelve (12) years or 500,000 miles, whichever comes first.

Specifications are provided for six (6) buses that will be branded for BRT service and four (4) buses that will be used for fixed route service. The BRT vehicles will have distinct design, system, and branding specifications from the fixed route buses. A "**Default**" specification indicates the standard design. A "**BRT Option**" is provided to indicate where the specifications for the BRT vehicle differs from the fixed route vehicle. If no BRT Option is provided, the Default specification applies for both vehicle designs.

The contractor shall conform to these technical specifications and shall not omit any unit or component or both, part or detail to make these buses ready for service, even though such part or detail is not mentioned in these specifications. In absence of a specification, the Contractor shall adhere to its manufacturing standards. No changes or substitutions are permitted without the prior written consent of the City.

6.2 Definitions

Alternative: An alternative specification condition to the default bus configuration. The City 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.

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.

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.

Combination Gas Relief Device: A relief device that is activated by a combination of high pressures or high temperatures, acting either independently or together.

Composite Container for CNG: A container fabricated of two or more materials that interact to facilitate the container design criteria.

Compressed Natural Gas (CNG): Mixtures of hydrocarbon gases and vapors consisting principally of methane in gaseous form that has been compressed for use as a vehicular fuel.

Container: A pressure vessel, cylinder or cylinders permanently manifolded together, used to store CNG.

Container Appurtenances: Devices connected to container openings for safety, control or operating purposes.

Container Valve: A valve connected directly to a container outlet.

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 City.

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 shall be determined from the seat at its reference height.

Energy Density: The relationship between the weight of an energy storage device and its power output in units of watt-hours per kilogram (W-h/kg).

Energy Storage System (ESS):A component or system of components that stores energy and for which its supply of energy is rechargeable by the on-vehicle system(engine/regenerative braking/ generator)or an off-vehicle energy source.

Fill Pressure for CNG: The pressure attained at the actual time of filling. Fill pressure varies according to the gas temperatures in the container, which are dependent on the charging parameters and the ambient conditions. The maximum dispensed pressure shall not exceed 125 percent of service pressure.

Flow Capacity: For natural gas flow, this is the capacity in volume per unit time (normal cubic meters/minute or standard cubic feet per minute) discharged at the required flow rating pressure.

Fuel Line: The pipe, tubing or hose on a vehicle, including all related fittings, through which natural gas 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. shall be allocated for the feet of each seated passenger protruding into the standee area.

Fuel Management System: Natural gas fuel system components that control or contribute to engine air fuel mixing and metering, and the ignition and combustion of a given air-fuel mixture. The fuel management system would include, but is not limited to, reducer/regulator valves, fuel metering equipment (e.g. carburetor, injectors), sensors (e.g., main throttle, waste gate).

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: 150lbs 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.

High Pressure: Those portions of the CNG fuel system that see full container or cylinder pressure.

High Voltage (HV): Greater than 50 V(AC and DC).

Hose: Flexible line.

Hybrid: A vehicle that uses two or more distinct power sources to propel the vehicle.

Hybrid System Controller (HSC): Regulates energy flow throughout hybrid system components in order to provide motive performance and accessory loads, as applicable, while maintaining critical system parameters (voltages, currents, temperatures, etc.) within specified operating ranges.

Hybrid Drive System (HDS): The mechanical and/or electromechanical components, including the engine, traction motors and energy storage system, which comprise the traction drive portion of the hybrid propulsion system.

Intermediate Pressure: The portion of a CNG system after the first pressure regulator, but before the engine pressure regulator. Intermediate pressure on a CNG vehicle is generally from 3.5 to 0.5 MPa (510 to 70 psi).

Inverter: A module that converts DC to and from AC.

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):50 V or less (AC and DC).

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.

Metering Valve: A valve intended to control the rate of flow of natural gas.

Module: An assembly of individual components

Motor (Electric): A device that converts electrical energy into mechanical energy.

Motor (Traction): An electric motor used to power the driving wheels of the bus.

Operating Pressure: The varying pressure developed in a container during service.

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.

Pressure Relief Device (PRD):A pressure and/or temperature activated device used to vent the container/cylinder contents and thereby prevent rupture of an NGV fuel container/cylinder, when subjected to a standard fire test as required by fuel container/cylinder standards.

Power: Work or energy divided by time

Power Density: Power divided by mass, volume or area.

Propulsion System: System that provides propulsion for the vehicle proportional to operator commands. Includes, as applicable, engine, transmission, traction motors, the hybrid drive system,(HDS), energy storage system (ESS), and system controllers including all wiring and converter/inverter.

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

Regenerative Braking: Deceleration of the bus by switching motors to act as generators, which return vehicle kinetic energy to the energy storage system.

Rejectable Damage: In terms of NGV fuel containers/cylinders, this is damage as outlined in CGA C-6.4, "Methods for External Visual Inspection of Natural Gas Vehicle Fuel Containers and Their Installations," and in agreement with the manufacturer's recommendations.

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: 150lbs 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.

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.

Solid State Alternator: A module that converts high-voltage DC to low-voltage DC (typically 12/24 V systems).

Sources of Ignition: Devices or equipment that because of their modes of use or operation, are capable of providing sufficient thermal energy to ignite flammable compressed natural gas-air mixtures when introduced into such a mixture, or when such a mixture comes into contact with them.

Special Tools: Tools not normally stocked by the City.

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. Standards referenced in "Section 6: Technical Specifications" are the latest revisions unless otherwise stated.

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

State of Charge (SOC): Quantity of electric energy remaining in the battery relative to the maximum rated amp-hour (Ah) capacity of the battery expressed in a percentage. This is a dynamic measurement used for the energy storage system. A full SOC indicates that the energy storage system cannot accept further charging from the engine-driven generator or the regenerative braking system.

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.

Thermally Activated Gas Relief Device: A relief device that is activated by high temperatures and generally contains a fusible material.

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.

6.3 Referenced Publications

The documents or portions thereof referenced within this specification shall be considered part of the requirements of the specification. The edition indicated for each referenced document is the current edition, as of the date of the APTA issuance of this specification.

6.4 Legal Requirements

The Contractor shall comply with all applicable federal, state and local regulations. These shall include but are not limited to ADA and EPA regulations, as well as state and local accessibility, safety and security requirements. Local regulations are defined as those below the state level.

Buses shall meet all applicable FMVSS regulations and shall accommodate all applicable FMCSR regulations in effect at the location of the City 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 shall prevail. Technical requirements that exceed the legal requirements are not considered to conflict.

6.5 Overall Requirements

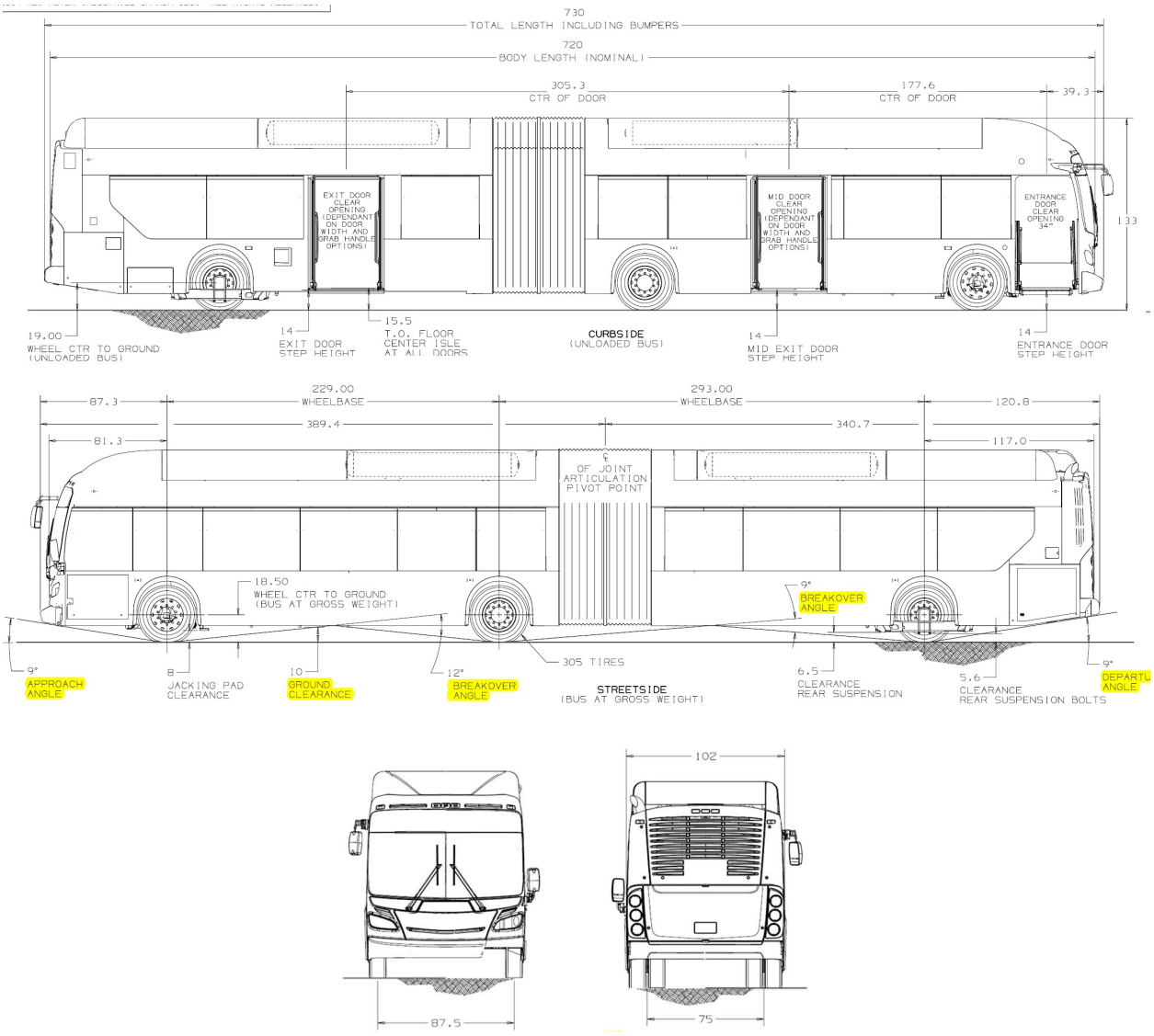
The Contractor shall ensure that the application and installation of major bus subcomponents and systems are compliant with all such subcomponent vendors' requirements and recommendations. Contractor and City shall identify subcomponent vendors that shall submit installation/application approval documents with the completion of a pilot or lead bus. Components used in the vehicle shall be of heavy-duty design and proven in transit service.

DIMENSIONS

6.6 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 should have the following overall approximate dimensions as shown in **Figure 1** at static conditions and design height.

FIGURE 1



6.6.1 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: The length of the bus should be between 60 ft and 61 ft overall. An articulation joint with interior and exterior bellows shall be incorporated into the design of the bus allowing for a raceway allowing passengers to pass from the front module of the bus to the rear. The articulation joint shall be designed for routine maintenance, and shall last the life of the bus. This joint – by sensing vehicle speed, relative angle between the lead and trailing sections, throttle and braking actions, and any other necessary inputs – will control the degree of stiffness in the joint to ensure that the bus does not jackknife or operate in a dangerous or unsafe condition.

6.6.2 Bus Width

Body width shall be maximum 102 in. (+0, -1 in.) excluding mirrors.

6.6.3 Bus Height

Maximum overall height shall be 135 in., including all rigid, roof-mounted items such as A/C, exhaust, fuel system and cover, etc.

6.6.4 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 angles provided in **Table 2** shall be met

TABLE 2
Default Breakover Angle

Angle	30 to 45ft Bus
Approach	8.6 deg. (min.)
Front breakover	8 deg. (min.)
Departure	8.6 deg. (min.)

6.6.5 Ground Clearance

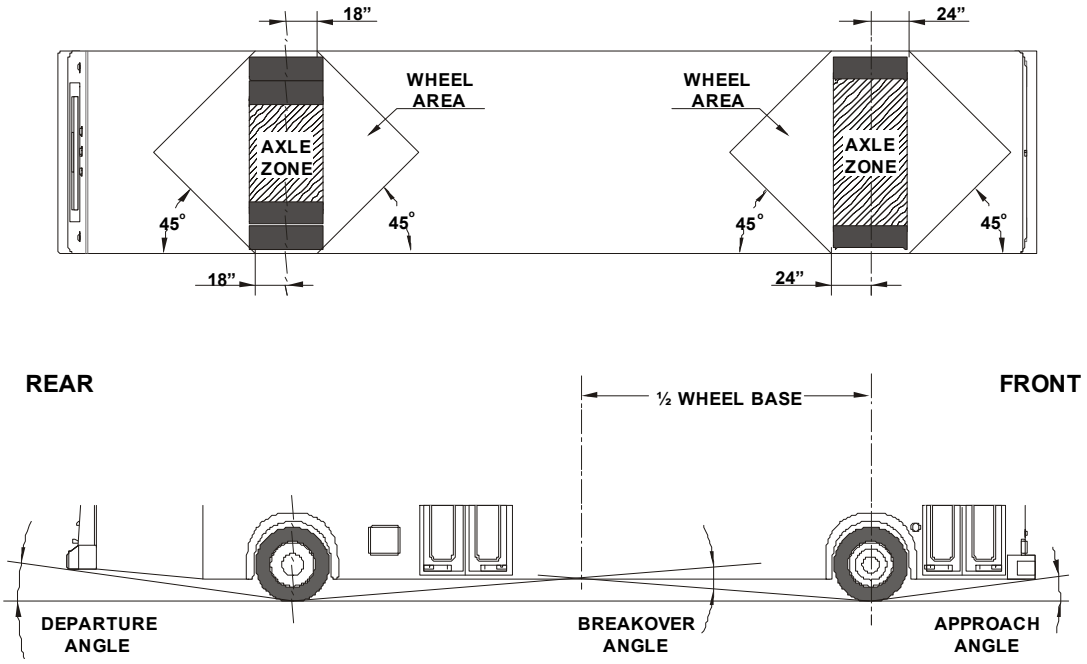
The bus shall maintain the minimum clearance dimensions as defined and shown in Figure 2 of SAE Standard J689, regardless of load up to the gross vehicle weight rating.

Ground clearance shall be no less than 9 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, shall be no less than 5.4 in.

Wheel area clearance shall 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



6.6.6 Step Height and Floor Height

Height of the step above the street shall be 14 inches measured at the centerline of the front and rear doorways. The 14 in. height shall accommodate level boarding at 14 in. platforms, measured from the surface of the street to the top of the platform. All floor measurements shall 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.

In addition, the bus shall have the capability of automatically adjusting floor height to accommodate small variances in platform to ground differences or changes over time. With proper programming, and by using

the signal from the onboard AVL as described in **6.100.3**, the floor height shall have the ability to adjust up to 1.5 inches either upwardly or downwardly.

6.6.7 Interior Headroom

Headroom above the aisle and at the centerline of the aisle seats shall 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 shall 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 shall 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 shall be provided on the overhead paneling.

6.6.8 Weight

It shall 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 shall not exceed the tire factor limits, brake test criteria or structural design criteria. The vehicle shall be designed to carry the gross vehicle weight, which shall not exceed the bus GVWR.

6.6.9 Capacity

Ambulatory seating capacity: 44 passengers (minimum)

Wheelchair seating capacity: 2 passengers (minimum)

Proposer shall submit suggested seating plan to accommodate as many seated passengers as possible, provide for ADA accessibility and seating, and include 5 doors, along with the interior bicycle rack. If 44 seats are not possible, the proposer shall state the maximum quantity of available seats.

6.7 Service Life

The minimum useful design life of the bus in transit service shall be at least twelve (12) years or 500,000 miles. It shall be capable of operating at least 40,000 miles per year, including the 12th year.

6.8 Maintenance and Inspection

Scheduled maintenance tasks shall be related and shall be in accordance with the manufacturer's recommended preventative maintenance schedule (along with routine daily service performed during the fueling operations).

Test ports, as required, shall be provided for commonly checked functions on the bus, such as air intake, exhaust, hydraulic, pneumatic, charge-air and engine cooling systems.

The coach manufacturer shall give prime consideration to the routine problems of maintaining the vehicle. All coach components and systems, both mechanical and electrical, which will require periodic physical Work or inspection processes shall be installed so that a minimum of time is consumed in gaining access

to the critical repair areas. It shall not be necessary to disassemble portions of the coach structure and/or equipment such as seats and flooring under seats in order to gain access to these areas. Each coach shall 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 shall be designed for ease of maintenance and repair. Individual panels or other equipment that may be damaged in normal service shall be repairable or replaceable. Ease of repair shall be related to the vulnerability of the item to damage in service.

Contractor shall provide a list of all special tools and pricing required for maintaining this equipment. Said list shall be submitted as a supplement to the Pricing Schedule.

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

6.8.1 Technical/Service Representatives

The Contractor shall, at its own expense, have one or more competent technical service representatives available on request to assist the City 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 "Section 7: Warranty Requirements."

6.9 Interchangeability

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

6.10 Training

The Contractor shall have one or more qualified instructors who shall be available at the City's property between the hours of 7:00 AM and 5:00 PM. Training shall be provided during the period immediately after acceptance of the First Bus to the conclusion of the initial Warranty period, one year following receipt of the First Bus. Instructor(s) shall conduct schools and advise the personnel of the City on the proper operation and maintenance of the equipment. The Contractor also shall provide visual and other teaching aids (such as manuals, slide presentations and literature) for use by the City's own training staff and which become the property of the City. Teaching materials shall be subject to the City's approval. The training program shall be divided into two (2) complete sections, one section for the Maintenance personnel and the other section for Transportation personnel.

The Contractor shall provide enough instructor classroom hours to cover the Maintenance and Transportation training sections. At minimum, sixty (60) instructor classroom hours with the fifteen (15) base bus order shall be provided. A detailed schedule and lesson plan for both the Maintenance and Transportation Training program must be provided ninety (90) days prior to the scheduled delivery date of the first bus and approved by the City. As part of the lesson plan, the name and qualifications of the instructor(s) must be provided. Utilization of vendor presenters is encouraged and supported. The Contractor is responsible for scheduling and costs of the vendor presenters.

Training cost is to be included in the Price Proposal on the form Training Curriculum Pricing. The cost of the training curriculum shall include all training costs including lesson plan preparation, classroom instructor hours, training materials, and all other related costs.

6.10.1 Training Curriculum

Maintenance Training

The Contractor shall provide a complete training and instruction curriculum for BJCTA's designated mechanics, service personnel, and supervisors. The training program should cover preventative maintenance, trouble shooting, and repair of the buses the Contractor will be providing through this Contract. The emphasis of the Training Curriculum modules should be on basic troubleshooting and preventative maintenance procedures.

The City will limit the number of personnel in each class to fifteen (15) or less, so that the class size will be manageable. A maximum of twenty-five (25) individuals will be scheduled for each module with the exception of the orientation module, which may have as many as thirty-five (35) individuals. Personnel attending each module or class will be designated by the City with a list of attending individuals available to Contractor upon request. All attendance records will be kept by the City.

The Maintenance Training and instruction program should cover (but is not limited to) the following areas:

A. Orientation Module
    1. History of Contractor
    2. Technical and Commercial features of the bus
    3. Visuals of Production System for the bus
    4. Compartment by compartment tour of the bus
    5. Special components or features of the Authority's bus
B. Electrical/Electronics
    1. Location of all key electrical components found on the bus.
    2. Explanation of the wiring diagram and wiring codes.
    3. Explanation of the Exterior and Interior lighting system along with basic troubleshooting of the system.
    4. Explanation of the safety shutdown system, including the warning indicators along with basic troubleshooting of the system.
C. Engine and Accessories
    1. Explanation of the engine and the location of the key components.
    2. Explanation of the engine driven accessories.
    3. Explanation of the fuel, air, and water system.

4. Explanation of engine tune up procedures.
5. Basic troubleshooting procedures for the engine.
6. Overhaul of the engine (taught as a separate course).

D. Transmission controls
1. Explanation of the transmission.
2. Explanation of the electronic control system.
3. Basic troubleshooting of the transmission.
4. Overhaul of the transmission (taught as a separate course).

E. Air Conditioning
1. Explanation of the air conditioning system and the location of all key air-conditioning components (handouts required).
2. Explanation of the Air conditioning electrical system.
3. Explanation of the air conditioning compressor along with basic troubleshooting and preventive maintenance of the air conditioning compressor.
4. Basic troubleshooting of the air conditioning system.
5. Preventive maintenance of the air conditioning system.

F. Doors
1. Explanation of the door mechanical systems.
2. Explanation of the door electrical systems.
3. Proper door adjustments.
4. Rebuilding of door components.
5. Basic troubleshooting of the door systems.

G. Mobility Aid Lift
1. Explanation of the Mobility Aid Lift mechanical systems.
2. Explanation of the Mobility Aid Lift electrical systems.
3. Proper adjustment of the Mobility Aid Lift.
4. Rebuilding of Mobility Aid components.
5. Basic troubleshooting of the Mobility Aid Lift system.

H. Brakes
1. Explanation of the brake system.
2. Basic brake system repair, including adjustments of brakes.

I. Air Systems
1. Explanation of the air system with the location of all air system components.
2. Basic troubleshooting of the air system.
3. Preventive Maintenance of the air system.

J. Suspension, Steering, and Axles
1. Explanation of the suspension system.
2. Basic repairs to the suspension system.
3. Basic troubleshooting of the suspension system.
4. Explanation of the Steering system.
5. Basic troubleshooting of the steering system.
6. Explanation of the Axles.

K. Body
1. Explanation of the body and the attachment method of exterior body panels.
2. Basic repair of the exterior panels.

L. Parts
1. Explanation of the parts manual and how it is divided.

2. Explanation of the parts numbering system.
3. Orientation to the bus and components on the bus.
4. Practice in finding parts in the parts manual.

M. Driving instructions
   1. Operator compartment
      a) Controls and switches
      b) Warning indicators and gauges
      c) Driver's seat adjustments and features
      d) Door control
   2. Walk around inspection
      a) Compartment by compartment explanation
      b) Mirror adjustments
      c) Climate control system
   3. Driving Instruction
      a) Turns
      b) Braking
      c) Transmission shifting patterns
      d) Backing

Operator Training

The Contractor shall provide a driving instruction module. This instruction module will be conducted on board a bus. Each trainee is to be given an opportunity to operate the bus with the Contractor's instructor on board. The Contractor shall provide the Operator Training program twice at the City's operating garage.

The Contractor shall provide complete training and instruction for the City's designated instructors, street supervisors, and dispatchers. The program shall include, but not be limited to, the following:

A. Operator Compartment
   1. Controls and switches
   2. Warning indicators and gauges
   3. Seat adjustment
   4. Door control
B. Walk Around Inspection
   1. Compartment by compartment explanation
   2. Mirror adjustments
   3. Climate control system
C. Driving Instruction
   1. Turns
   2. Braking
   3. Transmission shifting patterns
   4. Backing

6.11 Operating Environment

The bus shall achieve normal operation in ambient temperature ranges of 10 ºF to 115 ºF, at relative humidity between 5 percent and 100 percent, and at altitudes up to 3000 feet above sea level. Degradation of performance due to atmospheric conditions shall be minimized at temperatures below 10 °F, above 115 °F or at altitudes above 3000 ft. Altitude requirements above 3000 feet will need separate discussions with

the engine manufacturer to ensure that performance requirements are not compromised. Speed, gradeability and acceleration performance requirements shall be met at, or corrected to, 77 °F, 29.31 in. Hg, dry air per SAEJ1995.

6.12 Noise

6.12.1 Interior Noise

The combination of inner and outer panels and any material used between them shall provide sufficient sound insulation so that a sound source with a level of 80 dBA measured at the outside skin of the bus shall have a sound level of 75 dBA or less at any point inside the bus. These conditions shall prevail with all openings, including doors and windows, closed and with the engine and accessories switched off.

The bus-generated noise level experienced by a passenger at any seat location in the bus shall not exceed 80 dBA. The driver area shall not experience a noise level of more than 78 dBA. Measurements of interior noise levels shall be taken in accordance with SAEJ2805. An exception shall be made for the turntable area, which shall be considered a separate environment.

6.12.2 Exterior Noise

Airborne noise generated by the bus and measured from either side shall 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 shall not exceed 78 dBA. The bus-generated noise at curb idle shall not exceed 65 dBA. If the noise contains an audible discrete frequency, a penalty of 5 dBA shall be added to the sound level measured. The Contractor shall comply with the exterior noise requirements defined in local laws and ordinances identified by the City and SAEJ366.

6.13 Fire Safety

The bus shall be designed and manufactured in accordance with all applicable fire safety and smoke emission regulations. These provisions shall include the use of fire-retardant/low-smoke materials, fire detection systems, bulkheads, metal wheel wells, and facilitation of passenger evacuation.

6.13.1 Materials

All materials used in the construction of the passenger compartment of the bus shall be in accordance with the Recommended Fire Safety Practices defined in FMVSS 302.

6.13.2 Fire Suppression

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

All materials used in the construction of the passenger compartment of the bus shall be in accordance with the Recommended Fire Safety Practices defined in FMVSS 302, dated October 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 and small light lenses, shall be exempt from this requirement.

The bus shall have a fire suppression system installed per manufacturer's recommendations.

VEHICLE PERFORMANCE

6.14 Power Requirements

The propulsion system shall be sized to provide sufficient power to enable the bus to meet the defined top speed, gradeability, and acceleration requirements, and operate all propulsion-driven accessories using actual road test results and computerized vehicle performance data.

6.14.1 Top Speed

The bus shall be capable of achieving a top speed of 65 mph on a straight, level road at GVWR with all accessories operating. The bus shall be capable of safely maintaining the vehicle speed according to the recommendations by the tire manufacturer. Values are assumed to be sustained. Manufacturer shall supply City with data if there is a variance between peak performance and sustained vehicle performance.

6.14.2 Gradeability

Gradeability requirements shall be met on grades with a dry commercial asphalt or concrete pavement at GVWR with all accessories operating.

The propulsion system shall enable the bus to achieve and maintain a speed of 40 mph on a 2½ percent ascending grade and 7 mph on a 16 percent ascending grade continuous. Values are assumed to be sustained. Manufacturer shall supply City with data if there is a variance between peak performance and sustained vehicle performance.

6.14.3 Acceleration (CNG)

The acceleration shall meet the requirements in **Table 3** below and shall be sufficiently gradual and smooth to prevent throwing standing passengers off-balance. Acceleration measurement shall commence when the accelerator is depressed.

TABLE 3
Maximum Start Acceleration Times on a Level Surface[1]

Speed (mph)	Maximum time (seconds)
10	5
20	10
30	18
40	30

50	60
Top speed	

1. Vehicle weight = GVWR

6.15 Operating Range (CNG)

The operating range of the coach shall be designed to meet the operating profile as stated in the "Design Operating Profile" section.

Test results from the FTA ADB Cycle economy tests or other applicable test procedures shall be provided to the City. Results shall include vehicle configuration and test environment information. Fuel economy data shall be provided for each design operating profile. Fuel economy tests shall be based on:

- The CBD portion of the FTA, ADB heavy-duty transit bus cycle.
- The CBD portion shall be further modified to add 20 minutes of idle time.

The operating range of the coach when run on the FTA ABD cycle shall be at least 400 miles with full fuel capacity.

POWERPLANT

6.16 Propulsion System (CNG)

The bus shall be powered by a CNG propulsion system. Function and operation of the bus shall be transparent to the bus operator and passengers. The OEM shall ensure 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 12 years without a structural failure. At a minimum, the propulsion system shall comply with applicable local, state and/or federal emissions and useful life requirements. The propulsion system shall comply with local, state and federal (maintenance) and other applicable sections.

6.16.1 Mounting

All power plant mounting shall be mechanically isolated to minimize transfer of vibration to the body structure and provide a minimum clearance of 0.75 in. Mounts shall control the movement of the power plant so as not to affect performance of belt-driven accessories or cause strain in piping and wiring connections to the power plant.

6.16.2 Propulsion System Service

The propulsion system shall be arranged so that accessibility for all routine maintenance is ensured. No special tools, other than dollies and hoists, shall be required to remove the propulsion system or any subsystems. Two City mechanics shall be able to remove, replace, and prepare the complete propulsion system assembly. The muffler, exhaust system, air cleaner, air compressor, starter, alternator, radiator, all engine accessories, and any other component requiring service or replacement shall be easily removable and independent of the engine and transmission removal. The Contractor shall provide all specialty tools and diagnostic equipment required for maintaining the propulsion system. The Contractor shall provide a

list of all specialty tools, diagnostic equipment, and facility requirements recommended for propulsion system service.

An engine oil pressure gauge and coolant temperature gauge shall be provided in the engine compartment. These gauges shall be easily read during service and mounted in an area where they shall not be damaged during minor or major repairs.

An air cleaner with a dry filter element and a graduated air filter restriction indicator shall be provided. The location of the air intake system shall be designed to minimize the entry of dust and debris and to maximize the life of the air filter. The engine air duct shall be designed to minimize the entry of water into the air intake system. Drainage provisions shall be included to allow any water/moisture to drain prior to entry into the air filter.

Engine oil and the radiator filler caps shall be hinged to the filler neck and closed with spring pressure or positive locks to prevent leakage. All fluid fill locations shall be properly labeled to help ensure that correct fluid is added. All fillers shall be easily accessible with standard funnels, pour spouts and automatic dispensing equipment. All lubricant sumps shall be fitted with magnetic-type drain plugs or magnets in pan.

Oil filtration systems shall be approved by the engine and transmission OEM and be designed with by-pass circuits in the event that a filter becomes plugged.

Engine Oil Pressure and Coolant Temperature Display. Engine oil pressure and coolant temperature gauges required in engine compartment.

6.17 Engine

Engine shall be Cummins CNG engine LN9 CNG or approved equal.

The engine shall comply with applicable local, state and/or federal emissions and useful life requirements. The engine shall 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.

The engine shall meet all regulatory requirements when operating on fuel equal to CARB Specifications for Compressed Natural Gas #2292.5. The four predominant characteristics that must be met are methane, ethane, butane and propane. The engine and related emission systems shall meet all applicable emissions and design/durability guidelines and standards. The Contractor shall provide the City with expected durability of the engine and related emission systems.

The engine starting system shall be protected by an interlock that prevents its engagement when the engine is running. The starter shall also be interlocked to the fuel fill door to prevent starting with door opening. The engine starter shall be protected by an interlock that prevents its engagement when the engine is running or the drive selector is not in the neutral position or both.

6.17.1 Electronic Control System

The engine shall be equipped with a natural gas electronic control system that complies with SAE J1939 for serial data communications between microprocessor systems in heavy duty vehicle applications.

The system shall include an electronic control module (ECM), on-board diagnostic capabilities, vital functions monitoring, archive of failure data, and communicate faults and vital conditions to service personnel. Failure data and communication of faults and vital conditions shall include a time stamp. The system shall also include electronic fuel system, an electronic accelerator pedal, and various sensors to monitor coolant level, oil pressure, coolant temperature, turbocharger pressure, engine speed, cylinder sequencing (timing and location) and exhaust back pressure (provide access port). When an impairment occurs in any one of these areas, the microprocessor must signal the operator through a properly labeled light on the dashboard and/or audible alarms. Trouble codes logged by the ECM shall be permanently retained in the ECM memory until removed with proper equipment. The ECM shall be accessible from two diagnostic reader ports, one positioned in driver's area and one in engine control box. The ECM shall contain a backup microprocessor unit that takes over engine control in case a fault develops with the main microprocessor system. There shall be no mechanical controls of linkage to the EMC. The system shall include a check engine light (amber) and a stop engine light (red) to be mounted on the dashboard in view of the operator. These lights shall be activated by the electronic control module. The data readers shall be capable of troubleshooting beyond isolating to function.

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

An automatic engine shutdown override feature shall be provided. A control shall be available to the operator/driver that when constantly depressed and released will delay the engine shutdown or allow the bus to be moved. Override action shall be recorded. This data shall be retrievable by the City.

6.17.2 Fast Idle Device

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

6.18 Cooling Systems

Temperature of operating fluids on the coach shall be controlled by a cooling system(s). The cooling system shall be sized to maintain all engine and transmission fluids and engine intake air at safe, continuous operating temperatures during the most severe operating conditions with the coach loaded to GVWR and in accordance with engine and transmission manufacturers' cooling system requirements. The cooling system shall meet the requirements stated in the operating environment.

6.18.1 Engine Cooling

A sight glass to determine satisfactory engine coolant level shall be provided and shall be accessible by opening one of the engine compartment's access doors. A spring-loaded, push-button type valve or lever shall 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 shall be accessible through the same access door.

The cooling fan shall be temperature controlled, allowing the engine to reach operating temperature quickly. The radiator and charge air cooler shall be of durable, corrosion-resistant construction with non-removable tanks.

6.18.1.1 Radiator

The radiator input shall be protected by an easily cleanable screen designed to collect large debris. Radiators with a fin density greater than 12 fins per inch or a louvered slit design shall not be used. No heat-producing components or climate-control system components shall be mounted between the engine cooling air intake aperture and the radiator.

6.18.1.2 Coolant

The cooling system shall be equipped with an ethylene glycol based coolant approved by the engine manufacturer and compatible with the existing coolant product. Coolant shall be 50% ethylene glycol with de-ionized or distilled water. The coolant shall contain the proper proportion of NALCOOL 3000 corrosion inhibitor, or equal, and must meet all current manufacturer specifications.

The cooling system shall be self-purging. Quarter-turn ball valves shall permit complete shutoff of both lines for the heating and defroster units. All low points in the cooling system shall be equipped with drain cocks. The radiator drain plug provided at the radiator shall be a minimum ½ in. dry break type. The drain plug shall be protected from damage and have a provision for attaching a drain adapter for directing the draining fluid into a container. This shall be accomplished without having the coolant drain onto or through any structure of body parts.

6.18.1.3 Drive Design

The fan cooling system shall be equipped with am EMP or equal electric fan drive bus cooling system. Electric fans shall be brushless, variable speed, reversible, and have a corrosion resistant metal shroud with finger guards that meet SAE 1308. The fan cooling system shall be designed with a master controller. The master controller shall have complete diagnostic capabilities allowing service technicians to access faults and information related to individual fans, controllers, and fuses via PC based software; collect and store cooling system and vehicle performance data; automatically reduce fan speed when the vehicle stops to minimize noise at the curbside; sense temperature of operating fluids and intake air and activate cooling fans if either is above safe operating conditions. If system controller loses communication with the engine or sensors it shall direct all fans to go into a fail-safe “fan on” mode. If fans lose communication with system controller, they shall go into a fail-safe “fan on” mode to avoid vehicle shutdown.

6.18.1.4 Mounting

Mounting location of radiator and charge air cooler shall be the Contractor’s standard design**.** The radiator and charge air cooler shall be designed to withstand thermal fatigue and vibration associated with the installed configuration. The radiator and charge air cooler cores shall be easily cleaned (to include engine side core surface) with standard pressure-washing equipment.

6.18.2 Charge Air Cooling

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

6.18.3 Transmission Cooling

The transmission shall 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 shall be matched to the 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. Unless otherwise noted, the transmission cooler is to be the first component to see cold water from the radiator outlet. In addition, all return water piping, aside from the thermostat bypass line, is to be plumbed in after the transmission cooler. The transmission should be easily removable without disturbing the engine and accessible for service.

6.19 Transmission (Conventional Powertrain)

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

The electronic controls shall 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 shall be made using the communications networks. Electronic controls shall 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 shall 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 nominal brake pedal application of 6 to 10 psi shall 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 electronically controlled transmission shall have on-board diagnostic capabilities, be able to monitor functions, store and time-stamp out-of-parameter conditions in memory, and communicate faults and vital conditions to service personnel. The transmission shall contain built-in protection software to guard against severe damage. The on-board diagnostic system shall trigger a visual alarm to the driver when the electronic control unit detects a malfunction. An electronic transmission fluid level monitoring and protection system shall be provided.

The transmission shall not incorporate an automatic neutral shift function.

Transmission shall be Allison B400R (6 speed) or approved equal and shall be equipped to reduce engine load at stop and shall provide load based shifting schedule.

6.20 Retarder

The powertrain shall be equipped with a retarder designed to extend brake lining service life. The application of the retarder shall cause a smooth blending of both retarder and service brake function and shall not activate the brake lights.

Actuation of ABS and/or automatic traction control (ATC) shall override the operation of the brake retarder. Brake lights shall not illuminate when the retarder is activated.

The retarder shall become partially engaged (approximately one-third of its total application, with a resulting deceleration of no greater than 0.077g) when the throttle pedal is completely released. Maximum retarder shall be achieved when brake pedal is depressed prior to engagement of service brakes, with a maximum resulting deceleration of approximately 0.20g in an empty bus. The resulting decelerations specified include the effects of engine braking, wind resistance and rolling resistance.

The thermostatically controlled cooling fan shall be activated when the retarder is engaged and the coolant temperature reaches the maximum operating temperature established by the engine and transmission manufacturers.

The retarder disable switch is required. To be located behind the front destination sign compartment access door.

6.21 Hydraulic Systems

Only power steering accessory may be driven hydraulically, subject to City approval. Hydraulic system service tasks shall be minimized and scheduled no more frequently than those of other major coach systems. All elements of the hydraulic system shall be easily accessible for service or unit replacement. Critical points in the hydraulic system shall 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 shall prevent the loss of power steering during operation of the bus if other devices are also powered by the hydraulic system. A full-length heavy-duty sight glass (non-plastic) shall be provided to determine the level of hydraulic fluid in the reservoir.

The hydraulic system shall operate within the allowable temperature range as specified by the lubricant manufacturer. No requirement for hydraulic system sensors.

6.22 Fluid Lines

All lines shall 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 shall 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 shall not be bundled with or used to support electrical wire harnesses.

Lines shall be as short as practicable and shall be routed or shielded so that failure of a line shall 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 shall be specified and installed per the manufacturer's recommendations.

6.22.1 Fittings and Clamps

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

6.22.2 Charge Air Piping

Charge air piping and fittings shall be designed to minimize air restrictions and leaks. Piping shall be as short as possible, and the number of bends shall be minimized. Bend radii shall be maximized to meet the pressure drop and temperature rise requirements of the engine manufacturer. The cross section of all charge air piping shall not be less than the cross section of the intake manifold inlet. Any changes in pipe diameter shall be gradual to ensure a smooth passage of air and to minimize restrictions. Piping shall 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 shall 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 shall be sealed with a short section of reinforced hose and secured with stainless steel constant tension clamps that provide a complete 360deg seal.

6.22.3 Radiator piping

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

6.22.4 Oil and Hydraulic Lines

Oil and hydraulic lines shall be compatible with the substances they carry. The lines shall 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 shall 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, shall be tagged or marked for use on the hydraulic system only.

6.22.5 Fuel Lines, CNG

Fuel lines shall comply with NFPA-52. All tubing shall be a minimum of seamless Type 304 stainless steel (ASTM A269 or equivalent).Fuel lines and fittings shall not be fabricated from cast iron, galvanized pipe, aluminum, plastic or copper alloy with content exceeding 70 percent copper. Pipe fittings and hoses shall be clear and free from cuttings, burrs or scale. Pipe thread joining material that is impervious to CNG shall be utilized as required. Fuel lines shall be identifiable as fuel lines only.

High-pressure CNG lines shall be pressure tested to a minimum of 125 percent of system working pressure prior to fueling. CNG, nitrogen or clean, dry air shall be used to pressure-test the lines/assembly. The bus manufacturer shall have a documented procedure for testing the high-pressure line assembly.

Fuel lines shall be securely mounted, braced and supported using “split-block” type or stainless steel P clamps; all mounting clamps shall be mounted to a rigid structure to minimize vibration and shall be protected against damage, corrosion or breakage due to strain, rubbing or wear. “Floating clamps” (not mounted to a rigid structure) shall not be permitted. Fuel lines shall not be used to secure other components (wires, air lines, etc.).

Manifolds connecting fuel containers shall be designed and fabricated to minimize vibration and shall be installed in protected location(s) to prevent line or manifold damage from unsecured objects or road debris.

Fuel hose connections, where permitted, shall be less than 48 in. in length, made from materials resistant to corrosion and action of natural gas, and protected from fretting and high heat and shall be supported approximately every 12 in.

6.23 Fuel System Design and Construction

The fuel type shall be CNG.

6.23.1 Fuel Containers/Cylinders

CNG fuel containers/cylinders must be designed, constructed, manufactured and tested in accordance with at least one of the following:

- NFPA 52-Standard for Compressed Natural Gas (CNG) Vehicular Fuel Systems
- FMVSS 304
- Any local standard(s) specifically intended for CNG fuel containers

The design and construction of the fuel system supplied by the OEM shall comply with federal and local regulations.

The fuel cylinders shall have a 3,600 psi working pressure.

6.23.2 Installation

Fuel cylinders shall be installed in accordance with ANSI/IAS NGV2 - 1998, "Basic Requirements for Compressed Natural Gas Vehicles (NGV) Fuel Containers" and NFPA 52, "Compressed Natural Gas (CNG) Vehicular Fuel Systems Code," 1998 edition, Section 303.In the case of a low-floor transit bus, the placement of tanks shall be limited to the roof of the vehicle or in the compartment above the engine of the vehicle.

Fuel cylinders, attached valves, pressure relief devices, and mounting brackets should be installed and protected so that their operation is not affected by bus washers and environmental agents such as rain, snow, ice or mud. These components should be protected from significant damage caused by road debris or collision.

The roof and area above the engine mounted tanks shall be contained within a skeletal structure resembling a roll cage and contained within an enclosure. The enclosure shall incorporate a hinged clamshell type access. The access panels shall be designed to offer protection from weather and to be sacrificial as a means of providing an escape path to atmosphere upon rapid enclosure pressure rise. The latching method shall utilize quick-release captive hardware that can be demonstrated to last the life of the bus. Additional shielding shall be provided surrounding end fittings and valves as needed. Shields shall be attached to the bus structure hinged in a manner that permits one mechanic to unlatch and swing the shield open for routine inspections. As practical, electrical components shall not be located within the roof enclosure, and if unavoidable, they shall be intrinsically safe.

CNG fueled buses shall be equipped with an active automatic gas detection system, which shall annunciate unsafe levels of methane. The automatic gas detection system shall be integrated with an onboard fire suppression system.

The access panels shall not be interlocked.

6.23.3 Labeling

CNG fuel systems shall be labeled in accordance with NFPA 52, "Compressed Natural Gas (CNG) Vehicular Fuel Systems Code," 1998 edition.

6.23.4 Pressure Relief Devices (PRDs)

PRDs must be designed, constructed, manufactured and tested in accordance with ANIS/IAS PRD1 - 1998, "Pressure Relief Devices for Natural Gas Vehicle (NGV) Fuel Containers" and ANSI/IAS NGV2-1998, "Basic Requirements for Compressed Natural Gas Vehicle (NGV) Fuel Containers." All natural gas fuel system piping, including the PRD vent line, shall be stainless steel. All PRDs must be vented to outside.

6.23.5 Valves

Valves must be installed in accordance with ANIS/IAS NGV2 - 1998, "Basic Requirements for Compressed Natural Gas Vehicle (NGV) Fuel Containers" and NFPA 52, "Standard for Compressed Natural Gas (CNG) Vehicular Fuel Systems."

6.23.6 Fuel Filler

The fuel filler shall be located on the right side, rear corner of the bus 36 to 50 inches from the street surface. The filler cap shall be retained to prevent loss and shall be recessed into the body.

The fill and vent receptacles shall be located within an enclosure on the right side of the bus. The access door shall be sized to allow full viewing of gauges, ease of hookups and maneuver of fuel nozzle.

The fuel fill receptacle and vent receptacle attachment shall be robust and capable of routine fueling connects/disconnects without deflection or metal fatigue, and capable of withstanding mechanical loads induced by a fueling drive-away incident without attachment failure.

6.23.7 Fueling System

The CNG fueling port receptacle shall be an ANSI/AGA NGV1 or NGV2 certified receptacle as designated by the City. The coach shall be capable of being fueled by a Sherex CC-5000, or approved equal. The fueling port receptacle location shall be such that connection by fueling personnel can be performed without physical strain or interference. A dust cap shall be permanently "tethered" to the fueling port receptacle.

The fueling port receptacle access door shall be equipped with an interlock sensor that disables the engine starting system when the access door is open, to prevent drive-aways. The interlock shall be of the type such that if the sensor fails, the coach will not start.

6.23.8 Defueling System

The CNG defueling port shall be an NGV-3.1/CGA-12.3 certified receptacle. The CNG defueling port shall be located on the curbside of the coach, in a location that is compatible with the City's defueling station operation. The defueling system shall incorporate the following characteristics:

- Dust cap permanently "tethered" to the defueling port.
- Device(s) to prevent inadvertent defueling. Specifications to be provided by City.
- Components compatible with City's defueling operation.
- The piping and fittings onboard the bus shall be sized to allow the fueling station to meet the following operating parameters:

The atmospheric-vent system shall allow a bus with 20,000 scf of on-board CNG storage to defuel to atmospheric pressure within 80 minutes.

6.24 Emissions and Exhaust

The engine and related systems shall meet all applicable emission and engine design guidelines and standards.

6.24.1 Exhaust System

The exhaust pipe shall be of sufficient height to prevent exhaust gases and waste heat from discoloring or causing heat deformation to the bus. The entire exhaust system shall be adequately shielded to prevent heat damage to any bus component, including the exhaust after treatment compartment area. The exhaust outlet

shall be designed to minimize rain, snow or water generated from high-pressure washing systems from entering into the exhaust pipe and causing damage to the after treatment.

Exhaust gases and waste heat shall be discharged from the roadside rear corner of the roof.

6.24.2 Exhaust After Treatment

An exhaust after treatment system will be provided to ensure compliance to all applicable EPA regulations in effect.

6.24.3 Particulate After Treatment

If required by the engine manufacturer to meet particulate level requirements specified by EPA, a particulate trap will be provided. The particulate trap shall regenerate itself automatically if it senses clogging. Regeneration cycles and conditions will be defined by the engine manufacturer.

STRUCTURE

6.25 Design

The structure of the bus shall be designed to withstand the transit service conditions typical of an urban or intercity duty cycle throughout its service life. The vehicle structural frame shall be designed to operate with minimal maintenance throughout the 12-year design operating profile. Structure shall be inherently crashworthy and not require the addition of barriers or other material in order to achieve maximum passenger safety and meet performance requirements detailed herein.The design operating profile specified by the City shall be considered for this purpose.

6.26 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 shall be submitted to the City.

If available, the Altoona Test Report shall be provided to the City with the Proposal submittal. If not available, then the report shall be provided prior to first acceptance of bus.

6.27 Distortion

The bus, loaded to GVWR and under static conditions, shall not exhibit deflection or deformation that impairs the operation of the steering mechanism, doors, windows, passenger escape mechanisms or service doors. Static conditions shall 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.

6.28 Resonance and Vibration

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

6.28.1 Engine Compartment Bulkheads

The passenger and engine compartment shall be separated by fire-resistant bulkheads. The engine compartment shall include areas where the engine and exhaust system are housed. This bulkhead shall preclude or retard propagation of an engine compartment fire into the passenger compartment and shall be in accordance with the Recommended Fire Safety Practices defined in FTA Docket 90A, dated October 20, 1993. Only necessary openings shall be allowed in the bulkhead, and these shall be fire-resistant. Any passageways for the climate control system air shall be separated from the engine compartment by fire-resistant material. Piping through the bulkhead shall 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 shall be fabricated of fire-resistant material and secured with fire-resistant fasteners. These panels, their fasteners and the bulkhead shall be constructed and reinforced to minimize warping of the panels during a fire that will compromise the integrity of the bulkhead.

6.28.2 Crashworthiness

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

The bus shall 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 shall not result in sharp edges or protrusions in the bus interior.

Exterior panels below 35 in. from ground level shall withstand a static load of 2000 lbs applied perpendicular to the bus by a pad no larger than 5 sq. in. This load shall not result in deformation that prevents installation of new exterior panels to restore the original appearance of the bus.

6.29 Corrosion

The bus flooring, sides, roof, understructure and axle suspension components shall be designed to resist corrosion or deterioration from atmospheric conditions and de-icing materials for a period of 12 years or 500,000 miles, whichever comes first. It shall maintain structural integrity and nearly maintain original appearance throughout its service life, with the City’s use of proper cleaning and neutralizing agents.

All materials that are not inherently corrosion resistant shall be protected with corrosion-resistant coatings. All joints and connections of dissimilar metals shall be corrosion resistant and shall be protected from galvanic corrosion. Representative samples of all materials and connections shall withstand a two-week

(336-hour) salt spray test in accordance with ASTM Procedure B-117 with no structural detrimental effects to normally visible surfaces and no weight loss of over 1 percent.

City is requiring additional consideration to be given to the placement and securement of all undercarriage components, such as hoses, airlines, and wiring to minimize exposure to environmental hazards and corrosion. Routing of hoses, airlines, and wiring on the undercarriage should be minimized as much as possible and preferably only used if the termination point of said house, airline, or wiring is on the undercarriage.

All exposed surfaces and the interior surfaces of tubing and other enclosed members below the lower window line shall be corrosion resistant through application of a corrosion protection system.

6.30 Towing

All buses shall be designed and constructed in such a way as to be able to be towed, or recovered (wheels off the ground) from the front or rear without any frame, structural, or body deformation. The method of attaching the towing device shall not require the removal, or disconnection, of suspension or steering components. Removal of the bike rack is permitted for attachment of towing devices.

Each towing device shall withstand, without permanent deformation, tension loads up to 1.2 times the curb weight of the bus within twenty (20) degrees of the longitudinal axis of the bus. The rear towing device(s) shall not provide a toehold for unauthorized riders. The front towing devices shall allow attachment of a rigid tow bar and shall permit lifting of the bus, at curb weight, by the towing devices and the tow bar until the front wheels are clear off the ground. The method of attaching the tow bar or adapter shall require the specific approval of the City.

The bus manufacturer shall also provide one (1) each towing and/or lift bar/devices necessary to recover/tow the bus. Any tow bar or adapter exceeding 50 lbs. should have means to maneuver or allow for ease of use and application. Each towing device shall accommodate a crane hood with a minimum 1.5 inch throat.

Instructions for towing the vehicle will be provided with the bid proposal. Contractor shall demonstrate compliance with these provisions using the Lead Bus.

6.31 Jacking

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

The location of the jacking pad shall be identified with a decal label on the exterior of the bus, directly over the jack pad.

6.32 Hoisting

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

The vehicle shall 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.

6.33 Floor

6.33.1 Floor Design

The floor shall 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 shall 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 shall prevent debris accumulation between the floor and wheel housings. The vehicle floor in the area of the entrance and exit doors shall have a lateral slope not exceeding 2 degrees to allow for drainage.

The floor design shall consist of two levels (bi-level construction). Aft of the rear door extending to the rear settee riser, the floor height may be raised to a height no more than 21 in. above the lower level, with equally spaced steps. An increase slope shall be allowed on the upper level, not to exceed 3.5 deg. off the horizontal.

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

The floor deck shall be reinforced as needed to support passenger loads. At GVWR, the floor shall have an elastic deflection of no more than 0.60 in. from the normal plane. The floor shall withstand the application of 2.5 times gross load weight without permanent detrimental deformation. The floor, with coverings applied, shall 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.

6.33.3 Floor Construction

The floor shall consist of the subfloor and the floor covering that will last the life of the bus. The floor as assembled, including the sealer, attachments and covering, shall be waterproof, non-hygroscopic and

resistant to mold growth. The subfloor shall be resistant to the effects of moisture, including decay (dry rot). It shall be impervious to wood-destroying insects such as termites.

If plywood is used, it shall be certified at the time of manufacturing by an industry-approved third-party inspection City such as APA – The Engineered Wood Association (formerly the American Plywood Association). Plywood shall be of a thickness adequate to support design loads, manufactured with exterior glue, satisfy the requirements of a Group I Western panel as defined in PS 1-95 (Voluntary Product Standard PS 1-95, "Construction and Industrial Plywood") and be of a grade that is manufactured with a solid face and back. Plywood shall be installed with the highest-grade, veneer side up with all edges sealed. Plywood shall be pressure-treated with a preservative chemical and that prevents decay and damage by insects.

Preservative treatments shall utilize no EPA-listed hazardous chemicals. The concentration of preservative chemicals shall be equal to or greater than required for an above ground level application. Treated plywood will be certified for preservative penetration and retention by a third-party inspection agency. Pressure-preservative treated plywood shall have a moisture content at or below fifteen (15) percent.

6.34 Rear Step Area to Rear Area

If the vehicle is of a bi-level floor design, then a rear step area shall be provided along the center aisle of the bus to facilitate passenger traffic between the upper and lower floor levels. This step area shall be cut into the rear platform and shall 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 shall be covered with skid-resistant material with a visually contrasting nosing and shall be sloped slightly for drainage. A warning decal or sign shall be provided at the immediate platform area to alert passengers to the change in floor level.

6.35 Wheel Housing

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

Interference between the tires and any portion of the bus shall not be possible in maneuvers up to the limit of tire adhesion with weights from curb weight to GVWR. Wheel housings, as installed and trimmed, shall withstand impacts of a 2in. steel ball with at least 200 ft.-lbs of energy without penetration. Wheel housings shall be adequately reinforced where seat pedestals are installed. Wheel housings shall be metal fabricated and have sufficient sound insulation to minimize tire and road noise and meet all noise requirements of this specification.

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

Design and construction of front wheel housings shall allow for the installation of a radio or electronic equipment storage compartment on the interior top surface. Wheel housings not equipped with seats or

equipment enclosure shall 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 shall be made to chain buses.

CHASSIS

6.36 Suspension General Requirements

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

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

6.37 Springs and Shock Absorbers

6.37.1 Suspension Travel

The suspension system shall 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 shall be provided at the limit of jounce travel. Rebound travel may be limited by elastomeric bumpers or hydraulically within the shock absorbers. Suspensions shall 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.

6.37.2 Damping

Vertical damping of the suspension system shall be accomplished by hydraulic shock absorbers mounted to the suspension arms or axles and attached to an appropriate location on the chassis. Damping shall be sufficient to control coach motion to three cycles or less after hitting road perturbations. The shock absorber bushing shall be made of elastomeric material that will last the life of the shock absorber. The damper shall incorporate a secondary hydraulic rebound stop.

6.37.3 Lubrication

All elements of steering, suspension and drive systems requiring scheduled lubrication shall be provided with grease fittings conforming to SAE Standard J534.These fittings shall be located for ease of inspection and shall be accessible with a standard grease gun from a pit or with the bus on a hoist. Each element requiring lubrication shall have its own grease fitting with a relief path. The lubricant specified shall be standard for all elements on the bus serviced by standard fittings and shall be required no less than every 6000 miles.

6.37.4 Kneeling

Kneeling shall not be necessary to achieve a floor height of 14 inches.

An operator-controlled kneeling system shall lower the entrance(s) of the bus a minimum of 2 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 shall 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 shall prevent movement when the bus is kneeled. The kneeling control shall be disabled when the bus is in motion. The bus shall kneel at a maximum rate of 1.25 in. per second at essentially a constant rate. After kneeling, the bus shall rise within 3 seconds to a height permitting the bus to resume service and shall rise to the correct operating height within 7 seconds regardless of load up to GVWR. During the lowering and raising operation, the maximum vertical acceleration shall not exceed 0.2g, and the jerk shall not exceed 0.3g/second.

An indicator visible to the driver shall be illuminated until the bus is raised to a height adequate for safe street travel. An audible warning alarm will sound simultaneously with the operation of the kneeler to alert passengers and bystanders. A warning light mounted near the curbside of the front door, a minimum 2.5 in. diameter amber lens, shall be provided that will blink when the kneel feature is activated. Kneeling shall not be operational while the wheelchair ramp is deployed or in operation.

6.38 Wheels

All wheels shall be interchangeable. Wheels shall be compatible with tires in size and load-carrying capacity. Front wheels and tires shall be balanced as an assembly per SAE J1986. Tires shall meet the following requirements

- Two-sided polished aluminum rims.
- Tire-pressure monitoring system.
- Standard non-locking lug nut.

6.39 Tires

Tires shall 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 shall not exceed the tire supplier’s rating.

The tires shall be supplied by the City from an existing tire contract. Tires shall be Good Year 305 / 70 / 22.5 or approved equal.

6.40 Steering Axle

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

All friction points on the front axle shall 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 shall be within 2 deg. of true Ackerman up to 50 percent lock measured at the inside (back lock) wheel. The steering geometry shall be within 3 deg. of true Ackerman for the remaining 100 percent lock measured at the inside (back lock) wheel.

6.40.1 Steering Wheel

The steering wheel diameter shall be approximately 18 to 20 in.; the rim diameter shall be ⅞ to 1¼ in. and shaped for firm grip with comfort for long periods of time.

Steering wheel spokes and wheel thickness shall 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.

6.40.2 Turning Effort

Hydraulically assisted steering shall be provided. The steering gear shall be an integral type with the number and length of flexible lines minimized or eliminated. Engine-driven hydraulic pump shall be provided for power steering.

Steering effort shall be measured with the bus at GVWR, stopped with the brakes released and the engine at normal idling speed on clean, dry, level, commercial asphalt pavement and the tires inflated to recommended pressure.

Under these conditions, the torque required to turn the steering wheel 10 deg. shall 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 shall not result in loss of steering control. With the bus in operation, the steering effort shall not exceed 55 lbs at the steering wheel rim, and perceived free play in the steering system shall not materially increase as a result of power assist failure. Gearing shall require no more than seven turns of the steering wheel lock-to-lock.

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

6.40.3 Steering Column Tilt

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

6.40.4 Steering Wheel Telescopic Adjustment

The steering wheel shall 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 4
Steering Wheel Height[1] Relative to Angle of Slope

At Minimum Telescopic Height Adjustment (29 in.)		At Maximum Telescopic Height Adjustment (5 in.)	
Angle of Slope	**Height**	**Angle of Slope**	**Height**
0 deg.	29 in.	0 deg.	34 in.
15 deg.	26.2 in.	15 deg.	31.2 in.
25 deg.	24.6 in.	25 deg.	29.6 in.
35 deg.	22.5 in.	35 deg.	27.5 in.

1. Measured from bottom portion closest to driver.

6.40.5 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.

6.41 Drive Axle

The bus shall be driven by a heavy-duty axle with a load rating sufficient for the bus loaded to GVWR. The drive axle shall 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 shall be magnetic type. If a planetary gear design is employed, the oil level in the planetary gears shall be easily checked through the plug or sight gauge. The axle and driveshaft components shall be rated for both propulsion and retardation modes with respect to duty cycle. The retardation duty cycle can be more aggressive than propulsion.

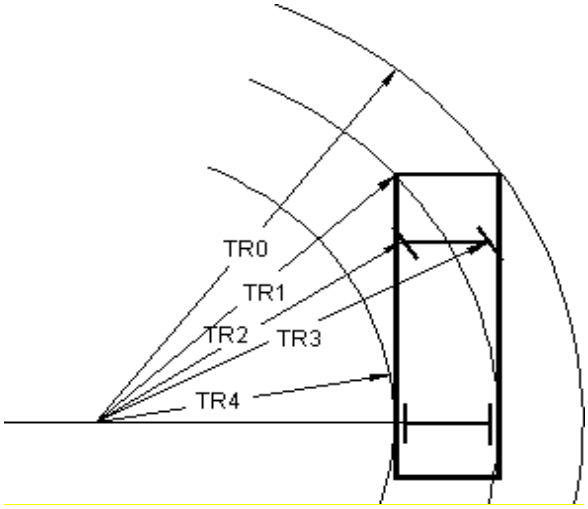
The drive shaft shall be guarded to prevent hitting any critical systems, including brake lines, coach floor or the ground, in the event of a tube or universal joint failure.

6.42 Turning Radius

Turning radius for a 60-ft articulated transit bus is as show below:

Bus Length (approxi-mate)	Maximum Turning Radius (see Figure 3)	Agency Requirement
35 ft	39 ft (TR0)	
40 ft	44 ft (TR0)	
60 ft	44.5 ft (outside front axle, TR0) 22.5 ft (inside rearmost axle, TR4)	

Figure 3
Turning Radius



6.43 Brakes

Service brakes shall be self-adjusting. Brake wear indicators (visible brake sensors) shall be provided on exposed push rods. Plastic wear indicators shall not be used.

6.43.1 Brake Actuation

Service brakes shall be controlled and actuated by a compressed air system. Force to activate the brake pedal control shall be an essentially linear function of the bus deceleration rate and shall 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 total braking effort shall be distributed among all wheels in such a ratio as to ensure equal friction material wear rate at all wheel locations. The engine control unit for the ABS system shall be protected, yet in an accessible location to allow for ease of service.

6.43.2 Friction Material

The brake linings shall be made of non-asbestos material. In order to aid maintenance personnel in determining extent of wear, a provision such as a scribe line or a chamfer indicating the thickness at which

replacement becomes necessary shall be provided on each brake lining. The complete brake lining wear indicator shall be clearly visible from the hoist or pit without removing backing plates. No remote brake wear indicator shall be required.

6.43.3 Hubs and Discs

The bus shall be equipped with disc brakes on all axles, and the brake discs shall allow machining of each side of the disc to obtain smooth surfaces per manufacturer's specifications.

Replaceable wheel bearing seals shall run on replaceable wear surfaces or be of an integral wear surface sealed design. Wheel bearing and hub seals and unitized hub assemblies shall not leak or weep lubricant when operating on the design operating profile for the duration of the initial manufacturer's warranty.

The brake system material and design shall be selected to absorb and dissipate heat quickly so that the heat generated during braking operation does not glaze the brake linings.

6.43.4 Parking/Emergency Brake

The parking brake shall 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.

An alarm shall alert driver of parking brake not be set if the vehicle is in the park or off position and the brake is not applied. Pull to apply parking brake.

6.44 Passenger Door Interlocks

To prevent opening rear passenger door while the bus is in motion, a speed sensor shall be integrated with the door controls to prevent the rear door from being enabled or opened unless the bus speed is less than 2 mph.

To preclude movement of the bus, an accelerator interlock shall lock the accelerator in the closed position, and a brake interlock shall engage the service brake system to stop movement of the bus when the driver's door control is moved to a rear door enable or open position, or a 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 shall bring the bus to a smooth stop and shall 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 shall be active whenever the vehicle master run switch is in any run position.

All door systems employing brake and accelerator interlocks shall be supplied with supporting failure mode effects analysis (FMEA) 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.

When the interlock is on, hazard flashers shall be activated.

6.45 Pneumatic System

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

Provision shall be made to apply shop air to the bus air systems. A quick disconnect fitting shall be easily accessible and located in the engine compartment and near the front bumper area for towing. Retained caps shall be installed to protect fitting against dirt and moisture when not in use. Air for the compressor shall be filtered. The air system shall be protected per FMVSS 121.

6.45.1 Air Compressor

The engine-driven air compressor shall be sized to charge the air system from 40 psi to the governor cut-off pressure in less than 4 minutes while not exceeding the fast idle speed setting of the engine.

6.45.2 Air Lines and Fittings

Air lines, except necessary flexible lines, shall 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 shall not be above the maximum limits as stated in SAE J844. Nylon tubing shall 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.

Line supports shall prevent movement, flexing, tension, strain and vibration. Copper lines shall 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 shall be pre-bent on a fixture that prevents tube flattening or excessive local strain. Copper lines shall be bent only once at any point, including pre-bending and installation. Rigid lines shall be supported at no more than 5-ft intervals. Nylon lines may be grouped and shall be supported at 30-in. intervals or less.

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

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

6.45.3 Air Reservoirs

All air reservoirs shall meet the requirements of FMVSS Standard 121 and SAE Standard J10 and shall be equipped with drain plugs and guarded or flush type drain valves. Major structural members shall protect these valves and any automatic moisture ejector valves from road hazards. Reservoirs shall be sloped toward the drain valve. All air reservoirs shall 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.

Drain valves shall be manual type except for an auto-moisture ejection type valve for wet tank. These valves, and any automatic moisture ejector valves, shall be labeled to identify the associated tank and shall be protected from road hazards by major structural members.

6.45.4 Air System Dryer

An air dryer shall prevent accumulation of moisture and oil in the air system. The air dryer system shall include one or more replaceable desiccant cartridges.

The air dryer system shall operate automatically and be sized to eliminate moisture and oil in the airlines and main air tank. The air dryer shall require minimum routine maintenance. The desiccant filter shall be replaceable by spin-on filter.

The air system shall be equipped with an air dryer located before the no. 1 air tank and as far from the compressor as possible to allow air to cool prior to entering the air dryer.

ELECTRICAL, ELECTRONIC, AND DATA COMMUNICATION SYSTEMS

6.46 Electrical, Electronic, and Data Communication Systems

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.

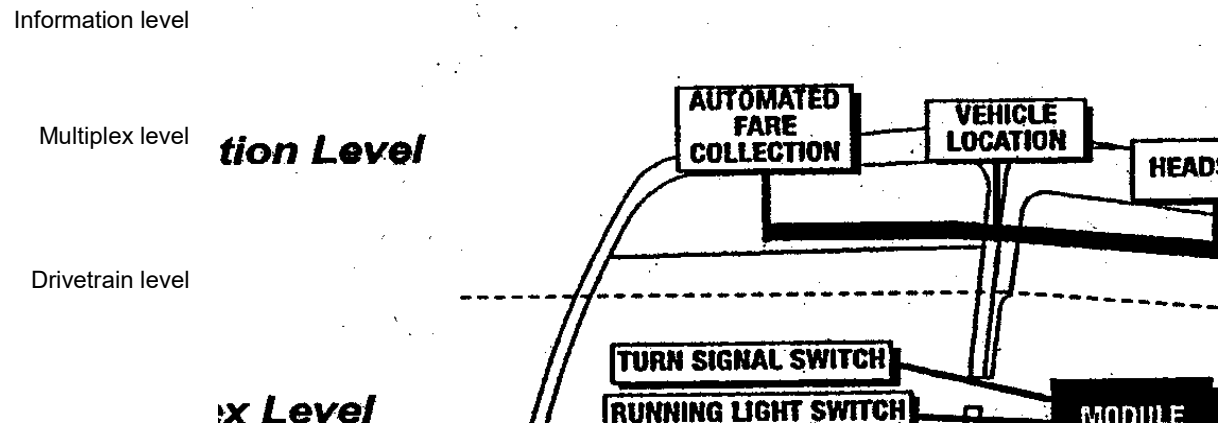
The data communication system consists of the bi-directional communications networks that electronic devices use to share data with other electronic devices and systems. Communication networks are essential to integrating electronic functions, both onboard the vehicle and off.

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

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

- **Powertrain level:** Components related to the powertrain, including the propulsion system components (engine, transmission and hybrid units) and anti-lock braking system (ABS), which may include traction control. At a minimum, powertrain components consisting of the engine, transmission, retarder, ASR and anti-lock braking systems shall be powered by a dedicated and isolated ignition supply voltage to ensure data communication between components exists when the vehicle ignition is switched to the "on" position.
- **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, fareboxes, 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 (if applicable); and gateway devices.

FIGURE 4
Data Communications Systems Levels



6.46.1 Modular Design

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

Power plant wiring shall be an independent wiring harness. Replacement of the engine compartment wiring harness(es) shall not require pulling wires through any bulkhead or removing any terminals from the wires.

6.46.2 Environmental and Mounting Requirements

The electrical system and its electronic components shall be capable of operating in the area of the vehicle in which they will be installed, as recommended in SAEJ1455.

Electrical and electronic equipment shall not be located in an environment that will reduce the performance or shorten the life of the component or electrical system when operating within the design operating profile. As a recommendation, no vehicle component shall generate, or be affected by, electromagnetic interference or radio-frequency interference (EMI/RFI) that can disturb the performance of electrical/electronic equipment as defined in SAEJ1113and UNECE Council Directive 95/54(R10).

The City shall follow recommendations from bus manufacturers and subsystem suppliers regarding methods to prevent damage from voltage spikes generated from welding, jumpstarts, shorts, etc.

6.46.3 Hardware Mounting

The mounting of the hardware shall not be used to provide the sole source ground, and all hardware shall be isolated from potential EMI/RFI, as referenced in SAE J1113.

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

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

All electrical/electronic hardware and its mounting shall comply with the shock and vibration requirements of SAEJ1455.

6.47 Electrical General Requirements

6.47.1 Batteries

Four Interstate type 31 batteries or approved equal. Each battery shall have a minimum of 700 CCA. Each battery shall have a purchase date no more than 120 days from the date of release, and shall be fully maintained prior to shipment to the City.

Positive and negative terminal ends shall be the same size.

6.47.2 Battery Cables

The battery terminal ends and cable ends shall be color-coded with red for the primary positive, black for negative and another color for any intermediate voltage cables. Positive and negative battery cables shall not cross each other if at all possible, shall be flexible and shall be sufficiently long to reach the batteries with the tray in the extended position without stretching or pulling on any connection and shall not lie directly on top of the batteries. Except as interrupted by the master battery switch, battery and starter wiring shall be continuous cables with connections secured by bolted terminals and shall 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. Color code each voltage.

6.47.3 JumpStart

A jump-start connector shall be located next to the battery disconnect switch.

6.47.4 Battery Compartment

The battery compartment shall prevent accumulation of snow, ice, and debris on top of the batteries and shall be self-draining and well-ventilated to prevent hydrogen buildup while protecting the compartment from road spray, water intrusion, and de-icing chemicals. It shall be accessible only from the outside of the vehicle. The access door shall not require any special locking devices to gain access to the switch, and it shall be accessible without removing or lifting the panel. The door shall be flush-fitting and incorporate a spring tensioner or equal to retain the door in a closed position when not in use.

To minimize the length and routing, throughout the bus, of battery cables, the battery compartment shall be located as close as practical to the electric generator and starter motor. 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.

All components within the battery compartment, and the compartment itself, shall be protected from damage or corrosion from the electrolyte. The inside surface of the battery compartment's access doors hall 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 manufacturers specification.

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

The vehicle shall be equipped with a 12 V DC and 24 V DC quick disconnect switch(es). The battery compartment door shall conveniently accommodate operation of the 12 V DC and 24 V DC quick disconnect switch(es).

The battery quick disconnect access door shall be identified with a decal. The decal size shall not be less than 3.5 × 5in. (8.89 × 12.7cm).

The battery hold-down bracket shall be constructed of a nonconductive and corrosion-resistant material (plastic or fiberglass).

6.47.5 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 shall contain a warning label prohibiting the use of lead-acid batteries.

6.47.6 Master Battery Switch

The batteries shall be equipped with a single switch for disconnecting both 12 V and 24 V power.

The location of the master battery switch shall be clearly identified on the exterior access panel, be accessible in less than 10 seconds for deactivation and prevent corrosion from fumes and battery acid when the batteries are washed of for are in normal service.

Turning the master switch off with the power plant operating, during an emergency, shall shut off the engine and shall not damage any component of the electrical system. The master switch shall be capable of carrying and interrupting the total circuit load.

6.47.7 Low-Voltage Generation and Distribution

Voltage monitoring and over-voltage output protection (recommended at 32 V) shall be provided.

Dedicated power and ground shall 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.

6.47.8 Circuit Protection

All branch circuits, except battery-to-starting motor and battery-to-generator/alternator circuits, shall 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 shall be provided to prevent engaging of the motor for more than 30 seconds at a time to prevent overheating. The circuit breaker fuses shall be easily accessible for authorized personnel. Fuses shall 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 shall be constructed to be rugged and waterproof. All manual reset circuit breakers critical to the operation of the bus shall be mounted in a location convenient to the City mechanic with visible indication of open circuits. The City shall consider the application of automatic reset circuit breakers on a case-by-case basis. The Contractor shall show all in-line fuses in the final harness drawings. Any manually resettable circuit breakers shall provide a visible indication of open circuits. Any manually resettable circuit breakers shall provide a visible indication of open circuits.

Circuit breakers or fuses shall 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.

6.47.9 Grounds

The battery shall 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 shall be grounded to the frame in multiple locations, evenly distributed throughout the vehicle to eliminate ground loops. No more than five ground ring/spade terminal connections shall 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) shall not be grounded through the chassis.

6.47.10 Low Voltage/Low Current Wiring and Terminals

All power and ground wiring shall conform to specification requirements of SAE Recommended Practice J1127, J1128 and J1292.Double insulations hall be maintained as close to the junction box, electrical compartment or terminals as possible. The requirement for double insulations hall be met by wrapping the harness with plastic electrical tape or by sheathing all wires and harnesses with non-conductive, rigid or flexible conduit.

Wiring shall be grouped, numbered and/or color-coded. Wiring harnesses shall 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 shall be prevented.

Strain-relief fittings shall be provided at all points where wiring enters electrical compartments. Grommets or other protective material shall be installed at points where wiring penetrates metal structures outside of electrical enclosures. Wiring supports shall be protective and non-conductive at areas of wire contact and shall not be damaged by heat, water, solvents or chafing.

To the extent practicable, wiring shall not be located in environmentally exposed locations under the vehicle. Wiring and electrical equipment necessarily located under the vehicle shall 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 shall include 10 percent (minimum one wire) excess wires for spares. This requirement for spare wires does not apply to data links and communication cables. Wiring harness length shall allow end terminals to be replaced twice without pulling, stretching, or replacing the wire. Terminals shall be crimped to the wiring according to the connector manufacturer's recommendations for techniques and tools. All cable connectors shall be locking type, keyed and sealed, unless enclosed in water tight cabinets or vehicle interior. Pins shall be removable, crimp contact type, of the correct size and rating for the wire being terminated. Unused pin positions shall be sealed with sealing plugs. Adjacent connectors shall use either different inserts or different insert orientations to prevent incorrect connections.

Terminals shall be crimped, corrosion-resistant and full ring type or interlocking lugs with insulating ferrules. When using pressure type screw terminal strips, only stranded wire shall be used. Insulation clearance shall 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 shall 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 shall meet these additional requirements:

- It shall include a mechanical clamp in addition to solder on the splice.
- The wire shall support no mechanical load in the area of the splice.
- The wire shall be supported to prevent flexing.

All splicing shall be staggered in the harness so that no two splices are positioned in the same location within the harness.

Wiring located in the engine compartment shall 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 shall be easily accessible for service from the driver's seat or top of the panel. The instrument panel shall be separately removable and replaceable without damaging the instrument panel or gauges. Wiring shall have sufficient length and be routed to permit service without stretching or chafing the wires.

6.47.11 Electrical Components

All electrical components, including switches, relays, flashers and circuit breakers, shall 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 shall 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 shall be easily accessible for servicing.

6.47.12 Electrical Compartments

All relays, controllers, flashers, circuit breakers and other electrical components shall be mounted in easily accessible electrical compartments. All compartments exposed to the outside environment shall be corrosion-resistant and sealed. The components and their functions in each electrical compartment shall be identified and their location permanently recorded on a drawing attached to the inside of the access panel or door. The drawing shall be protected from oil, grease, fuel and abrasion.

The front compartment shall be completely service able from the driver's seat, vestibule or from the outside. "Rear start and run" controls shall be mounted in an accessible location in the engine compartment and shall be protected from the environment.

6.48 Electronic General Requirements

If an electronic component has an internal real-time clock, it shall 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 shall record accumulated service time without relying on battery backup.

All electronic component suppliers shall ensure that their equipment is self-protecting in the event of shorts in the cabling, and also in over-voltage (over 32V DC on a 24V DC nominal voltage rating with a maximum of 50 V DC) and reverse polarity conditions. If an electronic component is required to interface with other components, it shall 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 shall be limited as much as possible and easily accessible and labeled.

6.48.1 Wiring and Terminals

Kinking, grounding at multiple points, stretching and reducing the bend radius below the manufacturer's recommended minimum shall not be permitted.

6.48.2 Discrete Inputs/Outputs (I/O)

All wiring to I/O devices, either at the harness level or individual wires, shall be labeled, stamped or color-coded in a fashion that allows unique identification at a spacing not exceeding 4 inches. Wiring for each I/O device shall 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.

6.48.3 Shielding

All wiring that requires shielding shall meet the following minimum requirements. A shield shall be generated by connecting to a ground, which is sourced from a power distribution bus bar or chassis. A shield shall be connected at one location only, typically at one end of the cable. However, certain standards or special requirements, such as SAE J1939 or RF applications, have separate shielding techniques that also shall be used as applicable.

When using shielded or coaxial cable, upon stripping of the insulation, the metallic braid shall be free from frayed strands, which can penetrate the insulation of the inner wires. To prevent the introduction of noise, the shield shall not be connected to the common side of a logic circuit.

6.48.4 Communications

The data network cabling shall be selected and installed according to the selected protocol requirements. The physical layer of all network communication systems shall not be used for any 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) shall meet the most stringent applicable wiring and terminal specifications.

6.48.5 Radio Frequency (RF)

RF components, such as radios, video devices, cameras, global positioning systems (GPS), etc., shall use coaxial cable to carry the signal. All RF systems require special design consideration for losses along the cable. Connectors shall be minimized, since each connector and crimp has a loss that will at tribute 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 shall be provided for ease of attachment of antenna and cable assembly. The corresponding component vendors shall be consulted for proper application of equipment, including installation of cables.

6.48.6 Audio

Cabling used for microphone level and line level signals shall be 22 AWG minimum with shielded twisted pair. Cabling used for amplifier level signals shall be 18 AWG minimum.

6.49 Multiplexing

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.

Multiplexing may either be distributed or centralized. A distributed system shall process information on multiple control modules within the network. A centralized system shall process the information on a single control module. Either system shall consist of several modules connected to form a control network.

Versatility and future expansion shall be provided for by expandable system architecture. The multiplex system shall be capable of accepting new inputs and outputs though the addition of new modules and/or the utilization of existing spare inputs and outputs. A multi-master multiplexing system framework shall be used, and modules shall be fully interchangeable with each other as well as possessing self-diagnostic capabilities. The modules shall be easily accessible for troubleshooting electrical failures and performing system maintenance. Multiplex input/output modules shall use solid-state devices to provide extended service life and individual circuit protection.

The instrument panel cluster shall feature an integrated PLC that can communicate with the rest of the multiplexing system. The instrument panel cluster shall feature two CAN ports and one USB device port so that direct connection can be made with a PC via USB without the use of adapters.

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 shall be designated as spares.

The input/output for the multiplex system may contain four types of electrical signals: discrete, modulating, analogue, serial data.

Discrete signals shall reflect the on/off status of switches, levers, limit switches, lights, etc. Analog signals shall 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 shall represent the status of variable devices such as rheostats, potentiometers, temperature probes, etc. Serial data signals shall reflect ASCII or alphanumeric data used in the communication between other on-board components.

6.50 Data Communications

All data communication networks shall be either in accordance with a nationally recognized interface standard, such as those published by SAE, IEEE or ISO, or shall be published to the City 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 shall 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 shall be conformance tested to the corresponding network standard.

Electrical and electronic subsystems and components on all buses shall 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 shall 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.

6.50.1 Drivetrain Level

Drivetrain components, consisting of the engine, transmission, retarder, anti-lock braking system and all other related components, shall be integrated and communicate fully with respect to vehicle operation with data using SAE Recommended Communications Protocols such as J1939 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 shall 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.

6.50.1.1 Diagnostics, Fault Detection, and Data Access

Drive train performance, maintenance and diagnostic data, and other electronic messages shall be formatted and transmitted on the communications networks.

The drivetrain level shall have the ability to record abnormal events in memory and provide diagnostic codes and other information to service personnel. At a minimum, this network level shall provide live/fail status, current hardware serial number, software/data revisions and uninterrupted timing functions.

6.50.1.2 Programmability (Software)

The drivetrain level components shall be programmable by the City with limitations as specified by the subsystem Supplier.

6.50.2 Multiplex Level

6.50.2.1 Diagnostics, Fault Detection, and Data Access

At a minimum, information shall be made available via a communication port on the multiplex system. The location of the communication port shall be easily accessible. A hardware gateway and/or wireless communications system are options if requested by the City. The communication port(s)shall be located as specified by the City.

The multiplex system shall have a proven method of determining its status (system health and input/output status) and detecting either active (online) or inactive (offline) faults through the use of on-board visual/audible indicators.

In addition to the indicators, the system shall employ an advanced diagnostic and fault detection system, which shall be accessible via either a personal computer or a hand held unit. Either unit shall have the ability to check logic function. The diagnostic data can be incorporated into the information level network or the central data access system.

No requirement for mock-up board.

6.50.2.2 Programmability (Software)

The multiplex system shall have security provisions to protect its software from unwanted changes. This shall be achieved through any or all of the following procedures:

- Password protection
- Limited distribution of the configuration software
- Limited access to the programming tools required to change the software
- Hardware protection that prevents undesired changes to the software

Provisions for programming the multiplex system shall be possible through a PC or laptop. The multiplex system shall have proper revision control to ensure that the hardware and software are identical on each vehicle equipped with the system. Revision control shall be provided by all of the following:

- Hardware component identification where labels are included on all multiplex hardware to identify components
- Hardware series identification where all multiplex hardware displays the current hardware serial number and firmware revision employed by the module
- 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 shall be electronic.

DRIVER PROVISIONS, CONTROLS, AND INSTRUMENTATION

6.51 Operator's Area

In general when designing the operator's area, it is recommended that SAE J833, "Human Physical Dimensions," be used.

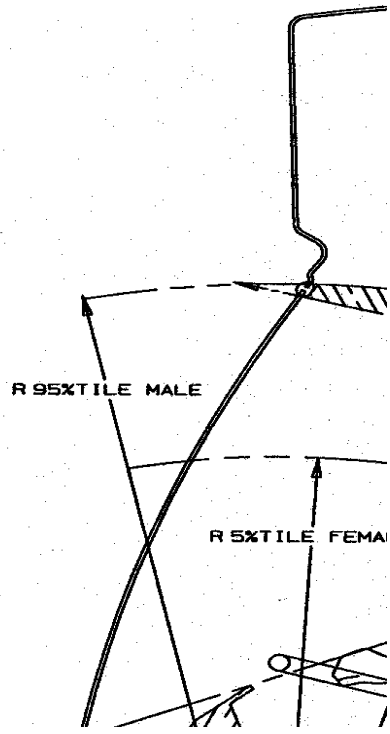
Switches and controls shall be divided into basic groups and assigned to specific areas, in conformance with SAE Recommended Practice J680, Revised 1988, "Location and Operation of Instruments and Controls in Motor Truck Cabs," and be essentially within the hand reach envelope described in SAE Recommended Practice J287, "Driver Hand Control Reach."

6.51.1 Operator's Platform

The covering of platform surfaces and risers, except where otherwise indicated, shall be the same material as specified for floor covering. Trim shall be provided along top edges of platforms unless integral nosing is provided. Stainless steel trim material.

The driver's platform shall 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 shall not position the driver such that the driver's vertical upward view is less than 15 degrees. A warning decal or sign shall be provided to alert the driver to the change in floor level. **Figure 2** illustrates a means by which the platform height can be determined, using the critical line of sight.

FIGURE 2
Determining Platform Height



6.51.2 Operator Lighting

The driver's area shall have a light to provide general illumination, and it shall illuminate the half of the steering wheel nearest the driver to a level of 5 to 10 foot-candles. The light shall be operator controlled by

an adjustable switch located on the operator's control panel or other approved location. These lights shall be LED.

6.51.3 Glare

The driver's work area shall be designed to minimize glare to the extent possible. Objects within and adjacent to this area shall be matte black or dark gray in color wherever possible to reduce the reflection of light onto the windshield. The use of polished metal and light-colored surfaces within and adjacent to the driver's area shall be avoided.

6.51.4 Visors/Sun Shades

An adjustable roller type sunscreen shall be provided over the driver's windshield and/or the driver's side window. The sunscreen shall be capable of being lowered to the midpoint of the driver's window. When deployed, the screen shall be secure, stable, and shall 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 shall remain in the lowered position until returned to the stowed position by the driver. Sunscreen shall be shaped to minimize light leakage between the visor and windshield pillars to the extent possible**.**

6.51.5 Driver's Amenities

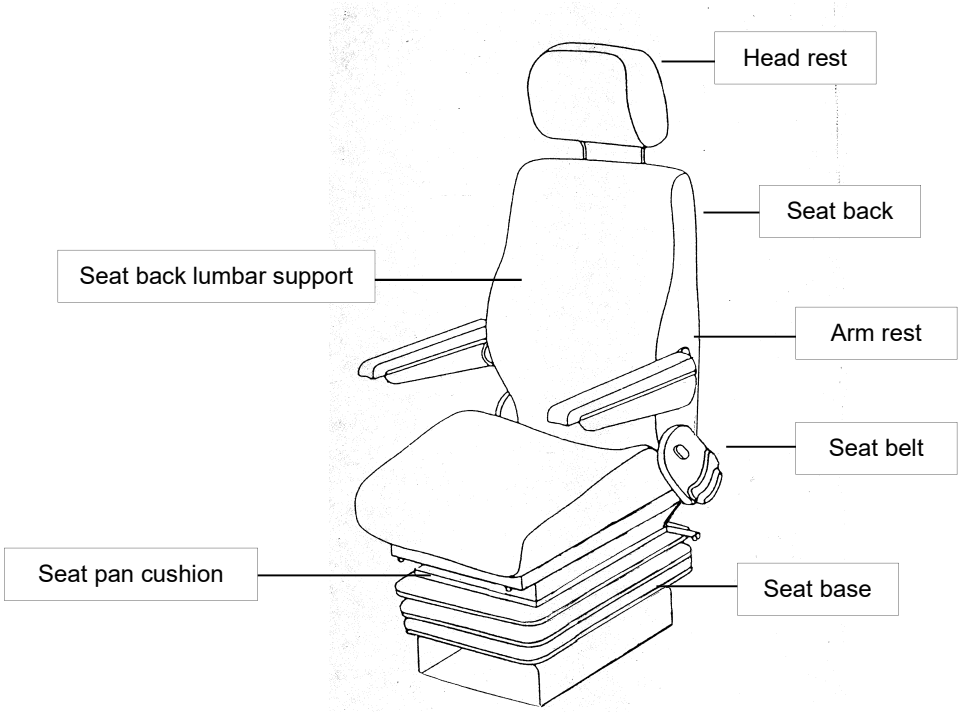
A suitable hanger shall be installed in a convenient, approved location for the driver's coat.

No drink holder.

An enclosed driver storage area shall be provided with a positive latching door and/or lock. The minimum size is 2750 $in.^3$

6.52 Driver's Seat

FIGURE 5
Driver's Seat



6.52.1 Dimensions

The driver's seat shall be comfortable and adjustable so that people ranging in size from a 95th-percentile male to a 5th-percentile female may operate the bus.

6.52.1.1 Seat Pan Cushion

Length. Measurement shall be from the front edge of the seat pan to the rear at its intersection with the seat back. The adjustment of the seat pan length shall be no less than 16.5 in.at its minimum length and no more than 20.5 in.at its maximum length.

Height. Measurements shall be from the cab floor to the top of the level seat at its center midpoint. The seat shall adjust in height from a minimum of 14 in., with a minimum 6 in. vertical range of adjustment.

Width. Measurement is the horizontal distance across the seat cushion. The seat pan cushion shall be 17 to 21 in. across at the front edge of the seat cushion and 20 to 23 in. across at the side bolsters.

6.52.1.2 Seat Pan Cushion Slope

Measurement is the slope of the plane created by connecting the two high points of the seat, one at the rear of the seat at its intersection with the seat back and the other at the front of the seat just before it waterfalls

downward at the edge. The slope can be measured using an inclinometer and shall be stated in degrees of incline relative to the horizontal plane (0 deg.). The seat pan shall adjust in its slope from no less than plus 12 deg. (rearward "bucket seat" incline) to no less than minus 5 deg. (forward slope).

6.52.1.3 Seat Base Adjustment

Measurement is the horizontal distance from the heel point to the front edge of the seat. The minimum and maximum distances shall be measured from the front edge of the seat when it is adjusted to its minimum seat pan depth (approximately 15 in.). On all low-floor buses, the seat base shall travel horizontally a minimum of 9 in. It shall adjust no closer to the heel point than 6 in. On all high-floor buses, the seat base shall travel a minimum of 9 in. and adjust no closer to the heel point than 6 in.

6.52.1.4 Seat Suspension

The driver's seat shall be appropriately dampened to support a minimum weight of 380 lbs. The suspension shall be capable of dampening adjustment in both directions**.**

Rubber bumpers shall be provided to prevent metal-to-metal contact.

6.52.1.5 Seat Back

Height. Standard height 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 shall be no less than 19 in. Seat back will include dual recliner gears on both sides of the seat.

6.52.1.6 Headrests

Adjustable headrest.

6.52.1.7 Seat Back Lumbar Support

Measurement is from the bottom of the seat back at its intersection with the seat pan to the top of the lumbar cushioning. The seat back shall provide adjustable-depth lumbar back support with three individual operating lumbar cells within a minimum range of 7 to 11 in.

6.52.1.8 Seat Back Angle Adjustment

The seat back angle shall 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 shall adjust in angle from a minimum of no more than 90 deg. (upright) to at least 105 deg. (reclined), with infinite adjustment in between.

6.52.2 Seat Belt

The belt assembly should be an auto-locking retractor (ALR).All seat belts should be stored in automatic retractors. The belts shall 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 shall withstand static horizontal forces as required in FMVSS 207 and 210.

Seat belts shall be provided across the driver's lap and diagonally across the driver's chest. The driver shall 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.

The lap belt assembly shall be a minimum of 72 in. in length.

6.52.3 Armrest

No armrests.

6.52.4 Seat Control Locations

While seated, the driver shall be able to make seat adjustments by hand without complexity, excessive effort or being pinched. Adjustment mechanisms shall hold the adjustments and shall not be subject to inadvertent changes.

6.52.5 Seat Structure and Materials

Cushions shall be fully padded with at least 3 in. of materials in the seating areas at the bottom and back. Material for the cushion shall adhere to FMVSS 302 or FTA Docket 90A standards.

The seat shall have black pleather vinyl covering.

6.52.6 Pedestal

Pedestal shall be powder-coated steel.

6.53 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 shall be conveniently located and shall provide for ease of operation. They shall be identifiable by shape, touch and permanent markings. Controls also shall be located so that passengers may not easily tamper with control settings.

All panel-mounted switches and controls shall be marked with easily read identifiers. Graphic symbols shall conform to SAE Recommended Practice J2402, "Road Vehicles – Symbols For Controls, Indicators, and Tell Tales," where available and applicable. Color of switches and controls shall be dark with contrasting typography or symbols.

Mechanical switches and controls shall be replaceable, and the wiring at these controls shall be serviceable from a convenient location. Switches, controls and instruments shall be dust- and water-resistant.

All switches/controls in the driver's controls area shall be mounted in an angled panel steep enough to discourage drivers from using it as a personal storage area for items like food, drinks, cell phones, etc.

6.53.1 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 shall be located within easy reach of the operator. The operator shall not be required to stand or turn to view or actuate these controls unless specified otherwise.

Systems or components monitored by onboard diagnostics system shall be displayed in clear view of the operator and provide visual and/or audible indicators. The intensity of indicators shall permit easy determination of on/off status in bright sunlight but shall not cause a distraction or visibility problem at night. All indicators shall be illuminated using backlighting.

The indicator panel shall be located in Area 1 or Area 5, within easy view of the operator instrument panel. All indicators shall have a method of momentarily testing their operation. The audible alarm shall be tamper-resistant and shall 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 shall 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 shall be concealed and protected from unauthorized access. **Table 6** represents instruments and alarms. The intent of the overall physical layout of the indicators shall be in a logical grouping of systems and severity nature of the fault.

Consideration shall be provided for future additions of spare indicators as the capability of onboard diagnostic systems improves. Blank spaces shall contain LEDs.

TABLE 6 (Transit Coach)
Transit Bus Instruments and Alarms

Device	Description	Location	Function	Visual/ Audible
Master run switch	Rotary, four-position detent	Side console	Master control for bus, off, day run, night run and clearance ID lights	
Engine start, front	Approved momentary switch	Side console	Activates engine starter motor	
Engine start, rear	Approved momentary switch	Engine compartment	Activates engine starter motor	
Engine run, rear	Three-position toggle switch	Engine compartment	Permits running engine from rear start, normal front run position and off	Amber light
Drive selector	Touch panel switch	Side console	Provides selection of propulsion: forward, reverse and neutral	Gear selection

TABLE 6 (Transit Coach)

Transit Bus Instruments and Alarms

Device	Description	Location	Function	Visual/ Audible
HVAC	Switch or switches to control HVAC	Side console	Permits selection of passenger ventilation: off, cool, heat, low fan, high fan or full auto with on/off only	
Driver's ventilation	Rotary, three-position detent	Side console or dash left wing	Permits supplemental ventilation: fan off, low or high	
Defroster fan	Rotary, three-position detent	Side console or dash left wing	Permits defroster: fan off, low, medium or high	
Defroster temperature	Variable position	Side console or dash left wing	Adjusts defroster water flow and temperature	
Windshield wiper	One-variable rotary position operating both wipers	Dash left wing	Variable speed control of left and right windshield wipers	
Windshield washer	Push button	Dash left wing	Activates windshield washers	
Dash panel lights	Rotary rheostat or stepping switch	Side console or dash left wing	Provides adjustment for light intensity in night run position	
Interior lights	Three-position switch	Side console	Selects mode of passenger compartment lighting: off, on, normal	
Fast idle	Two-position switch	Side console	Selects high idle speed of engine	
WC ramp/ kneel enable	Two-position switch[1]	Side console or dash right wing	Permits operation of ramp and kneel operations at each door remote panel	Amber light
Front door ramp/kneel enable	Two-position keyed switch[1]	Front door remote or dash right wing	Permits ramp and kneel activation from front door area, key required[1]	Amber light
Front door ramp	Three-position momentary switch	Right side of steering wheel	Permits deploy and stow of front ramp	Red light
Front kneel	Three-position momentary switch	Front door remote	Permits kneeling activation and raise and normal at front door remote location	Amber or red dash indicator; exterior alarm and amber light
Rear door ramp/kneel enable	Two-position keyed switch[1]	Rear door remote	Permits ramp and kneel activation from rear door area; key required[1]	Red light
Rear door ramp	Three-position momentary switch	Rear door remote	Permits deploy and stow of rear ramp	
Rear kneel	Three-position momentary switch	Rear door remote	Permits kneeling activation and raise and normal at rear door remote location	

TABLE 6 (Transit Coach)

Transit Bus Instruments and Alarms

Device	Description	Location	Function	Visual/ Audible
Silent alarm	Recessed push button, NO and NC contacts momentary	Side console	Activates emergency radio alarm at dispatch and permits covert microphone and/or enables destination sign emergency message	
Video system event switch	Momentary on/off momentary switch with plastic guard	Side console	Triggers event equipment, triggers event light on dash	Amber light
Left remote mirror	Four-position toggle type	Side console	Permits two-axis adjustment of left exterior mirror	
Right remote mirror	Four-position toggle type	Side console	Permits two-axis adjustment of right exterior mirror	
Mirror heater	Switch or temperature activated	Side console	Permits heating of outside mirrors when required	
Passenger door control	Five-position handle type detent or two momentary push buttons	Side console, forward	Permits open/close control of front and rear passenger doors	Red light
Rear door override	Two-position switch in approved location	Side console, forward	Allows driver to override activation of rear door passenger tape switches	
Engine shutdown override	Momentary switch with operation protection	Side console	Permits driver to override auto engine shutdown	
Hazard flashers	Two-position switch	Side console or dash right wing	Activates emergency flashers	Two green lights
Fire suppression	Red push button with protective cover	Dash left wing or dash center	Permits driver to override and manually discharge fire suppression system	Red light
Mobile data terminal	Mobile data terminal coach operator interface panel	Above right dash wing	Facilitates driver interaction with communication system and master log-on	LCD display with visual status and text messages
Destination sign interface	Destination sign interface panel	In approved location	Facilitates driver interaction with destination sign system, manual entry	LCD display
Turn signals	Momentary push button (two required) raised from other switches	Left foot panel	Activates left and right turn signals	Two green lights and optional audible indicator
PA manual	Momentary push button	In approved location	Permits driver to manually activate public address microphone	
Low-profile microphone	Low-profile discrete mounting	Steering column	Permits driver to make announcements with both hands on the wheel and focusing on road conditions	

TABLE 6 (Transit Coach)

Transit Bus Instruments and Alarms

Device	Description	Location	Function	Visual/ Audible
High beam	Detented push button	In approved location	Permits driver to toggle between low and high beam	Blue light
Parking brake	Pneumatic PPV	Side console or dash left wing	Permits driver to apply and release parking brake	Red light
Park brake release	Pneumatic PPV	Vertical side of the side consoler dash center	Permits driver to push and hold to release brakes	
Hill holder	Two-position momentary switch	Side console	Applies brakes to prevent bus from rolling	
Remote engine speed	Rotary rheostat	Engine compartment	Permits technician to raise and lower engine RPM from engine compartment	
Master door/ interlock	Multi-pole toggle, detented	Out of operator's reach	Permits driver override to disable door and brake/throttle interlock	Red light
Warning interlocks deactivated	Red indicator light	Dash panel center	Illuminates to warn driver that interlocks have been deactivated	Red light
Retarder disable	Multi-pole switch detented	Within reach of operator or approved location	Permits driver override to disable brake retardation/regeneration	Red light
Alarm acknowledge	Push button momentary	Approved location	Permits driver to acknowledge alarm condition	
Rear door passenger sensor disable	Multi-pole toggle, detented	In sign compartment or driver's barrier compartment	Permits driver to override rear door passenger sensing system	
Indicator/ alarm test button	Momentary switch or programming[1]	Dash center panel	Permits driver to activate test of sentry, indicators and audible alarms	All visuals and audibles
Auxiliary power	110 V power receptacle	Approved location	Property to specify what function to supply	
Speedometer	Speedometer, odometer, and diagnostic capability, 5-mile increments	Dash center panel	Visual indication of speed and distance traveled, accumulated vehicle mileage, fault condition display	Visual
Air pressure gauge	Primary and secondary, 5 psi increments	Dash center panel	Visual indication of primary and secondary air systems	Red light and buzzer
Fire detection	Coach operator display	Property specific or dash center	Indication of fire detection activation by zone/location	Buzzer and red light

TABLE 6 (Transit Coach)

Transit Bus Instruments and Alarms

Device	Description	Location	Function	Visual/ Audible
Door obstruction	Sensing of door obstruction	Dash center	Indication of rear door sensitive edge activation	Red light and buzzer
Door ajar	Door not properly closed	Property specific or dash center	Indication of rear door not properly closed	Buzzer or alarm and red light
Low system air pressure	Sensing low primary and secondary air tank pressure	Dash center	Indication of low air system pressure	Buzzer and red light
Methane detection function	Detection of system integrity	Property specific or dash center	Detects system failure	No start condition, amber light
Methane detection	Indication of 20% LED emergency light (LEL)	Property specific or dash center	Detects levels of methane	Flashing red at 20% LEL
Methane detection	Indication of 50% LEL	Property specific or dash center	Detects levels of methane	Solid red at 50% LEL
Engine coolant indicator	Low coolant indicator may be supplied as audible alert and visual and/or text message	Within driver's sight	Detects low coolant condition	Amber light
Hot engine indicator	Coolant temperature indicator may be supplied as audible alert and visual and/or text message	Within driver's sight	Detects hot engine condition and initiates time delay shutdown	Red light
Low engine oil pressure indicator	Engine oil pressure indicator may be supplied as audible alert and visual and/or text message	Within driver's sight	Detects low engine oil pressure condition and initiates time-delayed shutdown	Red light
ABS indicator	Detects system status	Dash center	Displays system failure	Amber light
HVAC indicator	Detects system status	Dash center	Displays system failure	Amber or red light
Charging system indicator (12/24 V)	Detect charging system status	Dash center	Detects no charge condition and optionally detects battery high, low, imbalance, no charge condition, and initiates time-delayed shutdown	Red light flashing or solid based on condition
Bike rack deployed indicator	Detects bike rack position	Dash center	Indication of bike rack not being in fully stowed position	Amber or red light
Fuel tank level	Analog gauge, graduated based on fuel type	Dash center	Indication of fuel tank level/pressure	

TABLE 6 (Transit Coach)
Transit Bus Instruments and Alarms

Device	Description	Location	Function	Visual/ Audible
DEF gauge	Level Indicator	Center dash	Displays level of DEF tank and indicates with warning light when low	Red light
Active regeneration	Detects status	Dash center	Indication of electric regeneration	Amber or red light
Turntable	Detects status	Dash center	Warning indication for hinge locking	Audible and amber warning and red light if locked
Turntable	Interlock momentary switch	Side console	Momentarily release interlock brakes due to overangled condition	

1. Indicate area by drawing. Break up switch control from indicator lights.

6.53.2 Driver Foot Controls

Accelerator and brake pedals shall be designed for ankle motion. Foot surfaces of the pedals shall be faced with wear-resistant, nonskid, replaceable material.

Pedal angle. The vertical angle of the accelerator and brake pedals shall be determined from a horizontal plane regardless of the slope of the cab floor. The accelerator and brake pedals shall 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 shall 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 shall 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 shall 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.

6.53.3 Brake and Accelerator Pedals

Non-adjustable brake pedal.

6.53.4 Driver Foot Switches

Floor-mounted foot control platform shall be designed so that the foot room for the operator is not impeded. The spacing of the switches shall be such that inadvertent simultaneous deflection of switches is prevented. Foot surfaces shall be wear-resistant, skid-resistant, replaceable material. The angle of foot platforms shall be determined from a horizontal plane, regardless of the slope of the cab floor.

6.53.4.1 Turn Signal Controls

Turn signal controls shall be floor-mounted, foot-controlled, water-resistant, heavy-duty, momentary contact switches.

The control switches for the turn signals shall be mounted on an inclined, stainless steel enclosure or metal plate integrated into the driver's platform. The control switch platform shall be located to the left of the steering column. The location and design of this enclosure shall be such that foot room for the operator is not impeded. It shall be located no closer to the seat front than the heel point of the accelerator pedal.

The turn signal platform shall be angled at a minimum of 10 degrees and a maximum of 37 degrees. The inclined mounting surface shall be skid-resistant. All other signals, including high

Activation of the turn signals shall also activate cornering lights on the streetside and the curbside of the vehicle.

6.53.4.2 Other Floor-Mounted Controls

The following may be floor mounted, momentary or latching, as identified by the City:

- Hazard
- High-beam
- PA system

6.54 Mirrors

6.54.1 Exterior Mirrors

The bus shall be equipped with corrosion-resistant, outside rearview mirrors mounted with stable supports to minimize vibration. Mirrors shall be firmly attached to the bus to minimize vibration and to prevent loss of adjustment with a breakaway mounting system. Mirrors shall 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.

Mirrors shall retract or fold sufficiently to allow bus washing operations but avoid contact with windshield.

Exterior mirrors shall be installed with a breakaway mounting system.

6.54.2 Curbside and Street-Side Mirrors

The curbside rearview mirror shall be mounted so that its lower edge is no less than 76in. above the street surface. A lower mount may be required due to mirror configuration requests.

A combination of plane/convex mirrors are preferred. The mirrors shall be located so as to provide the driver a view to the rear along both sides of the bus and shall be adjustable both in the horizontal and vertical directions to view the rearward scene. The street-side rearview mirror shall be positioned so that the driver's line of sight is not obstructed. Curbside and Street-side mirrors shall be remote controlled and have incorporated LED turn signals.

6.54.3 Interior Mirrors

Mirrors shall be provided for the driver to observe passengers throughout the bus without leaving the seat and without shoulder movement. The driver shall be able to observe passengers in the front/entrance and rear/exit areas (if applicable), anywhere in the aisle, and in the rear seats.

WINDOWS

6.55 Windows

A minimum of 16,000 square inches of window area, including operator and door windows, shall be required on each side of the standard configuration bus.

6.56 Windshield

The windshield shall permit an operator's field of view as referenced in SAE Recommended Practice J1050. The vertically upward view shall be a minimum of 14 degrees, measured above the horizontal and excluding any shaded band. The vertically downward view shall permit detection of an object 3½ feet high and no more than 2 feet in front of the bus. The horizontal view shall be a minimum of 90 degrees above the line of sight. Any binocular obscuration due to a center divider may be ignored when determining the 90 degree requirement, provided that the divider does not exceed a 3 degree angle in the operator's field of view. Windshield pillars shall not exceed 10 degrees of binocular obscuration. The windshield shall be designed and installed to minimize external glare as well as reflections from inside the bus.

6.56.1 Windshield Glazing

The windshield glazing material shall 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.

Two piece windshield is required. Windshield shall be easily replaceable by removing zip-locks from the windshield retaining moldings. Bonded-in-place windshields shall not be used. Winglets may be bonded.

The upper portion of portion of the windshield above the driver's field of view shall 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.

6.56.2 Windshield Wipers

The bus shall be equipped with a windshield wiper for each half of the windshield. At 60 mph, no more than 10 percent of the wiped area shall be lost due to windshield wiper lift. For two-piece windshields, both wipers shall park along the center edges of the windshield glass. For single-piece windshields, wipers shall park along the bottom edge of the windshield. Windshield wiper motors and mechanisms shall be easily accessible for repairs or service. The fastener that secures the wiper arm to the drive mechanism shall be corrosion-resistant.

Single-control, electric two-speed intermittent wiper.

6.56.3 Windshield Washers

The windshield washer system, when used with the wipers, shall deposit washing fluid evenly and completely wet the entire wiped area.

The windshield washer system shall have a minimum 3-gallon reservoir, located for easy refilling from outside the bus. Reservoir pumps, lines and fittings shall be corrosion-resistant and must include a means to determine fluid level.

6.57 Driver's Side Window

The driver's side window glazing material shall 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.

Driver's side window shall slide open rearward have exterior and interior handles, and be non-egress.

When in an open position, the window shall not rattle or close during braking. This window section shall slide in tracks or channels designed to last the service life of the bus. The operator's side window shall not be bonded in place and shall be easily replaceable. The glazing material shall have a single-density 70 percent transmittance.

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. (560 mm) above the operator's floor to ensure visibility of an under-mounted convex mirror. Driver's window construction shall maximize ability for opening of the window.

The design shall prevent sections from freezing closed in the winter. Light transmittance shall 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.

6.58 Side Windows

Side windows shall not be bonded in place, but shall be easily replaceable without disturbing adjacent windows and shall 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 and shall be black anodized.

6.58.1 Emergency Exit (Egress) Configuration

All side windows shall be fixed in position, except as necessary to meet the emergency escape requirements.

6.58.2 Configuration

All side windows shall be hidden frame and fixed in position, except as necessary to meet the emergency escape requirements.

6.58.3 Materials

The material shall conform to the requirements of ANSI Z26.1-1996 Test Grouping 2 and the recommended practices defined in SAE J673. SHGC and light transmission performance shall be defined by the National Fenestration Rating Council.

Side windows glazing material shall have a minimum of 6 mm nominal thickness tempered safety glass.

Windows on the bus sides and in the rear door shall be tinted a neutral color, complementary to the bus exterior. The maximum solar energy transmittance shall not exceed 44 percent, as measured by ASTM E-424. Luminous transmittance shall be no less than 71 percent as measured by ASTM D-1003. Windows over the destination signs shall not be tinted.

44 percent luminous transmittance. All glass treatments must be permanent, within the glass and/or in the center membrane. Surface films are not permitted.

6.58.4 Rear Window

No requirement for rear window.

HEATING, VENTILATING AND AIR CONDITIONING

6.59 Heating, Ventilating, and Air Conditioning

The heating, ventilation, air conditioning (HVAC) units may either be roof or rear-mounted. Fuel tank location will affect the location of the HVAC unit. All tests results shall be provided to the City.

6.60 HVAC Capacity and Performance

The HVAC climate control system shall be capable of controlling the temperature and maintaining the humidity levels of the interior of the bus as defined in the following paragraphs.

With the bus running at the design operating profile with corresponding door opening cycle, and carrying a number of passengers equal to 150 percent of the seated load, the HVAC system shall control the average passenger compartment temperature within arrange between 65 and 85 °F, while maintaining the relative humidity to a value of 50 percent or less. The system shall maintain these conditions while subjected to any outside ambient temperatures within arrange of 10 to 110°F and at any ambient relative humidity levels between 5 and 50 percent.

Additional testing shall be performed as necessary to ensure compliance to performance requirements stated herein.

6.61 Pull Down Performance

The air-conditioning portion of the HVAC system shall be capable of reducing the passenger compartment temperature from 110 to 90 °F in less than 20 minutes after engine start-up. Engine temperature shall be within the normal operating range at the time of start-up of the cool-down test, and the engine speed shall

be limited to fast idle, which may be activated by a driver-controlled device. During the cool-down period, the refrigerant pressure shall not exceed 400 psi, and the condenser discharge air temperature, measured 6 in. from the surface of the coil, shall not exceed 145 °F. 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, shall be used. There shall be no passengers on board, and the doors and windows shall be closed.

The air conditioning system shall meet these performance requirements using R134a or approved equal refrigerant.

6.62 HVAC Controls and Temperature Uniformity

The HVAC system excluding the driver's heater/defroster shall be centrally controlled with an advanced electronic/diagnostic control system with provisions for extracting/reading data. The system shall be compliant with J1939 Communication Protocol for receiving and broadcasting of data. After manual selection or activation or both of climate control system operation mode, and all other interior climate control system requirements for the selected mode shall be attained automatically to within ±2 °F of specified temperature control set-point.

The temperature controls for the bus shall be a dual-temperature control setpoint. The temperature control setpoint for the system shall be 75°F in the cooling mode and 68°F in the heating mode.

The operator shall have full control over the defroster and operator's heater. The operator shall be able to adjust the temperature in the operator's area through air distribution and multiple speed fan control. The interior climate control system shall switch automatically to the ventilating mode if the refrigerant compressor or condenser fan fails. Interior temperature distribution shall be uniform to the extent practicable to prevent hot or cold spots or both. After stabilization with doors closed, the temperatures between any two points in the passenger compartment in the same vertical plane, and 6 inches to 72 inches above the floor, shall not vary by more than 5°F with doors closed. The interior temperatures, measured at the same height above the floor, shall not vary more than ±5 °F, from the front to the rear, from the average temperature determined in accordance to APTA Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System. Variations of greater than ±5 °F will be allowed for limited, localized areas provided that the majority of the measured temperatures fall within the specified requirement.

6.63 Air Flow Passenger Area

The cooling mode of the interior climate control system shall introduce air into the bus at or near the ceiling height at a minimum rate of 25 cubic ft. per minute (cfm) per passenger based on the standard configuration bus carrying a number of passengers equal to 150 percent of the seated load. Airflow shall be evenly distributed throughout the bus, with air velocity not exceeding 100 ft. per minute on any passenger. The ventilating mode shall provide air at a minimum flow rate of 20 cfm per passenger.

Airflow may be reduced to 15 cfm per passenger (150 percent of seated load) when operating in the heating mode. The fans shall not activate until the heating element has warmed sufficiently to ensure at least 70 °F air outlet temperature. The heating air outlet temperature shall not exceed 110 °F under any normal

operating conditions. Outside airflow may be cut off during initial warm up, provided no manual manipulation is required.

6.64 Air Flow Operator's Area

The Contractor shall provide separate heating, ventilation, and defroster system for the operator's area and the operator shall control the system. The system shall meet the following requirements:

- The heater and defroster system shall provide heating for the operator and heated air to completely defrost and defog the windshield, operator's side window, and the front door glasses in all operating conditions. Fan(s) shall draw air from the bus body interior or the exterior or both through a control device and pass it through the heater core to the defroster system and over the operator's feet. A minimum capacity of 100 cfm shall be provided. The operator shall have complete control of the heat and fresh airflow for their area.
- The windshield defroster unit shall meet the requirements of SAE Recommended Practice J382, "Windshield Defrosting Systems Performance Requirements."
- The Contractor shall provide a ventilation system to ensure operator comfort and shall be capable of providing fresh air in both the foot and head areas. Vents shall be adjustable and controllable by the operator from the normal driving position.

6.65 Controls for the Climate Control System (CCS)

The controls for the driver's compartment for heating, ventilation and cooling systems shall be integrated and shall meet the following requirements:

- A separate switch shall control the heat/defrost system fan that has an "off" position and at least two positions for speed control. All switches and controls shall preclude the possibility of clothing becoming entangled, and shields shall be provided, if required. If the fans are approved by the City, an "on/off" switch shall be located to the right of or near the main defroster switch.
- A manually operated control valve shall control the coolant flow through the heater core. If a cable-operated manual control valve is used, then the cable length shall be kept to a minimum to reduce cable seizing. Heater water control valves shall be "positive" type, closed or open. The method of operating remote valves shall require the written approval of the City.

6.66 HVAC Air Filtration

Air shall be filtered before entering the AC system and being discharged into the passenger compartment. The filter shall meet the ANSI/ASHRAE 52.1 requirement for 5 percent or better atmospheric dust spot efficiency, 50 percent weight arrestance, and a minimum dust holding capacity of 120 gram per 1000 cfm cell. Air filters shall be easily removable for service.

Air filters shall be of disposable type.

6.67 Roof Ventilators

Two roof ventilators shall be provided in the roof of the bus, one approximately over or just forward of the front axle and the other approximately over the rear axle.

Each ventilator shall be easily opened and closed manually. When open with the bus in motion, this ventilator shall provide fresh air inside the bus. The ventilator shall cover an opening area no less than 425 sq. in. and shall 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 shall be incorporated into the roof ventilator. Roof ventilator(s) shall be sealed to prevent entry of water when closed.

6.68 HVAC Maintainability

Manually controlled shut-off valves in the refrigerant lines shall allow isolation of the compressor and dehydrator filter for service. To the extent practicable, self-sealing couplings utilizing O-ring seals shall 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 shall be located to efficiently transfer heat to the atmosphere and shall not ingest air warmed above the ambient temperature by the bus mechanical equipment, or to discharge air into any other system of the bus. The location of the condenser shall preclude its obstruction by wheel splash, road dirt or debris. HVAC components located within 6 in. of floor level shall be constructed to resist damage and corrosion.

High and low refrigerant pressure readings accessed via diagnostics within HVAC HMI.

6.69 Fans, Motors, and Pumps

All HVAC electric motors shall be brushless and each motor shall be serviced by a solid state controller. All electric boost pumps shall be brushless and seal less.

EXTERIOR PANELS, FINISHES AND EXTERIOR LIGHTING

6.70 Body Design

The bus shall have a clean, smooth, simple design, primarily derived from bus performance requirements and passenger service criteria established by these Technical Specifications.

The exterior and body features, including grilles and louvers, shall be shaped to facilitate cleaning by automatic bus washers without snagging washer brushes. Water and dirt shall not be retained in or on anybody feature to freeze or bleed out onto the bus after leaving the washer. The body and windows shall 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 shall be sufficiently stiff to minimize vibration, drumming, or flexing while the bus is in service. When panels are lapped, the upper and forward panels shall act as a watershed. However, if entry of moisture into the interior of the vehicle is prevented by other means, then rear cap panels may be lapped otherwise. The windows, hatches and doors shall be able to be sealed. Accumulation of spray and splash generated by the bus's wheels shall be minimized. The basic bus structure shall be designed so that fatigue damage will not occur throughout the service life of the vehicle.

6.70.1 Materials

Body materials shall be selected and the body fabricated to reduce maintenance, extend durability and provide consistency of appearance throughout the service life of the bus. Detailing shall be kept simple, and add-on devices and trim shall be minimized and integrated into the basic design.

6.71 Exterior Panels and Finishes

Exterior protrusions greater than ½ in. and within 80 in. of the ground shall 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. Grilles, doors, bumpers and other features on the sides and rear of the bus shall be designed to minimize toeholds or handholds. Exterior protrusions shall not cause a line-of-sight blockage for the driver.

6.71.1 Exterior Panel Repair and Replacement

Structural elements supporting exterior body panels shall allow side body panels below the windows to be repaired in lengths not greater than 12.5 feet. Lower side body panels shall be made of impact-resistant material and shall be easily and quickly replaceable.

6.72 Roof-Mounted Equipment

A non-skid, clearly marked walkway or steps shall be incorporated on the roof to provide access to equipment without damaging any system or bus paneling.

6.73 Rain Gutters

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

6.74 License Plate Provisions

Provisions shall be made to mount standard-size U.S. license plates per SAE J686 on the front and rear of the bus. These provisions shall direct-mount or recess the license plates so that they can be cleaned by automatic bus-washing equipment without being caught by the brushes. The front and rear license plate holder shall use four inserts. The rear license plate provision shall be illuminated per SAE J587.

6.75 Wheel House Fenders/Wheel Covers

Features to minimize water spray from the bus in wet conditions shall be included in wheel housing design. Any fender skirts shall be easily replaceable. They shall be flexible if they extend beyond the allowable body width. Wheels and tires shall be removable with the fender skirts in place.

6.76 Splash Aprons

Splash aprons, composed of ¼ in. minimum composition or rubberized fabric, shall be installed behind and/or in front of wheels as needed to reduce road splash and to protect underfloor components. The splash aprons shall extend downward to within 6 in. off the road surface at static conditions. Apron widths shall be no less than tire widths. Splash aprons shall be bolted to the bus understructure. Splash aprons and their attachments shall be inherently weaker than the structure to which they are attached. The flexible portions of the splash aprons shall not be included in the road clearance measurements. Splash apron shall be installed as necessary to protect the wheelchair loading device from road splash. Other splash aprons shall be installed where necessary to protect bus equipment.

6.77 Access Doors

Conventional or pantograph hinged doors shall be used for the engine compartment and for all auxiliary equipment compartments, including doors for checking the quantity and adding to the engine coolant, engine lubricant, transmission fluid, and the windshield washer reservoir.

Access openings shall be sized for easy performance of tasks within the compartment, including tool operating space. Access doors shall be of rugged construction and shall maintain mechanical integrity and function under normal operations throughout the service life of the bus. They shall close flush with the body surface. All doors shall be hinged at the top or on the forward edge and shall be prevented from coming loose or opening during transit service or in bus washing operations.

Doors with top hinges shall have safety props stored behind the door or on the doorframe. All access doors shall be retained in the open and closed positions by props or counter balancing with over-center or gas-filled springs and shall be easily operable by one person. Springs and hinges shall be corrosion resistant.

Access doors larger than 100 sq. in. in area shall 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 shall be standardized throughout the vehicle and will require a nominal 5/16 in. square male tool to open or lock.

Latch handles shall be flush with, or recessed behind, the body contour and shall be sized to provide an adequate grip for opening. Access doors, when opened, shall not restrict access for servicing other components or systems. Access doors subject to becoming open by wind force shall be positioned such that the normal air flow influence by the bus moving in a forward direction shall bias closing the door. Engine doors shall be vented when possible to allow heat to escape.

6.78 Bumper Location

Bumpers shall 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 shall be such that when one bus is parked behind another, a portion of the bumper faces will contact each other.

6.78.1 Front Bumper

No part of the bus, including the bumper, shall 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 shall return

to its pre-impact shape within 10 minutes of the impact. The bumper shall protect the bus from damage as a result of 6.5 mph impacts at any point by the common carriage with contoured impact surface defined in Figure 2 of FMVSS 301 loaded to 4000 lbs parallel to the longitudinal centerline of the bus. It shall 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 shall be independent of every power system of the bus and shall not require service or maintenance in normal operation during the service life of the bus. The bumper may increase the overall bus length specified by no more than 7 in.

Default

Provisions for installing an exterior bike rack shall be made.

BRT Option

No Provisions for installing an exterior bike rack shall be made. An interior bike rack shall be installed.

6.78.2 Rear Bumper

No part of the bus, including the bumper, shall be damaged as a result of a 2 mph impact with a fixed, flat barrier perpendicular to the longitudinal centerline of the bus. The bumper shall return to its pre-impact shape within 10 minutes of the impact. When using a yard tug with a smooth, flat plate bumper 2 ft. wide contacting the horizontal centerline of the rear bumper, the bumper shall provide protection at speeds up to 5 mph, over pavement discontinuities up to 1 in. high, and at accelerations up to 2 mph/sec.

The rear bumper shall protect the bus when impacted anywhere along its width by the common carriage with contoured impact surface defined in Figure 2 of FMVSS 301 loaded to 4000 lbs, at 4 mph parallel to or up to a 30 deg. angle to the longitudinal centerline of the bus. The rear bumper shall be shaped to preclude unauthorized riders standing on the bumper. The bumper shall 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.

6.78.3 Bumper Material

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

6.79 Finish and Color

All exterior surfaces shall be smooth and free of wrinkles and dents. Exterior surfaces to be painted shall be properly prepared as required by the paint system Supplier prior to application of paint to 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 shall be made prior to cleaning, priming and painting, where possible, to prevent corrosion. The bus shall 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 shall 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 coatings will be tested based on OEM recommendations which will include adhesion testing, thickness tested either wet or dry mag, and orange peel threshold agreement. Undercoating will only include thickness and adhesion. All exterior finished surfaces shall be impervious to diesel fuel, gasoline and commercial cleaning agents. Finished surfaces shall resist damage by controlled applications of commonly used graffiti-removing chemicals. Except for periodic cleaning, exterior surfaces of the bus shall be maintenance-free, permanently colored, and not require refinish/repaint for the life of the bus. Durable, peel-resistant pressure sensitive appliques shall be used for any striping and coloring required.

Requirements for protection against graffiti/vandalism for body material surfaces. All screened markings shall be coated with a protective abrasion resistant film that resists damage from cleaning chemicals, graffiti, and sunlight.

Coach exteriors will be painted to the graphic design scheme that will be determined prior to manufacture. The City will supply to the Contractor graphic design drawings of the front, rear, both sides, and roof of the coaches. The color scheme shall be no more than four (4) colors plus base white and clear coat.

Appearance Zones

Zone	Description
1	Sides - From below drip rail to top of wheel wells - (Entrance/Exit doors Included) Front mask - From bottom of destination sign enclosure down to bottom of windshields Rear - From below drip rail to top of zone 2
2	Sides - From top of wheel wells to bottom of panels (access doors Included) Front - bottom of windshields to top of front bumper Rear - Bottom 15" of engine door and corner pillars
3	Roof sides - drip rail up to top of roof side Front mask - bottom of destination sign enclosure to top of mask Rear - Top 14.5" of rear crown/door
4	Top of roof panels
5	Wheel Rims and painted chassis - visible

Solids Gloss using a multi angle observer

Zone	Requirements
1	80 units +
2	80 units +
3	80 units +
4	70 units
5	N/A

Flat Black Gloss - All Int/Ext Parts using a 60° observer

Zone	Requirements
1	17units +/-4
2	17units +/-4
3	17units +/-4
4	17units +/-4
5	N/A

Solids Gloss using a multi angle observer

Zone	Requirements
1	80 units +
2	80 units +
3	80 units +
4	70 units
5	N/A

Flat Black Gloss - All Int/Ext Parts using a 60° observer

Zone	Requirements
1	17units +/-4
2	17units +/-4
3	17units +/-4
4	17units +/-4
5	N/A

Before acceptance of finished product, both interiors and exteriors of coaches shall be free of over spray, dust, dirt, and other contaminants.

6.80 Decals, Numbering, and Signing

Monograms and other special signing shall be applied to the inside and outside of the bus as required. Signs shall be durable and fade-, chip- and peel-resistant. The signs may be painted, decals, or pressure-sensitive appliqués. All decals shall be installed per the decal Supplier recommendations.

Signs shall be provided in compliance with the ADA requirements defined in 49 CFR Part 38, Subpart B, 38.27. Decals indicating on-board CNG fuel shall be affixed to the bus.

Interior decal layout shall consist of the following basic items:

- Information required by Federal, State, and Local regulations
- City bus ID numbers
- Driver and passenger information typical of the proposed bus

Exterior decal layout shall consist of the following basic items:

- Exterior graphics
- Side reflective arrows
- MAX logos and identification

- Bus ID numbers
- CNG decals

BRT Option

BRT Bus ID Numbers

Size, quantity, and location of decals for the BRT buses may differ from the fixed route buses. BRT 101 through 110 shall be applied to the inside and outside of the bus as required.

6.81 Exterior Lighting

Commercially available LED-type lamps shall be utilized at all exterior lamp locations. All exterior lighting shall conform to all State regulations and FMVSS 108. OEM headlight installation shall be provided in accordance with FMVSS 108 and Part 393, Subpart B of FMVSA as applicable.

All exterior lights shall be designed to prevent entry and accumulation of moisture or dust. Lamps, lenses and fixtures shall be interchangeable to the extent practicable. Two hazard lamps at the rear of the bus shall be visible from behind when the engine service doors are opened. Light lenses shall be designed and located to prevent damage when running the vehicle through an automatic bus washer.

All LED lamps shall be standard installation of the OEM. The entire assembly shall be specifically coated to protect the light from chemical and abrasion degradation.

LED lamps used for tail, brake, and turn signal lamps shall be a minimum of 7 in. in diameter.

6.81.1 High and Low Beam

High beam headlamps shall be halogen and low beam headlamps shall be LED. High and low beam shall be separate assemblies. Lights shall be sealed.

6.81.2 Brake and Tail Light

Two LED 7-inch diameter sealed taillights shall be mounted on each side of the engine closure door or rear end panels, so that the lights are not affected by engine heat. The (red) stop/tail lights shall be mounted directly above the (amber) directional signal lights. Two additional (red) stoplights shall be located above the engine compartment on the centerline of the bus. If stop and tail lights are not visible from the rear when the engine door is open, two amber hazard warning lights, one on each side of the engine compartment, shall be furnished. Each light shall be replaceable as an individual unit.

6.81.3 Standard Turn Signals

Turn-signal lights shall be provided at the front, rear, curb, and street sides of the bus in accordance with federal regulations.

6.81.4 Clearance Lamps

Front marker (clearance) lights along with lights located on the roof and sides of the bus shall have protective shields or be of the flush mount type to protect the lens against minor impacts.

6.81.5 Backup Light/Alarm

Visible and audible warnings shall inform following vehicles or pedestrians of reverse operation. Visible reverse operation warning shall conform to SAE Standard J593. Audible reverse operation warning shall conform to SAE Recommended Practice J994 Type C or D.

6.81.6 Doorway Lighting

Lamps at the front and rear passenger doorways (if applicable) shall comply with ADA requirements and shall activate only when the doors open. These lamps shall illuminate the street surface to a level of no less than 1 foot-candle for a distance of 3 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 shall be shielded to protect passengers' eyes from glare.

6.81.7 Service Area Lighting (Interior and Exterior)

LED lamps shall 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 shall include, but not be limited to, the engine compartment, the communication box, junction/apparatus panels and passenger door operator compartments. Lighting shall be adequate to light the space of the service areas to levels needed to complete typical emergency repairs and adjustments. The service area lamps shall be suitable for the environment in which they are mounted.

Engine compartment lamps shall be controlled by a switch mounted near the rear start controls. All other service area lamps shall be controlled by switches mounted on or convenient to the lamp assemblies. Power to the service area lighting shall be programmable. Power shall latch on with activation of the switch and shall be automatically discontinued (timed out) after 30 minutes to prevent damage caused by inadvertently leaving the service area lighting switch in the "on" position after repairs are made.

INTERIOR PANELS AND FINISHES

6.82 Interior Panels and Finishes General Requirements

Materials shall be selected on the basis of maintenance, durability, appearance, safety, flammability, and tactile qualities. Trim and attachment details shall be kept simple and unobtrusive. Materials shall be strong enough to resist everyday abuse and be vandalism and corrosion resistant. Interior trim shall 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 shall 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 shall also be resistant to this cleaning method.

Panels shall be easily replaceable and tamper resistant. They shall be reinforced, as necessary, to resist vandalism and other rigors of transit bus service. Individual trim panels and parts shall be interchangeable to the extent practicable. All interior panels are required to meet FMVSS 302. All trimmed panels should be laminated plastic with an enhanced pebble finish. Untrimmed areas shall be painted and finished.

6.83 Interior Access Panels and Doors

Access for maintenance and replacement of equipment shall be provided by panels and doors that appear to be an integral part of the interior. Access doors shall be hinged with gas props or over-center springs, where practical, to hold the doors out of the mechanic's way. Panels shall prevent entry of mechanism lubricant into the bus interior. All fasteners that retain access panels shall be captive in the cover. The number of special fastener tools required for panel and access door fasteners shall be minimized.

6.83.1 Access Doors with Locks

Access doors shall be secured with locks. The locks shall be standardized so that only one tool is required to open access doors on the bus. Access doors shall be equipped with locks requiring one nominal 5/16 in. square end tool to open. Locking devices shall lock clockwise and unlock counter clockwise.

6.83.2 Floor Panels

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

6.84 Operator Area Barrier

A barrier or bulkhead between the driver and the street-side front passenger seat shall be provided. The barrier shall minimize glare and reflections in the windshield directly in front of the barrier from interior lighting during night operation.

Operator area barrier shall extend from floor to ceiling and from the bus wall to the first stanchion immediately behind the Operator to provide security to the Operator and prevent passengers from reaching the driver or driver's personal effects.

Location and shape must permit full seat travel and reclining possibilities that can accommodate the shoulders of a 95th-percentile male. The partition shall 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 (1.2kg), microcomputer, public address amplifier, etc. The panel should be properly attached to minimize noise and rattles.

6.85 Modesty Panels

Sturdy divider panels constructed of durable, unpainted, corrosion-resistant material complementing the interior shall be provided to act as both a physical and visual barrier for seated passengers. Modest panels shall be immune to vandalism or be of a design incorporating inexpensive/easily replaceable sacrificial panels, firms, etc.

Modesty panels shall be located, when applicable, front and rear sections of doorways to protect passengers on adjacent seats, and along front edge of rear upper level. Modesty panels shall extend no higher than the lower window opening of the side window and shall project toward the aisle no further than passenger knee projection in longitudinal seats or the aisle side of the transverse seats.

Modesty panels forward of transverse seats shall extend downward to 1 and 1½ in. above the floor. Dividers positioned at the doorways, where applicable, shall 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. Design and installation of approved modesty panels located in front of forward-facing seats shall include a handhold or grab handle along its top edge. Modest panels installed at doorways shall be equipped with grab rails. The modesty panel and its mounting shall withstand a static force of 250 lbs applied to a 4 × 4 in. area in the center of the panel without permanent visible deformation. The City reserves the right of selecting from any of the listed materials.

6.85.1 Front End

The entire front end of the bus shall 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 shall 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 shall be formed metal or composite material. Composite dash panels shall be reinforced as necessary, vandal-resistant and replaceable. All colored, painted, and plated parts forward of the operator's barrier shall be finished to reduce glare.

6.85.2 Rear Bulkhead

The rear bulkhead and rear interior surfaces shall 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 shall 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 shall be louvered to reduce airflow noise and to reduce the probability of trash or liter 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 shall be hinged or shall be able to be easily removed and replaced. Grilles where access to or adjustment of equipment is required shall be heavy duty and designed to minimize damage and limit unauthorized access.

6.85.3 Headlining

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

6.85.4 Interior Panel Fastening

Interior panels shall be attached so that there are no exposed unfinished or rough edges or rough surfaces. Fasteners should be corrosion resistant. Panels and fasteners shall not be easily removable by passengers. Exposed interior fasteners should be minimized, and where required shall be tamper resistant.

6.86 Insulation

Any insulation material used between the inner and outer panels shall be physically retained and be sealed or self-sealing to minimize entry or retention of moisture. Insulation properties shall be unimpaired during the service life of the bus. Any insulation material used inside the engine compartment shall not absorb or retain oils or water and shall be designed to prevent casual damage that may occur during maintenance operations. Insulation shall meet the requirements of FMVSS 302.

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, shall provide a thermal insulation sufficient to meet the interior temperature requirements. The bus body shall be thoroughly sealed so that the driver or passengers cannot feel drafts during normal operations with the passenger doors closed.

6.87 Floor Covering

The floor covering shall have a non-skid walking surface that remains effective in all weather conditions and complies with all ADA requirements. The floor covering, as well as transitions of flooring material to the main floor and to the entrance and exit area, shall be smooth and present no tripping hazards. Seams shall be sealed/welded per manufacturer's specifications. The standee line shall be approximately 2 in. wide and shall extend across the bus aisle. The color and pattern shall be consistent throughout the floor covering.

Any areas on the floor that are not intended for standees, such as areas "swept" during passenger door operation, shall be clearly and permanently marked. The floor shall be easily cleaned and shall be arranged to minimize debris accumulation. A one-piece center strip shall 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 shall 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 shall extend from the center strip to the outboard edge of the rear/exit area.

The floor under the seats and wheelchair locations shall be covered with smooth surface antiskid flooring material. The center strip shall be ribbed. The floor covering shall closely fit the sidewall cove or extend to the top of the cove.

6.88 Passenger Interior Lighting

The light source shall 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 lighting system shall interface with vehicle multiplex control system through J1939 gateway with serial data input or discrete inputs.

Interior lights shall be LED lights. The lens material shall be translucent polycarbonate. Lenses shall be designed to effectively "mask" the light source. Lenses shall be sealed to inhibit incursion of dust and insects yet be easily removable for service. Access panels shall be provided to allow servicing of components located behind light panels. If necessary, the entire light fixture shall be hinged. The interior lighting design shall require the approval of the City.

The front entrance area and curb lights shall illuminate when the front door is open and master run switch is in the "lights" positions. Rear exit area and curb lights shall illuminate when rear door is unlocked.

6.88.1 Seating Areas

The interior lighting system shall provide a minimum 15 foot-candle illumination on a 1 sq ft plane at an angle of 45 degrees 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 shall be 7 foot-candles.

6.88.2 Vestibules/Doors

Floor surface in the aisles shall 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.

6.88.3 Step and Ramp Lighting

Step and ramp lighting for the intermediate steps between lower and upper floor levels shall be a minimum of 4 foot-candles and shall illuminate in all engine run positions. The step lighting shall be low profile to minimize tripping and snagging hazards for passengers and shall be shielded as necessary to protect passengers' eyes from glare. Exterior and interior step and ramp lighting shall comply with federal regulations.

6.88.4 Farebox Lighting

A light fixture shall be mounted in the ceiling above the farebox location. 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.

6.89 Fare Collection

Space and structural provisions shall be made for installation of currently available fare collection devices, which shall be as far forward as practicable. Location of the fare collection device shall not restrict traffic in the vestibule, including wheelchairs if a front door loading device is used, and shall allow the driver to easily reach the farebox controls and to view the fare register. The farebox shall not restrict access to the driver area, shall not restrict operation of driver controls and shall 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 shall allow use, without restriction, by passengers. The farebox location shall permit accessibility to the vault for easy manual removal or attachment of suction devices. Meters and counters on the farebox shall be readable on a daily basis. The floor under the farebox shall be reinforced as necessary to provide a sturdy mounting platform and to prevent shaking of the farebox. A 1-inch inside diameter

waterproof conduit shall be provided from the ITS enclosure to the farebox mounting location, through the bus floor, and shall contain a power cable for 24 volts, 20 amp circuit with circuit protection. This power circuit shall include a grounded lead.

Default

Farebox placement should minimize impact to passenger access and minimize interference with the driver's line of sight. If the driver's platform is higher than 12 inches, then the farebox is to be mounted on a platform of suitable height to provide accessibility for the driver without compromising passenger's access. Farebox shall be Genfare Fast Fare, or approved equal.

BRT Option

Fare purchasing will occur off-board. Provisions for a fare validator at all doors shall be provided. Fare validator shall be Genfare Fast Fare, or approved equal.

Fare collection and validation equipment shall be provided and installed by the Contractor. Contractor shall provide fare collection installation layout to the City for approval.

PASSENGER ACCOMMODATIONS

6.90 Passenger Seating Arrangements

The passenger seating arrangement in the bus shall be such that seating capacity is maximized and in compliance to the following requirements. Final seating arrangement shall be approved by the City.

Default

Combination Forward-Facing and Perimeter Seating Arrangement

Passenger seats shall be arranged in a transverse, two-position forward-facing configuration at the front section of the bus, and in longitudinal rows facing the centerline of the bus with one row of transverse, forward-facing seats provided at the rear of the bus. Each seat shall have a minimum width of 17 in., not including any armrest.

BRT Option

Interior Bike Rack

The seating arrangement shall be coordinated with the installation of two interior bike racks. Provisions shall be made for two interior bike loading positions. The City shall approve the final seating configuration with the interior bike racks during the Pre-Production Meeting. Contractor shall coordinate with the vendor on the installation of these bike racks. Interior bike racks shall be Sportworks Spinlock Interior Rack, or approved equal.

6.90.1 Seat style

No requirement for drain hole in seats.

Default

Non-Padded Inserts – un-upholstered

The passenger seats shall be equipped with un-upholstered inserts throughout the bus.

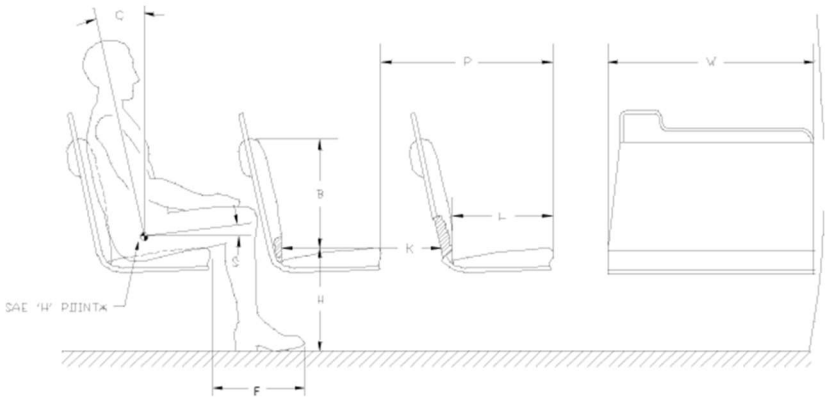
BRT Option

Padded Inserts

The passenger seat shall be equipped with padded inserts throughout the bus.

6.90.2 Dimensions

FIGURE 6
Seating Dimensions and Standard Configuration



Seat dimensions for the various seating arrangements shall have the dimensions as follows (refer to **Figure 6**):

- The width, W, of the two-passenger transverse seat shall be a minimum 35 in.
- The length, L, shall be 17 in., ±1 in.
- The seat back height, B, shall be a minimum of 15 in.
- The seat height, H, shall 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 shall also be allowed for limited transverse seats, but only with the expressed approval of the City.
- Foot room = F.
- The seat cushion slope, S, shall be between 5 and 11 deg.
- The seat back slope, C, shall be between 8 and 17 deg.
- Hip to knee room = K.
- The pitch, P, is shown as reference only.

6.90.2.1 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, shall be a minimum of 26 in. At all seating positions in paired transverse seats immediately behind other seating positions, hip-to-knee room shall be no less than 27 in.

6.90.2.2 Foot Room

Foot room, measured at the floor forward from a point vertically below the front of the seat cushion, shall be no less than 14 in. Seats immediately behind the wheel housings and modesty panels may have foot room reduced.

6.90.2.3 Aisles

The aisle between the seats shall be no less than 20 in. wide at seated passenger hip height. Seat backs shall be shaped to increase this dimension to no less than 24 in. at 32 in. above the floor (standing passenger hip height).

6.90.3 Structure and Design

The passenger seat frame and its supporting structure shall 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 shall 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 shall 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 shall 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 shall peak at 0.05 to 0.015 seconds from initiation. Permanent deformation of the seat resulting from two 95th-percentile males striking the seat back during this 10g deceleration shall not exceed 2 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 shall not introduce a laceration hazard.

The seat assembly shall withstand static vertical forces of 500 lbs applied to the top of the seat cushion in each seating position with less than ¼in. permanent deformation in the seat or its mountings. The seat assembly shall withstand static horizontal forces of 500 lbs evenly distributed along the top of the seat back with less than ¼in. permanent deformation in the seat or its mountings. The seat backs at the aisle position and at the window position shall withstand repeated impacts of two 40-lb sandbags without visible deterioration. One sandbag shall strike the front 40,000 times and the other sandbag shall strike the rear 40,000 times. Each sandbag shall be suspended on a 36 in. pendulum and shall strike the seat back 10,000 times each from distances of 6, 8, 10 and 12 in. Seats at both seating positions shall withstand 4000 vertical drops of a 40-lb sandbag without visible deterioration. The sandbag shall be dropped 1000 times each from heights of 6, 8, 10 and 12 in. Seat cushions shall 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 shall incorporate a handhold no less than ⅞ in. in diameter for standees and seat access/egress. The handhold shall not be a safety hazard during severe decelerations. The handhold

shall extend above the seat back near the aisle so that standees shall have a convenient vertical assist, no less than 4 in. long that may be grasped with the full hand. This handhold shall not cause a standee using this assist to interfere with a seated 50th-percentile male passenger. The handhold shall also be usable by a 5th-percentile female, as well as by larger passengers, to assist with seat access/egress for either transverse seating position. The upper rear portion of the seat back and the seat back handhold immediately forward of transverse seats shall be padded and/or constructed of energy-absorbing materials. During a 10g deceleration of the bus, the HIC number (as defined by SAE Standard J211a) shall not exceed 400 for passengers ranging in size from a 5th percentile female through a 95th-percentile male.

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 shall be the same general design as transverse seats but without seat back handholds. Longitudinal seats may be mounted on the wheelhouses. Armrests shall be included on the ends of each set of longitudinal seats except on the forward end of a seat set that is immediately to the rear of a transverse seat, the 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 shall be located from 7 to 9 in. above the seat cushion surface. The area between the armrest and the seat cushion shall be closed by a barrier or panel. The top and sides of the armrests shall have a minimum width of 1 in. and shall be free from sharp protrusions that form a safety hazard.

Seat back handhold and armrests shall 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 shall 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.

6.90.4 Construction and Materials

Selected materials shall minimize damage from vandalism and shall reduce cleaning time. The seats shall be attached to the frame with tamper-resistant fasteners. Coloring shall be consistent throughout the seat material, with no visually exposed portion painted. Any exposed metal touching the sides or the floor of the bus shall be stainless steel. The seat, pads and cushions shall be contoured for individuality, lateral support and maximum comfort and shall 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 shall be a nominal ¼ inch. The seat back and seat back handhold immediately forward of transverse seats shall 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 shall be interchangeable to the extent practicable.

6.91 Passenger Assists

Passenger assists in the form of full grip, vertical stanchions or handholds shall be provided for the safety of standees and for ingress/egress. Passenger assists shall be convenient in location, shape and size for both the 95th-percentile male and the 5th-percentile female standee. Starting from the entrance door and moving

anywhere in the bus and out the exit door, a vertical assist shall be provided either as the vertical portion of 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 and at interior steps for bi-level designs shall be powder-coated in a high-contrast yellow color.

Excluding those mounted on the seats and doors, the assists shall have a cross-sectional diameter between 1¼ and 1½ inches or shall provide an equivalent gripping surface with no corner radii less than ¼ in. All passenger assists shall permit a full hand grip with no less than 1½ in. of knuckle clearance around the assist. Passenger assists shall be designed to minimize catching or snagging of clothes or personal items and shall be capable of passing the NHTSA Drawstring Test.

Any joints in the assist structure shall 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 shall be of anodized aluminum, stainless steel or powder-coated metal. Connecting tees and angles may be powder-coated metal castings. Assists shall withstand a force of 300 lbs applied over a 12in. lineal dimension in any direction normal to the assist without permanent visible deformation. All passenger assist components, including brackets, clamps, screw heads and other fasteners used on the passenger assists shall be designed to eliminate pinching, snagging and cutting hazards and shall be free from burrs or rough edges.

6.91.1 Front Doorway

Front doors, or the entry area, shall be fitted with ADA-compliant assists. Assists shall be as far outward as practicable, but shall be located no farther inboard than 6 in. from the outside edge of the entrance step and shall be easily grasped by a 5th-percentile female boarding from street level. Door assists shall be functionally continuous with the horizontal front passenger assist and the vertical assist and the assists on the wheel housing or on the front modesty panel.

6.91.2 Vestibule

The aisle side of the driver's barrier, the wheel housings and when applicable the modesty panels shall be fitted with vertical passenger assists that are functionally continuous with the overhead assist and that extend to within 36 in. of the floor. These assists shall have sufficient clearance from the barrier to prevent inadvertent wedging of a passenger's arm.

The forward-most vertical stanchions on either side of the aisle immediately behind the driver's area shall be powder-coated black. Vertical stanchions in the front near the entrance door and vicinity of the exit door shall be powder-coated yellow.

A horizontal passenger assist shall be located across the front of the bus and shall prevent passengers from sustaining injuries on the fare collection device or windshield in the event of a sudden deceleration. Without restricting the vestibule space, the assist shall provide support for a boarding passenger from the front door through the fare collection procedure. The assist shall be no less than 36 in. above the floor. The assists at the front of the bus shall be arranged to permit a 5th-percentile female passenger to easily reach from the door assist, to the front assist, to vertical assists on the driver's barrier, wheel housings or front modesty panel.

6.91.3 Rear Doorway

Vertical assists that are functionally continuous with the overhead assist shall be provided at the aisle side of the transverse seat immediately forward of the rear door and on the aisle side of the rear door modesty panel(s). Passenger assists shall be provided on modesty panels that are functionally continuous with the rear door assists. Rear doors, or the exit area, shall be fitted with assists 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 shall provide at least 1½ in. of knuckle clearance between the assists and their mounting. The assists shall be designed to permit a 5th-percentile female to easily move from one assist to another during the entire exiting process. The assists shall be located no farther inboard than 6 in. from the outside edge of the rear doorway step.

6.91.4 Overhead

Except forward of the standee line and at the rear door, a continuous, full-grip, overhead assist shall be provided. This assist shall be located over the center of the aisle seating position of the transverse seats. The assist shall be no less than 70 in. above the floor.

Six (6) flexible nylon straps shall be appropriately located for handholds where vertical assists are not available for use by passengers that cannot reach to 70 in.

Overhead assists shall simultaneously support 150 lbs on any 12in. length. No more than 5 percent of the full grip feature shall be lost due to assist supports.

6.91.5 Longitudinal Seat Assists

Longitudinal seats shall have vertical assists located between every other designated seating position, except for seats that fold/flip up to accommodate wheelchair securement. Assists shall extend from near the leading edge of the seat and shall be functionally continuous with the overhead assist. Assists shall be staggered across the aisle from each other where practicable and shall be no more than 52 in. apart or functionally continuous for a 5th percentile female passenger.

6.91.6 Wheel Housing Barriers/Assists

Unless passenger seating is provided on top of wheel housings, passenger assists shall be mounted around the exposed sides of the wheel housings (and propulsion compartments if applicable), which shall also be designed to prevent passengers from sitting on wheel housings. Such passenger assists shall also effectively retain items, such as bags and luggage, placed on top of wheel housings.

6.92 Passenger Doors

Doorways will be provided in the locations and styles as follows. Passenger doors and doorways shall comply with ADA requirements.

Front “curbside” door shall be forward of the front wheels and under direct observation of the driver.

Two rear doors on the curb-side of the bus and 2 rear doors on the street-side will be required for a total of five (5) doors.

If air-powered, the door system shall operate per specification at air pressures between 90 and 130 psi.

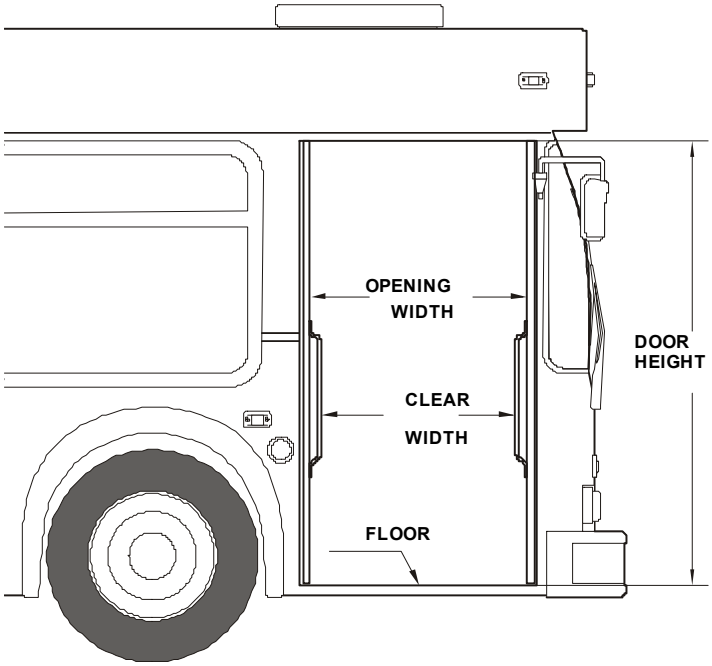
6.92.1 Materials and Construction

Structure of the doors, their attachments, inside and outside trim panels and any mechanism exposed to the elements shall be corrosion resistant. Door panel construction shall be of corrosion-resistant metal or reinforced non-metallic composite materials. When fully opened, the doors shall provide a firm support and shall not be damaged if used as an assist by passengers during ingress or egress. Door edges shall 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 shall have no less than 2 in. of soft weather stripping. The doors, when closed, shall be effectively sealed, and the hard surfaces of the doors shall be at least 4 in. apart (not applicable to single doors).The combined weather seal and window glazing elements of the front door shall not exceed 10 deg. of binocular obstruction of the driver's view through the closed door.

6.92.2 Dimensions

FIGURE 7
Transit Bus Minimum Door Opening



When open, the doors shall leave an opening no less than 75 in. in height.

Default

31. ¾ Minimum Doorway Clear Width

Front door clear width shall be a minimum of 31¾ in. with the doors fully opened. Rear door opening clear width shall be a minimum of 24 in. with the doors fully opened. If arear door ramp or lift is provided, then the clear door opening width shall be a minimum of 31¾ in. with door fully opened.

BRT Option

Wide doors for BRT application is preferred. The mechanism for opening and closing front and rear curbside doors shall not interfere with a 14-inch platform, level with the floor of the bus. Final door selection shall be recommended by the Contractor and approved by the City.

If the City requires a minimum rear door clear width of 31¾ in. or greater and an outward opening (swing) door is specified, then the maximum outboard excursion of 13 in. may be exceeded.

6.92.3 Door Glazing

The upper section of both front and rear doors shall be glazed for no less than 45 percent of the respective door opening area of each section. The lower section of the front door shall be glazed for no less than 25 percent of the door opening area of the section.

Door glazing shall be easily replaceable.

The front door panel glazing material shall have a nominal ¼ in. thick tempered glass conforming with the requirements of ANSI Z26.1 Test Grouping 2 and the recommended practices defined in SAE J673.

Glazing material in the rear doorway door panels shall be the same material, thickness, and color as the side windows.

6.92.4 Door Projection

The exterior projection of the front doors beyond the side of the bus shall be minimized and shall not block the line of sight of the rear exit door via the curb side mirror when the doors are fully open. The exterior projection of both doors shall be minimized and shall not interfere with a 14-inch platform during the opening or closing cycles or when doors are fully opened.

Projection inside the bus shall not cause an obstruction of the rear door mirror or cause a hazard for standees.

6.92.5 Door Height Above Pavement

It shall 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 a 14 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.

6.92.6 Closing Force

Closing door edge speed shall not exceed 19 in. per second. Power close rear doors shall be equipped with a sensitive edge or other obstruction sensing system such that if an obstruction is struck by a closing door edge, the doors will stop or reverse direction or both prior to imparting a 10-pound force on 1 square inch of that obstruction. Whether or not the obstruction sensing system is present or functional, it shall be possible to withdraw a 1 ½ inch diameter cylinder from between the center edges of a closed and locked door with an outward force not greater than 35 pounds.

6.92.7 Door Actuators

Doors shall open or close completely in not more than 3.5 seconds from the time of control actuation and shall be subject to the closing force requirements.

Door actuators shall 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 shall be concealed from passengers but shall be easily accessible for servicing. The door actuators shall be rebuildable. If powered by compressed air, exhaust from the door system shall be routed below the floor of the bus to prevent accumulation of any oil that may be present in the air system and to muffle sound.

6.92.8 Emergency Operation

In the event of an emergency, it shall 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 shall be clearly marked as an emergency-only device and shall require two distinct actions to actuate. The respective door emergency unlocking device shall be accessible from the doorway area. The unlocking device shall 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” shall meet the requirements of FMVSS 217.

Locked doors shall require a force of more than 100 lbs to open manually. When the locked doors are manually forced to open, damage shall be limited to the bending of minor door linkage with no resulting damage to the doors, actuators, or complex mechanism. An alarm should sound if sensitive edge is engaged.

6.92.9 Door Control

The door control shall be located in the operator’s area within the hand reach envelope described in SAE Recommended Practice J287, “Driver Hand Control Reach.” Door control located on street side.

Provisions shall be made for operating the front door and curbside rear doors independently while providing positive tactile feedback to the operator identifying the door control selection and resist inadvertent door actuation.

Door actuators shall also be designed in order that rear doors on both sides of the vehicle cannot both operate simultaneously.

Proposer shall identify items in Table 7 affected by the change to a 5-door design.

6.92.10 Operator-Controlled Front and Rear Doors

Operation of, and power to, the passenger doors shall be completely controlled by the operator. Although the exit door is driver controlled at the side console, an acoustic sensing system is required to detect obstructions on door closing. A green light shall illuminate above the exit door indicating when the driver has authorized its use.

A control or valve in the operator's compartment shall 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 shall close the rear/center doors (if applicable), deactivate the door control system, release the interlocks and permit only manual operation of the rear/center doors.

6.93 Accessibility Provisions

Space and body structural provisions shall be provided at the front or rear door of the bus to accommodate a wheelchair loading system.

6.93.1 Loading System

An automatically controlled, power-operated ramp system compliant to requirements defined in 49 CFR Part 38, Subpart B, §38.23c shall provide ingress and egress quickly, safely and comfortably, both in forward and rearward directions, for a passenger in a wheelchair from a level street or curb.

Default

Front Door Location of Loading System, Flip-Out Design Ramp with 7:1 Slope
The wheelchair loading system shall be located at the front door, with the ramp being of a simple hinged, flip-out type design being capable of deploying to the ground at a maximum 7:1 slope with a minimum ramp width of 32".

Alternative

Bridge plates shall be incorporated at doors on both sides of the bus. The bridge plates, if used shall bridge the gap between the station platform and the main floor of the bus. Proposer shall offer alternatives for locations and types of bridge plates.

Alternative

The first bridge plate on the street-side of the bus shall also be ADA compliant and allow passengers with mobility devices ADA compliant access to the bus when boarding from a street-side station with 14" platform height.

6.93.2 Wheelchair Accommodations

Two wheelchair parking spaces and securement systems shall be provided, per applicable ADA regulations. City will approve acceptable securement system.

Default

Two Wheelchair Securement Locations

At least one forward-facing locations, as close to the wheelchair loading system as practical, shall provide parking space and securement system compliant with ADA requirements for a passenger in a wheelchair.

BRT Option

Fully Automatic Wheelchair Securement Device

One wheelchair securement system shall be fully automatic and allow passengers in a wheelchair to secure themselves without requiring driver assistance. Sufficient space shall be provided to accommodate wheelchair maneuvering into the wheelchair securement device. The automatic wheelchair securement device shall be a Q'Straint Quantum system or approved equal.

6.93.3 Interior Circulation

Maneuvering room inside the bus shall accommodate easy travel for a passenger in a wheelchair from the loading device and from the designated securement area. It shall 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. shall be maintained. As a guide, no width dimension should be less than 34 in. Areas requiring 90 deg. turns of wheelchairs should have a clearance arc dimension no less than 45 in., and in the parking area where 180 deg. 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.

SIGNAGE AND COMMUNICATION

6.94 Destination Signs

A destination sign system shall be furnished on the front and on the curbside of the bus near the front door. A rear route number sign shall be located a minimum of 90 in. above ground on the curb side rear corner of the bus. The sign located near the front door shall not block the driver's critical horizontal line of sight. Display areas of destination signs shall be clearly visible in direct sunlight and/or at night. Parts shall be commercially available.

All signs shall be controlled via a single human-machine interface (HMI). In the absence of a single mobile data terminal (MDT), the HMI shall be conveniently located for the bus driver within reach of the seated driver. The HMI for the destination signs shall be located to the upper left of the driver.

The destination sign compartments shall meet the following minimum requirements:

- Compartments shall be designed to prevent condensation and entry of moisture and dirt.
- Compartments shall be designed to prevent fogging of both compartment window and glazing on the unit itself.
- Access shall be provided to allow cleaning of inside compartment window and unit glazing.
- The front window shall have an exterior display area of no less than 8.5 in. high by 56 in. wide.

6.95 Passenger Information and Advertising

Provisions shall 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, shall be retained near the juncture of the bus ceiling and sidewall. The retainers may be concave and shall support the media without adhesives. The media shall be illuminated by the interior light system.

6.96 Passenger Stop Request and Signal

A passenger "stop requested" signal system that complies with applicable ADA requirements defined in 49 CFR, Part 38.37, shall be provided. The system shall consist of a pull chord, chime, and interior sign message. The pull chord shall be accessible to all seated passengers, with provisions for standees. It shall be easily accessible to all passengers, seated or standing. Touch tape or equivalent shall be provided at adjacent to each wheelchair parking position and priority seating positions.

An Additional heavy-duty "stop request" signal button shall be installed on the modesty panel stanchion immediately forward of the rear door and clearly identified as "STOP."

A single "stop request" chime shall sound when the system is first activated. A double chime shall sound anytime the system is activated from wheelchair passenger areas.

Exit signals located in the wheelchair passenger area shall be no higher than 4 ft. above the floor. Instructions shall be provided to clearly indicate function and operation of these signals.

6.97 Public Address System

A public-address system shall be provided on each bus for facilitating radio system and driver-originated announcements to passengers. The public-address system shall include an advanced technology system that can reduce background noise. It shall provide a highly sensitive unidirectional microphone element. The system shall be muted when not in use. The microphone shall 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 hands. A provision shall be provided to secure the microphone in a stored position when not in use.

Twelve (12) interior loudspeakers shall 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 shall be 8 Ohms. Mounting shall be accomplished with riv-nuts and machine screws. One exterior loudspeaker shall be provided over the top of the front door.

6.98 Radio Handset and Control System

Each bus shall have a recessed speaker in the ceiling panel above the driver. This speaker shall be the same component used for the speakers in the passenger compartment. It shall have 8 Ohms of impedance.

Contractor will install a handset for driver use.

Contractor shall install a driver display unit as close to the driver's instrument panel as possible.

6.99 Emergency Alarm

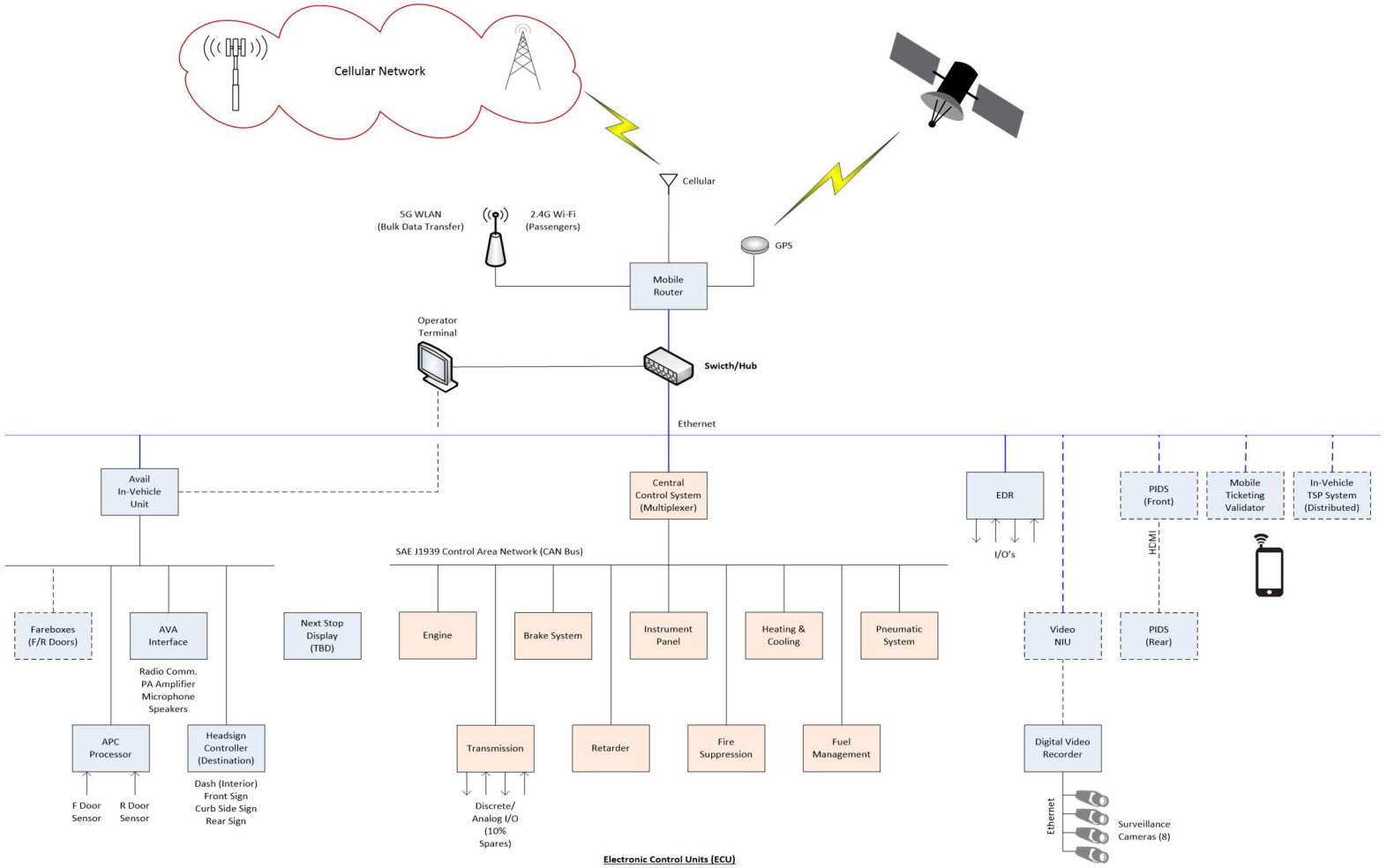
Contractor shall install an emergency alarm that is accessible to the driver but hidden from view.

SYSTEMS AND TECHNOLOGY

6.100 Integrated Technologies

The BRT vehicles shall be equipped with the latest systems and technology available for modern transit systems. The technology shall be an integration of advanced communications technologies into the vehicles that improve safety and operational efficiencies and enhance customer convenience. The architecture of the technology is provided in **Figure 8**. The diagram is provided as an illustration only to depict what the City requires as the technology landscape for the BRT system.

Figure 8
BRT Bus Technology Systems Architecture



6.100.1 Event Data Recorders (EDR)

The contractor shall install and EDR, I/O Corporation, Model G3-MFD, Tacholink Event Data Recorder or approved equal. The EDR shall function independently from the Automated Transportation Management System (ATMS) and Master Display Terminal (MDT) systems. The entire EDR system shall be capable of monitoring the J1939 network for various vehicle codes and conditions and generate metrics for drivers, buses, and bus fleets via browser based software. The EDR shall be capable of monitoring the following functions:

Vehicle Activity

- Date and time
- Ignition status codes
- Vehicle speed codes
- Engine RPM

Diagnostics/Troubleshooting

- Video camera inputs
- Engine diagnostic and fault codes
- Transmission Diagnostic and Fault Codes
- Power traction unit diagnostics

6.100.2 Camera Surveillance System

An Apollo Road Runner HD (High Definition) Mobile Recording System, or approved equal, with twelve (12) cameras, shall be installed. Location of cameras will be determined by the City.

Provide all equipment, materials, labor, and installation for a complete HD (High Definition) camera surveillance system on each bus. The HD digital video recording (DVR) system must be a mobile-based digital recording system that supports up to eight (12) HD color cameras and stores digital images on a compact vehicle mounted digital video recorder. The system components shall be located in a secure location in the electronics/equipment compartment.

Designed for heavy-duty automotive use, as well as be enclosed in a tamper-proof housing. The unit shall function within the normal operating characteristics of a coach or transit vehicle.

The camera surveillance shall consist of the following capabilities:

A. Recorder:

- The system shall be provided in compatible and interchangeable formats that support simultaneous recording of up to four (4), eight (8), twelve (12), or up to sixteen (16) high definition cameras and an equal number of microphones (up to four (4), eight (8), twelve (12), or up to sixteen (16).
- The system shall support two additional audio channels capable of synchronizing to user-selectable cameras.

- The Recorder shall support up to four (4), eight (8), twelve (12) or sixteen (16) standard HD cameras inputs with optional video encoder(s).
- The Recorder shall provide PoE (Power over Ethernet) to high definition cameras directly with no additional hardware required.
- The system shall be capable of recording all cameras at the highest resolution and quality at a minimum of 30 images per second per camera.
- The Recorder shall be ruggedized and secure with lockable recording media without the need for an additional enclosure.
- The system shall include a driver event switch that features a system status "heartbeat" style health indicator to provide visual confirmation that the system is operating properly.
- The system shall be capable of simultaneous recording, playback and remote access allowing multiple users to review video without interruption of recording.
- The system shall save the serial number of the hard disk drive to the system log in order to record and track the replacement of the recording media.
- The system shall record onto a removable hard disk drive up to 8.0TB.
- All storage shall be removable. Systems that move data between multiple storage devices shall not be acceptable.
- Fully redundant removable RAID data packs shall be provided as an option. Redundant recording shall duplicate storage completely and shall include all cameras and entire storage duration.
- The system shall record onto a removable hard disk drive equipped with a key lock to prevent tampering, and shall be 'swappable' for use in any same model Recorder, regardless of the number of cameras supported.
- The system shall be capable of maintaining one (1) month of recorded high definition video at a rate of 30 images per second on every camera simultaneously on a single on-board drive.
- The system shall be made entirely of new materials and shall be engineered and constructed with rugged materials to protect the system from environmental elements including shock, dust and humidity.
- The Recorder shall be Mil-Spec Rated: STD-810F and SAE Rated: J1455 for vibration and shock and include a shock absorbing mounting kit.
- The system shall be capable of configuring video quality, resolution and recording speed individually for each camera.
- The Recorder shall record video in user adjustable resolution setting of F-HD (1920x1080), HD 1280x720), W-D1 (864x480), QHD (640x360) or W-CIF (432x240).
- The system shall not require defragmentation, maintenance or any other housekeeping operations that may interrupt recording when the vehicle ignition is powered on.
- All recorded data shall be immediately available on the removable storage media; the system shall not require a waiting period or completion of any processes prior to obtaining access.
- The recorder shall feature an eSATA port for virtually unlimited onboard storage options.
- The system shall include an optional built-in heater for operating in temperatures as low as -20°F. Systems that require an additional enclosure to comply with this requirement are not acceptable.
- The system shall have an optional hard disk player and software to allow for transferring of files directly from the HDD to a PC, where the images can be printed, emailed or saved onto another storage media.
- The system shall feature a built-in 3-axis accelerometer capable of tagging video or sending alarm notification when the vehicle exceeds a pre-determined G-force setting.

- The system shall be FCC approved and shall be powered by 12 or 24 VDC vehicle power supply connected by 12 gauge wires and protected from spikes, surges and reverse polarity operating between 9 and 36 VDC.
- The Recorder shall meet the requirements of ISO 7637-2 "Electrical disturbances from conduction and coupling". The Recorder shall provide regulated 12-volt power for all peripherals (up to 40 watts).
- The Recorder shall have the option to remain operating for a pre-determined length of time after the vehicle power is terminated, up to twenty-four hours.
- The system shall feature pre-event recording that allows the system to record up to five (5) minutes of video prior to system activation (manually, motion activation, etc.).
- The system shall be capable of streaming live video to first responders through cellular or wireless LAN options.
- The system shall feature a built-in GPS receiver.
- The system shall be equipped with a minimum of two (2) USB ports to allow for exporting video clips using CDRW, HDD or USB flash memory.
- The Recorder shall include a functional Gigabit Ethernet port for system configuration and transmission of video using software over 802.11, LAN/WAN or cellular networks.
- The Recorder shall feature H.264 "Main Profile" video compression for superior video quality, network performance and recording duration. "Constrained Baseline Profile" or "Baseline Profile" type H.264 is not acceptable.
- The system shall be capable of on-board viewing, downloading and control via laptop using the included software.
- The Recorder dimensions shall not exceed: 11.2" x 3.9" x 13.9" (WxHxD).
- The Recorder shall be compatible with a facility-based Recorder system and allow for software interoperability between vehicle and facility recording systems.
- Onboard system components shall be removable / replaceable as an entire component to minimize vehicle down times and simplify maintenance.
- Proposers shall explain how IP cameras are set-up and configured for use during initial set up and for field replacement and/or adding additional cameras if needed at a later time.
- Video quality recorded at the maximum recording quality and rate while maintaining on-board video on a single hard disk drive for 30 days, utilizing the hard disk drive specified in the base bid of this proposal.

B. Software / Firmware:

- License-free software that is capable of live viewing, playback, calendar and event searches, and administration shall be provided at no extra cost, and shall be compatible with Windows® 7, Windows® 8, and/or Windows® 10.
- All future software updates for license-free software shall be included free of charge.
- The software shall provide various levels of user access rights that allow and restrict access to various functions. The software shall feature 256 user passwords and 64 user groups.
- When equipped with GPS, the system shall provide historical and live software mapping display routes of the vehicle location and speed charts.
- When equipped with GPS, the system software shall be capable of connecting to pre-recorded video by selecting a point on the map or selecting a point on the speed chart to view from that speed or location.

- To retrieve recorded video, the software shall provide searches by: event, time lapse, time and date, vehicle location and vehicle speed. Optional software shall allow for easy fleet-wide searches and wireless download of video based solely upon the date and a general map location.
- The software shall display the current time and date on the video.
- When events are detected, the unit shall display the event information and allow users to access the remote site directly to search the image associated with the event.
- The included software shall allow the user to connect to multiple units simultaneously and allow for viewing a minimum of 64 camera views at one time. Optional management software shall feature secure, instant live access to simultaneously provide live viewing to multiple parties with no reduction in video quality or additional use of wireless bandwidth.
- The system shall feature optional software for automated event video upload to a central server repository.
- The system shall include optional software with advanced backend capabilities for automatic download of video clips and the ability to classify event video data.
- The system shall feature optional software for large-scale remote viewing and admin functions for up to 256 simultaneous users and for viewing up to hundreds of camera views at one time.
- The software shall allow for automated software upgrades and simultaneous updates to multiple sites.
- Image adjustments, PTZ control and alarm out controls shall be administered utilizing the software.
- The software shall be capable of synchronizing the time of all Recorder systems utilizing a “master Recorder” or to GPS time (if applicable). Daylight savings adjustments shall be automatic.
- Software settings shall allow the system (when networked) to send email notification for any system event including video loss, camera obstruction, hard drive “full status”, etc. Optional software shall supply health information of the video system with error logs, reports and automatic notification for: video blind events, video loss events, disk errors, disk temperature events, fan errors, recorder errors, disk almost full and disk S.M.A.R.T (Self-monitoring, analysis and reporting technology) events.
- Software settings shall allow the system to send notification to the vehicle driver or external systems for any system event including video loss, camera obstruction, hard drive “full status”, etc. When networked, the system shall be capable of sending notification to a central location. Optional management software shall support fleet-wide email notification of system events as well as a fleet—wide health summary featuring camera and Recorder health reports.
- Options for archiving/retrieving video shall include: Saving a video clip as a Windows Media Player (.avi) file, saving as an image (.bmp), or saving video as a self-executable format (.exe).
- Video clips saved using the self-executable format (.exe) shall be encrypted and should be viewed without the use of any software, providing the ability to easily transfer secure video evidence.
- Video clips shall include the option of viewing a single camera or multiple cameras on a single screen.
- Executable video clips shall display GPS map location vehicle and speed upon playback and metadata from other onboard systems.
- Video clips shall provide the option of saving a portion of the video clip (shorter in length and/or reducing the number of cameras) in order to make a smaller video clip from the original.
- The software shall feature the option to archive video clips requiring a password for reviewing.

C. HD Cameras:

- All cameras shall utilize 48 volt PoE (Power over Ethernet), supplied from the Recorder.

- Interior cameras shall be high definition, low light, IR Illuminating with a lux rating of 0.
- Interior cameras shall be color with a built-in high sensitivity microphone.
- Camera resolution setting options shall be F-HD (1920x1080), HD (1280x720), W-D1 (864x480), QHD (640x360) or W-CIF (432x240).
- Exterior cameras shall be impact and tamper-resistant and rated a minimum of IP66 for proven durability in exterior mobile applications.
- Exterior cameras shall feature a UV coated dome for additional exterior protection.

D. Warranty, Service & Support:

- All hardware shall include a warranty of two (2) years parts and labor.
- Unlimited telephone and email technical support shall be provided at no additional charge for the life of the system.
- Additional extended warranty and service contracts shall be available.

An Apollo RoadRunner HD (High Definition) Mobile Recording System with 8 cameras or approved equal shall be installed. Location of cameras will be determined by Procuring Agency.

Full installation for a multi-camera surveillance system, including the installation of cameras, recorder, microphone, etc. Agency to specify the required camera system details via **Tables 8 & 9** (or approved equal).

Table 8

	Camera Supplier
Camera Supplier	Apollo Video HD Camera Systems, 8 channel, 8 camera DVR system or approved equal
DVR Model	RoadRunner HD
DVR Hard Drive Size	4 TB
Camera System Cable Type	Cat 5
Event Marker Button	Yes
Impact Sensor/Accelerometer	Yes
Discrete Mic	Yes

Table 9

	Camera Required? (Y/N)	Color Camera? (Y/N)	Built-in Mic? (Y/N)
Entrance Door Cam	Yes	Yes	Yes
Forward Facing Cam(Windshield)	Yes	Yes	Yes
Front, Rear Facing Camera	Yes	Yes	Yes
Mid, Rear Facing Camera	Yes	Yes	Yes
Exit Door Camera	Yes	Yes	Yes
Exterior Curb-side Camera	Yes	Yes	Yes
Exterior Street-side Camera	Yes	Yes	Yes
Rear, Forward Facing Camera	Yes	Yes	Yes

6.100.3 Automatic Vehicle Locator (AVL) / Global Positioning System (GPS)

The bus shall be equipped with a GPS-based Automatic Vehicle Location (AVL) technology. The AVL system shall provide the location information for the bus. This location information shall be used by all other equipment that require location information for their function. The AVL system shall be furnished and installed by the Contractor. The AVL system shall be fully functional upon delivery. The AVL vendor shall be consulted for proper application of equipment, including configuration and installation of cables. The AVL system shall be Avail, myAvail system, or approved equal.

6.100.4 Automatic Vehicle Annunciator (AVA)

The bus shall be equipped with a GPS-based Automatic Vehicle Annunciator (AVA). The AVA system shall use the location information provided by the AVL system. The AVA system shall be furnished and installed by the Contractor. The AVA system shall be fully functional upon delivery. The AVA vendor shall be consulted for proper application of equipment, including configuration and installation of cables.

6.100.5 Automatic Passenger Counter (APC)

The bus shall be equipped with an Automatic Passenger Counter (APC). The APC system shall use the location information provided by the AVL system. The APC system shall be furnished and installed by the Contractor. The APC system shall be fully functional upon delivery. The APC vendor shall be consulted for proper application of equipment, including configuration and installation of cables.

6.100.6 Transit Signal Priority

Default

No TSP system shall be installed.

BRT Option

A transit signal priority (TSP) transponder will be installed. The radio-frequency emitted by the transponder shall not disturb the performance of electrical/electronic equipment as defined in SAE J1113 and UNECE Council Directive 95/54 (R10). Connectors shall be minimized, since each connector and crimp has a loss that will attribute to attenuation of the signal. Cabling should allow for the removal of antennas or attached electronics without removing the installed cable between them. If this cannot be done, then a conduit of sufficient size shall be provided for ease of attachment of antenna and cable assembly. The corresponding component vendors shall be consulted for proper application of equipment, including installation of cables.

The TSP system shall use the vehicle's GPS receiver and antenna to obtain the vehicle position, speed, and heading. The time information from the GPS satellites will also be used to synchronize the frequency hopping of the 2.4 GHz radio.

Operating in the reserved ISM communications band, and requiring no license, a 2.4 GHz spread spectrum/frequency hopping radio will provide the communications from the vehicle to the intersection when within range of a GPS intersection. The radio shall have a transmit power of not more

than 1 watt. The radio shall have an unobstructed range of at least 2,500 feet (762 m). The radio will meet FCC Part 15 and Canada ICES-003 rules. Radio link association and coordination among intersections and vehicles shall be automatic.

The radio/GPS Control Unit will monitor the status of the vehicle's turn signals via an interface cable and the left and right turn signal lines in the vehicle. The vehicle control unit will also monitor the disable input line as well as the remote activation input.

The Vehicle Control Unit will have dimensions of no greater than 5.5 inches (14.0cm) wide by 1.75 inches (4.4 cm) high by 7.35 inches (18.4 cm) deep.

The radio/GPS antenna will be a hemispherical dome with a height of 1.43" (3.6 cm) a diameter of 2.85" (7.2 cm) with a pair of 15' (4.6m) coax cables with factory terminated SMA connectors. One of these connectors will have a pin and the other will have a socket. This antenna will include one element for receiving the GPS signal and one element for transmitting and receiving the radio signal. This antenna (along with the radio/GPS module described in paragraph 5 above) may also be used in the intersection.

The vehicle equipment will be supplied complete with a 25-foot (7.6m) (or longer) vehicle interface cable.

The vehicle will transmit the following information when within range of an equipped intersection:

a. The priority level of the vehicle equipment. This will be either high priority or low priority. The priority level will be factory set. The high priority model will have the option to be wired to operate as low priority either permanently or temporarily.
b. The agency ID, vehicle classification ID and vehicle ID of the vehicle. Setting these ID numbers will be accomplished through programming software. Each vehicle control unit will be capable of setting 254 different agency IDs and 15 different vehicle type classifications with 9,999 different identification numbers per class for a total of 38,096,190 codes per priority level.
c. The location, speed and heading of the vehicle.
d. The status of the vehicle's turn signals.
e. The radio channel as assigned by the intersection and the serial number of the vehicle control unit.
f. An Ethernet port and a USB port shall be available on the radio/GPS control unit. The radio/GPS control unit shall also include multi-purpose communication ports compliant with the RS-232 communication standard. These ports enable unit configuration to be set into the radio/GPS control unit and read from radio/GPS control unit. It also allows real-time communication between the radio/GPS control unit and the interface computer as well as interfacing with other devices. One of the ports may be configured to output GPS data at 38400 baud rate in the NMEA format. It will output the following messages:
    i. GGA Global Positioning System Fix Data
    ii. GSA GPS DOP and active satellites
    iii. GSV Satellites in view
    iv. RMC Recommended Minimum Navigation Information

g. The GPS data shall be available while the equipment is shut off.

The vehicle control unit will be equipped with an ON/OFF switch to activate the system and request priority. The switch will be depressed to activate the system. In addition, a remote activation line is provided to interface with other vehicle equipment. This line may have the following signals applied to request priority.

a. +10-36 VDC
b. +5VDC
c. Ground
d. The equipment may also be configured to be activated with the light bar/remote activation line or the ON/OFF switch rather than both.

The vehicle control unit will also have a series of indicator lights that will operate as follows:

a. A status indicator as well as an indicator light in the switch will indicate that the equipment is powered on.
b. A GPS indicator will indicate the status of GPS reception. An amber indication means that GPS has not been acquired and that the radio is not "on the air." A green indication means that GPS has been acquired.
c. A priority indicator will indicate the priority level currently being broadcast. A green indication means high priority. An amber indication means low priority. If the indicator is off, probe priority is being broadcast
d. A disable indicator will indicate if the vehicle equipment is in a disable mode. The disable indicator will flash amber and the indicator in the power switch will flash green at a rate of 2 Hz.
e. A link indicator illuminates green if other radios are within range.
f. These indicators shall be configurable via software to change their brightness based on ambient light levels. There shall be separate settings for daytime and nighttime.

The radio/GPS control unit will be equipped with a disable input that, when activated, will cause the radio to transmit that the vehicle is in disable mode, thereby eliminating the possibility of the priority request continuing after the priority vehicle has arrived at its destination. The disable input will be programmable to operate in either a latching or non-latching mode. The disable input will be programmed so that the input may be activated by applying ground or by applying +10-36 VDC. Operation of the disable input will be programmable using software.

The turn signal inputs shall be configurable to accept the following types of inputs:

a. A flashing input
b. A steady ground input
c. A Steady+10-36 VDC input

Separate inputs shall be available to temporarily force the radio/GPS control unit to broadcast that it is in low priority and in probe priority. These inputs shall be configurable to accept a ground input or a +10-36 VDC input.

The vehicle equipment will operate over a temperature range of –30º F (-34º C) to 165º F (+74º C).

The vehicle equipment will operate over a relative humidity range of 5% to 95%.

Windows™ based software will be available for programming the vehicle control unit through its RS-232 compatible multi-purpose port or USB port.

The communication protocol will be made available upon request for creating software to implement real-time communication via J-1708 to other onboard devices such as Automatic Vehicle Location (AVL) equipment. This interface may be used to initiate preemption and transit signal priority requests. In addition the AVL equipment will be able to perform the following actions on the vehicle equipment:

a. Temporarily change priority level
b. Change Agency, Class and Vehicle ID
c. Activate and deactivate disable mode
d. Set turn signal status
e. Set transit route ID

The Vehicle unit will be able to provide the following to the AVL equipment:

a. GPS RMC message data
b. Door status
c. Date and time
d. Make and Model
e. Discrete input status

A third party radio may be connected to the vehicle equipment through the Ethernet port. This radio may then be used to allow the vehicle equipment to communicate over the users short range radio network with the central management software while in the vicinity of the users garage facility. When in range this connection will permit, logs to be downloaded and firmware may be updated.

The low priority version of the vehicle unit will be able to receive passenger count data and minutes late data from compatible AVL and passenger counter. It shall use this information to calculate and transmit a conditional priority level which will be used by the phase selector to calculate a conditional priority for approaching low priority vehicles.

a. Conditional priority may be calculated according to one of the following methods
    i. Minutes Late Only
    ii. Passenger Count Only
    iii. Highest value of minutes late or passenger count
    iv. Addition of minutes late and passenger count
b. The minutes late threshold may be 0-254 minutes for each of 15 priority levels.
c. The passenger count threshold may be 0-254 passengers for each of 15 priority levels.

The vehicle unit will have the capability of storing up to 10,000 of the most recent priority control calls. When the log is full, the vehicle unit will drop the oldest entry to accommodate the new entry.

The vehicle unit will store the record in non-volatile memory and will retain the record if power terminates. Each record entry will include the following points of information about the priority call:

a. Agency: Indicates the operating agency of the vehicle.
b. Classification: Indicates the class type of vehicle.
c. Identification number: Indicates the unique ID number of the vehicle.
d. Priority level: Indicates the vehicle's priority level (High or Low priority).
e. Approach Direction: Channel A, B, C, or D; indicates the vehicle's direction of travel.
f. Call duration: Indicates the total time in seconds the priority status is active.
g. Minutes late (if received from compatible AVL)
h. Passenger Count (if received from compatible AVL or passenger counter)
i. Conditional Priority (if received from compatible AVL or passenger counter)
j. Time and date call started and ended: Indicates the time a priority call started and ended, provided in seconds, minutes, hours, day, month, year.
k. Turn signal status: Indicates the status of the turn signal at the beginning of the hold time.
l. Intersection: Indicates the name being transmitted by the intersection equipment that received the request.
m. Intersection ID: Indicates the ID being transmitted by the intersection equipment that received the request.
n. Speed of vehicle: entry speed, exit speed, average speed through call.
o. Disabled Status: Indicates if the vehicle was disabled.
p. Preemption Confirmed: Indicates if the preemption was confirmed by the intersection.
q. No Preempt Status: The reason the preemption did not occur.

6.101 Modifications and Approved Equals

Modifications to any unit or component, part or detail, of the technical specifications must be submitted in writing. Any change, revision, or substitution of specified products requires approval of the City. To submit modifications or a request for approved equal, Contractor must indicate deviation from the Technical Specifications on the "Form for Technical Specification Conformance" and submit a description of the of the change, revision, or substitution in the "Form for Proposal Deviation" with the Proposal.

SECTION 7: WARRANTY REQUIREMENTS

7.1. Basic Provisions

7.1.1 Warranty Requirements

7.1.1.1 Contractor Warranty

Warranty will go into effect based on the date of acceptance on each Vehicle, that date shall be the date that the Vehicle is found acceptable for revenue service.

The Contractor shall ensure in its procurement arrangements that the warranty requirements of this Contract are enforceable through and against the Contractor's suppliers, vendors, and subcontractors. Any inconsistency or difference between the warranties extended to the City by the Contractor and those extended to the Contractor by its suppliers, vendors, and subcontractors, shall 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.

Any extended damage or failure sustained as a result of a failed warranty component shall be repaired or replaced as the responsibility of the Contractor.

If the City or its representative detects a defect within the warranty periods defined, it shall promptly notify the successful Supplier's representative. Within five (5) working days after receipt of notification, the Contractor's representative shall either agree that the defect is in fact covered by warranty, or reserve judgement until the subsystem or component is inspected by the Contractor's representative. The Contractor must respond within five (5) working days as to the assessment. The component may be removed and examined at the City's property or at the Contractor's plant. The City and Contractor shall mutually agree upon whether the defect is one covered by the warranty, if no agreement is obtained within the five day period, the City reserves the right to commence the repair. Work necessary to affect the repairs shall commence within ten (10) working days after receipt of notification by the Contractor. Any extended damage or failure sustained as a result of a failed warranty component shall be repaired or replaced as the responsibility of the Contractor.

The Contractor warrants that whenever any change is required to strengthen or correct a defect or deficiency of the Vehicles, this correction would be made for all of the Vehicles where said defect or deficiency exists at the Contractor's expense.

Warranties in this document are in addition to any statutory remedies or warranties imposed on the Contractor. Consistent with this requirement, the Contractor warrants and guarantees to the original City each complete bus and specific subsystems and components as follows. Performance requirements based on design criteria shall not be deemed a warranty item.

7.1.1.2 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 City's locale.

7.1.1.3 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 as defined in Section 7.3 City-Specific Provisions.

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 or Class 2 Failure for a period of 12 years or 500,000 miles, whichever comes first.

7.1.1.4 Propulsion System

Propulsion system components, particularly the engine, transmission and drive motors, and drive and non-drive axles shall be warranted to be free from Defects and Related Defects for five years or 300,000 miles, whichever comes first.

7.1.1.5 Emission Control System (ECS)

The Contractor warrants the emission control system for five years or 300,000 miles, whichever comes first. The ECS shall include, but is not limited to, the following components:

- complete exhaust system, including catalytic converter (if required)
- after treatment device
- components identified as emission control devices

7.1.1.6 Subsystems Component Warranty

Other subsystems shall be warranted to be free from Defects and Related Defects for the time and mileage established in Section 7.1.5 City-Specific Provisions.

7.1.1.7 Extended Warranty

The City requires the subsystems and components identified in Section 7.3 City-Specific Provisions to be warranted to be free from Defects and Related Defects for the years and mileage indicated.

7.1.1.8 Serial Numbers

Upon delivery of each bus, the Contractor shall provide a complete electronic list of serialized units installed on each bus to facilitate warranty tracking. The list shall include, but is not limited to:

- engine
- transmission
- alternator
- starter
- A/C compressor and condenser/evaporator unit
- drive axle
- power steering unit

- air compressor
- wheelchair ramp (if applicable)

The Contractor shall provide updated serial numbers resulting from warranty campaigns. The format of the list shall be approved by the City prior to delivery of the first production bus.

7.1.1.9 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 shall be extended by the number of days equal to the delay period.

If any component, unit, or subsystem is repaired, rebuilt, or replaced by the Contractor or by the RTC or authorized representative, with the concurrence of the Contractor, the component, unit, or subsystem shall have the unexpired warranty period of the original or full warranty of the new component, whichever is greater.

7.1.2 Voiding of Warranty

The warranty shall not apply to the failure of any part or component of the bus that directly results from misuse, negligence, accident or repairs not conducted in accordance with the Contractor-provided maintenance manuals and with workmanship performed by adequately trained personnel in accordance with recognized standards of the industry. The warranty also shall be void if the City 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 City shall maintain documentation, auditable by the Contractor, verifying service activities in conformance with the Contractor's maintenance manuals.

7.1.3 Exceptions and Additions to Warranty

The warranty shall not apply to the following items:

- scheduled maintenance items
- normal wear-out items
- items furnished by the City

7.1.3.1 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 shall request this waiver.

Contractor shall state in writing that the City's warranty reimbursements will not be impacted. The Contractor also shall 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 City to assign its warranty obligations to others, but only on a case-by-case basis approved in writing by the City. Otherwise, the Contractor shall 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.

7.1.3.2 Superior Warranty

The Contractor shall pass on to the City any warranty offered by a component Supplier that is superior to that required herein. The Contractor shall provide a list to the City noting the conditions and limitations of the Superior Warranty not later than the start of production. The Superior Warranty shall not be administered by the Contractor.

7.1.4 Fleet Defects

7.1.4.1 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 minimum fleet size of twelve (12) or more buses where such items are covered by warranty. A Fleet Defect shall 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 shall 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 shall become a separate bus fleet for the purposes of Fleet Defects.

The Contractor shall correct a Fleet Defect under the warranty provisions defined in "Repair Procedures." After correcting the Defect, the City and the Contractor shall mutually agree to and the Contractor shall promptly undertake and complete a work program reasonably designed to prevent the occurrence of the same Defect in all other buses and spare parts purchased under this Contract. Where the specific Defect can be solely attributed to particular identifiable part(s), the work program shall include redesign and/or replacement of only the defectively designed and/or manufactured part(s). In all other cases, the work program shall include inspection and/or correction of all the buses in the fleet via a mutually agreed-to arrangement. The Contractor shall update, as necessary, technical support information (parts, service and operator's manuals) due to changes resulting from warranty repairs. The City may immediately declare a Defect in design resulting in a safety hazard to be a Fleet Defect. The Contractor shall be responsible to furnish, install and replace all defective units.

7.1.4.2 Exceptions to Fleet Defect Provisions

The Fleet Defect warranty provisions shall not apply to City-supplied items, such as radios, fare collection equipment, communication systems and tires. In addition, Fleet Defects shall not apply to interior and exterior finishes, hoses, fittings and fabric.

7.2. Repair Procedures

7.2.1 Repair Performance

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

7.2.2 Repairs by the Contractor

If the City detects a Defect within the warranty periods defined in this section, it shall, within thirty (30) days, notify the Contractor's designated representative. The Contractor or its designated representative shall, if requested, begin Work on warranty-covered repairs within five calendar days after receiving notification of a Defect from the City. The City shall make the bus available to complete repairs timely with the Contractor's repair schedule.

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

7.2.3 Repairs by the City

7.2.3.1 Parts Used

If the City performs the warranty-covered repairs, then it shall correct or repair the Defect and any Related Defects utilizing parts supplied by the Contractor specifically for this repair. At its discretion, the City may use Contractor-specified parts available from its own stock if deemed in its best interests.

7.2.3.2 Contractor-Supplied Parts

The City may require that the Contractor supply parts for warranty-covered repairs being performed by the City. Those parts may be remanufactured but shall have the same form, fit and function, and warranty. The parts shall be shipped prepaid to the City from any source selected by the Contractor within fourteen (14) days of receipt of the request for said parts and shall not be subject to an City handling charge.

7.2.3.3 Defective Component Return

The Contractor may request that parts covered by the warranty be returned to the manufacturing plant. The freight costs for this action shall be paid by the Contractor. Materials should be returned in accordance with the procedures outlined in "Warranty Processing Procedures."

7.2.3.4 Failure Analysis

The Contractor shall, upon specific request of the City, provide a failure analysis of Fleet Defect or safety-related parts, or major components, removed from buses under the terms of the warranty that could affect fleet operation. Such reports shall be delivered within 60 days of the receipt of failed parts.

7.2.3.5 Reimbursement for Labor and Other Related Costs

The City shall be reimbursed by the Contractor for labor. The amount shall be determined by the City for a qualified mechanic at a straight time wage rate per hour, which includes fringe benefits and overhead adjusted for the City'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 shall not exceed the rates in effect in the City's service garage at the time the Defect correction is made.

7.2.3.6 Reimbursement for Parts

The City shall be reimbursed by the Contractor for defective parts and for parts that must be replaced to correct the Defect. The reimbursement shall be at the current price at the time of repair and shall include taxes where applicable, plus fifteen (15) percent handling costs. Handling costs shall not be paid if parts are supplied by the Contractor and shipped to the City.

7.2.3.7 Reimbursement Requirements

The Contractor shall respond to the warranty claim with an accept/reject decision including necessary failure analysis no later than sixty (60) days after the City submits the claim and defective part(s), when requested. Reimbursement for all accepted claims shall occur no later than sixty (60) days from the date of acceptance of a valid claim. The City may dispute rejected claims or claims for which the Contractor did not reimburse the full amount. 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.

7.2.4 Warranty after Replacement/Repairs

If any component, unit or subsystem is repaired, rebuilt or replaced by the Contractor or by the City with the concurrence of the Contractor, then the component, unit or subsystem shall have the unexpired warranty period of the original. Repairs shall not be warranted if Contractor-provided or authorized parts are not used for the repair, unless the Contractor has failed to respond within five days, in accordance with "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) shall have three (3) months or remaining time and/or miles of the original warranty, whichever is greater. This remaining warranty period shall 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 City.

7.2.4.1 Warranty Processing Procedures

The following list represents requirements by the Contractor to the City 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

7.2.5 Forms

The City'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 City.

7.2.6 Return of Parts

When returning defective parts to the Contractor, the City shall tag each part with the following:

- bus number and VIN
- claim number
- part number
- serial number (if available)

7.2.7 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.

7.3. City-Specific Provisions

This table shall be included in the Technical Proposal and may be submitted in Excel spreadsheet format.

TABLE 10
Subsystem and Component Warranty

Proposer Name:	40-FT CNG							
1 = Offered warranty does not meet requested warranty 2 = Offered warranty meets requested warranty 3 = Offered warranty exceeds requested warranty 4 = Extended warranty offered at additional cost	Months/Miles							
	City Intended Warranty		Initial Warranty Offering	Initial Warranty Offering	Score	Extended Warranty Offering	Additional Warranty Cost
	Parts & Labor		Parts & Labor	Labor (if different)			
Description	Score						
Engine	60/300K	2					
Engine Starter	36/150K	2					
Cooling System Including EMP	60/300K	2					
Charge Air Cooling System	60/300K	2					
Transmission Cooling System	60/300K	2					
Transmission	60/300K	2					
Hydraulic System	36/150K	2					
CNG Fuel System	144/500K	2					
CNG De-Fueling System	144/500K	2					
Final Drive Axle	60/300K	2					
Exhaust System	60/300K	2					
Chassis Suspension	144/500K	2					
Springs and Shock Absorbers	36/150K	2					
Kneeling Valve	36/150K	2					
Steering front axle	60/300K	2					
Brakes (except friction material)	36/150K	2					
Friction Material	60K	2					
Pneumatic System	36/150K	2					
Air Compressor	36/150K	2					
Air Lines and Fittings	36/150K	2					
Air Reservoirs	36/150K	2					
Air System Dryer	36/150K	2					
Body	144/500K	2					
Corrosion	144/500K	2					

Fire Protection	36/UNL	2					
Floor Covering	36/UNL	2					
Operator Platform	144/500K	2					
Farebox Platform	144/500K	2					
Battery Compartment	144/500K	2					
Bike Rack	24/UNL	2					
Finish and Color	144/500K	2					
Exterior Lighting	144/500K	2					
Interior Panels	60/UNL	2					
Operator Barrier and Schedule Holder	60/UNL	2					
Passenger Interior Lighting	144/500K	2					
Passenger Seating	60/UNL	2					
Seating Construction and Materials	60/UNL	2					
Passenger Assists	144/500K	2					
Door Actuators	36/UNL	2					
Loading System	36/UNL	2					
Operator's Controls	36/UNL	2					
Operator/Interior Lights	144/500K	2					
Operator's Seat	36/UNL	2					
Heating Ventilating and Air Conditioning (HVAC)	36/UNL	2					
Destination Signs	60/UNL	2					
Integrated Systems	36/UNL	2					
Alternator	36/UNL	2					
Batteries	48/UNL	2					
Wheelchair lift/ramp system	144/500K	2					
Automatic Fire Suppression System (AFSS)	36/UNL	2					
ITS/Radio Com. Intelligent Transportation System (ITS)	36/UNL	2					
Digital Video System	36/UNL	2					
Camera Enclosures	36/UNL	2					
Networked Video Recorder	36/UNL	2					
Digital Removable Drive/Disk Storage Media	36/UNL	2					
Audio Microphone	36/UNL	2					
Global Positioning System	36/UNL	2					
Wireless Capability/Bus Mounted Data Recorder	36/UNL	2					

SECTION 8: QUALITY ASSURANCE

8.1. Contractor's In-Plant Quality Assurance Requirements

8.1.1 Quality Assurance Organization

8.1.1.1 Organization Establishment

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

8.1.1.2 Control

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

8.1.1.3 Authority and Responsibility

The quality assurance organization shall have the authority and responsibility for reliability, quality control, inspection planning, establishment of the quality control system, and acceptance/rejection of materials and manufactured articles in the production of the transit buses.

8.1.2 Quality Assurance Organization Functions

8.1.2.1 Minimum Functions

The quality assurance organization shall include the following minimum functions:

- **Work instructions:** The quality assurance organization shall verify inspection operation instructions to ascertain that the manufactured product meets all prescribed requirements.
- **Records maintenance:** The quality assurance organization shall maintain and use records and data essential to the effective operation of its program. These records and data shall be available for review by the resident inspectors. Inspection and test records for this procurement shall be available for a minimum of one year after inspections and tests are completed.
- **Corrective action:** The quality assurance organization shall detect and promptly ensure correction of any conditions that may result in the production of defective transit buses. These conditions may occur in designs, purchases, manufacture, tests or operations that culminate in defective supplies, services, facilities, technical data or standards.

8.1.2.2 Basic Standards and Facilities

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

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

- **Measuring and testing facilities:** The Contractor shall provide and maintain the necessary gauges and other measuring and testing devices for use by the quality assurance organization to verify that the buses conform to all specification requirements. These devices shall be calibrated at established periods against certified measurement standards that have known, valid relationships to national standards.
- **Production tooling as media of inspection:** When production jigs, fixtures, tooling masters, templates, patterns and other devices are used as media of inspection, they shall be proved for accuracy at formally established intervals and adjusted, replaced or repaired as required to maintain quality.
- **Equipment use by resident inspectors:** The Contractor's gauges and other measuring and testing devices shall be made available for use by the resident inspectors to verify that the buses conform to all specification requirements. If necessary, the Contractor's personnel shall be made available to operate the devices and to verify their condition and accuracy.

8.1.2.3 Maintenance of Control

The Contractor shall maintain quality control of purchases:

- **Supplier control:** The Contractor shall require each Supplier to maintain a quality control program for the services and supplies that it provides. The Contractor's quality assurance organization shall inspect and test materials provided by Suppliers for conformance to specification requirements. Materials that have been inspected, tested and approved shall be identified as acceptable to the point of use in the manufacturing or assembly processes. Controls shall be established to prevent inadvertent use of nonconforming materials.
- **Purchasing data:** The Contractor shall verify that all applicable specification requirements are properly included or referenced in purchase orders of articles to be used on transit buses.

8.1.2.4 Manufacturing Control

- **Controlled conditions:** The Contractor shall ensure that all basic production operations, as well as all other processing and fabricating, are performed under controlled conditions. Establishment of these controlled conditions shall be based on the documented Work instructions, adequate production equipment and special working environments if necessary.
- **Completed items:** A system for final inspection and test of completed transit buses shall be provided by the quality assurance organization. It shall measure the overall quality of each completed bus.
- **Nonconforming materials:** The quality assurance organization shall monitor the Contractor's system for controlling nonconforming materials. The system shall include procedures for identification, segregation and disposition.
- **Statistical techniques:** Statistical analysis, tests and other quality control procedures may be used when appropriate in the quality assurance processes.
- **Inspection status:** A system shall be maintained by the quality assurance organization for identifying the inspection status of components and completed transit buses. Identification may include cards, tags or other normal quality control devices.

8.1.2.5 Inspection System

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

- **Inspection personnel:** Sufficient trained inspectors shall be used to ensure that all materials, components and assemblies are inspected for conformance with the qualified bus design.
- **Inspection records:** Acceptance, rework or rejection identification shall be attached to inspected articles. Articles that have been accepted as a result of approved materials review actions shall be identified. Articles that have been reworked to specified drawing configurations shall not require special identification. Articles rejected as unsuitable or scrap shall be plainly marked and controlled to prevent installation on the bus. Articles that become obsolete as a result of engineering changes or other actions shall be controlled to prevent unauthorized assembly or installation. Unusable articles shall be isolated and then scrapped. Discrepancies noted by the Contractor or resident inspectors during assembly shall be entered by the inspection personnel on a record that accompanies the major component, subassembly, assembly or bus from start of assembly through final inspection. Actions shall be taken to correct discrepancies or deficiencies in the manufacturing processes, procedures or other conditions that cause articles to be in nonconformity with the requirements of the Contract specifications. The inspection personnel shall verify the corrective actions and mark the discrepancy record. If discrepancies cannot be corrected by replacing the nonconforming materials, then the City shall approve the modification, repair or method of correction to the extent that the Contract specifications are affected.
- **Quality assurance audits:** The quality assurance organization shall establish and maintain a quality control audit program. Records of this program shall be subject to review by the City.

8.2. Inspection

8.2.1 Inspection Stations

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

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

8.2.2 Resident Inspectors

8.2.2.1 Resident Inspector's Role

The City shall be represented at the Contractor's plant by resident inspectors, as required by FTA. Resident inspectors may be City employees or outside contractors. The City shall provide the identity of each inspector and shall also identify his or her level of authority in writing. They shall monitor, in the

Contractor's plant, the manufacture of transit buses built under the procurement. The presence of these resident inspectors in the plant shall not relieve the Contractor of its responsibility to meet all the requirements of this procurement. The City shall 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 shall be governed by the guidelines included as Attachment A to this section.

8.2.2.2 Pre-Production Meetings

The primary resident inspector may participate in design review and Pre-Production Meetings with the City. At these meetings, the configuration of the buses and the manufacturing processes shall be finalized, and all Contract documentation provided to the inspector.

No less than 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 shall review the inspection procedures and finalize inspection checklists. The resident inspectors may begin monitoring bus construction activities two weeks prior to the start of bus fabrication.

8.2.2.3 Authority

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

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

Discrepancies noted by the resident inspector during assembly shall be entered by the Contractor's inspection personnel on a record that accompanies the major component, subassembly, assembly or bus from start of assembly through final inspection. Actions shall be taken to correct discrepancies or deficiencies in the manufacturing processes, procedures or other conditions that cause articles to be in nonconformity with the requirements of the Contract specifications. The inspection personnel shall verify the corrective actions and mark the discrepancy record. If discrepancies cannot be corrected by replacing the nonconforming materials, then the City shall approve the modification, repair or method of correction to the extent that the Contract specifications are affected.

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

8.2.2.4 Support Provisions

The Contractor shall provide office space for the resident inspectors in close proximity to the final assembly area. This office space shall be equipped with desks, outside and interplant telephones, Internet access, file cabinet and chairs.

8.2.2.5 Compliance with Safety Requirements

At the time of the Pre-Production Meeting, the Contractor shall 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 City's inspector(s) and any other City representatives during the course of the Contract.

8.3. Acceptance Tests

8.3.1 Responsibility

Fully documented tests shall be conducted on each production bus following manufacture to determine its acceptance to the City. These acceptance tests shall include pre-delivery inspections and testing by the Contractor and inspections and testing by the City after the buses have been delivered.

8.3.2 Pre-Delivery Tests

The Contractor shall conduct acceptance tests at its plant on each bus following completion of manufacture and before delivery to the City. These pre-delivery tests shall include visual and measured inspections, as well as testing the total bus operation. The tests shall be conducted and documented in accordance with written test plans approved by the City.

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 "Section 6: Technical Specifications." The City 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 shall be by actual test, or by supplying a report of a previously performed test on similar or like components and configuration. Any additional testing shall be recorded on appropriate test forms provided by the Contractor and shall be conducted before acceptance of the bus.

The pre-delivery tests shall be scheduled and conducted with 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, shall be filed with the assembly inspection records for each bus. The underfloor equipment shall be available for inspection by the resident inspectors, using a pit or bus hoist provided by the Contractor. A hoist, scaffold or elevated platform shall be provided by the Contractor to easily and safely inspect bus roofs. Delivery of each bus shall require written authorization of the primary resident inspector. Authorization forms for the release of each bus for delivery shall be provided by the Contractor. An executed copy of the authorization shall accompany the delivery of each bus.

8.3.2.1 Visual and Measured Inspections

Visual and measured inspections shall 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.

8.3.2.2 Total Bus Operation

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

Each bus shall be driven for a minimum of fifteen (15) miles during the road tests. If requested, computerized diagnostic printouts showing the performance of each bus shall be produced and provided to the City. Observed Defects shall be recorded on the test forms. The bus shall be retested when Defects are corrected and adjustments are made. This process shall continue until Defects or required adjustments are no longer detected.

Attachment A: New Bus Manufacturing Inspection Guidelines

Pre-Production Meeting

Responsibilities

City

- 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 City) 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).

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 shall 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 City.
- Last vehicle on production line.
- Last vehicle off production line.
- Last vehicle shipped to the City.

Plant Tour (if Meeting at OEM's Location)

The City 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

The Contractor shall conduct acceptance tests at its plant on each bus following completion of manufacture and before delivery to the City. These pre-delivery tests shall include visual and measured inspections, as well as testing the total bus operation. The tests shall be conducted and documented in accordance with written test plans approved by the City. The underfloor equipment shall be available for inspection by the resident inspectors, using a pit or bus hoist provided by the Contractor. A hoist, scaffold or elevated platform shall be provided by the Contractor to easily and safely inspect bus roofs. Delivery of each bus shall require written authorization of the primary resident inspector. Authorization forms for the release of each bus for delivery shall be provided by the Contractor. An executed copy of the authorization shall accompany the delivery of each bus.

Additional tests may be conducted at the City's discretion to ensure that the completed buses have attained the required quality and have met the requirements in "Section 6: Technical Specifications." The City 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 shall be by actual test, or by supplying a report of a previously performed test on similar or like components and configuration. Any additional testing shall be recorded on appropriate test forms provided by the Contractor and shall be conducted before acceptance of the bus.

The pre-delivery tests shall be scheduled and conducted with 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, shall be filed with the assembly inspection records for each bus.

Visual and Measured Inspections

Visual and measured inspections shall 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 shall be evaluated during road tests. The purpose of the road tests is to observe and verify the operation of the bus as a system and to verify the functional operation of the subsystems that can be operated only while the bus is in motion.

Each bus shall be driven for a minimum of 15 miles during the road tests. If requested, computerized diagnostic printouts showing the performance of each bus shall be produced and provided to the City. Observed defects shall be recorded on the test forms. The bus shall be retested when defects are corrected and adjustments are made. This process shall continue until defects or required adjustments are no longer detected.

Post-Delivery Tests

The City shall conduct acceptance tests on each delivered bus. These tests shall be completed within 15 days after bus delivery and shall be conducted in accordance with the City'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 City. The post-delivery tests shall include visual inspection and bus operations. No post-delivery test shall 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 City shall record details of all defects on the appropriate test forms and shall notify the Contractor of acceptance or non-acceptance of each bus, after completion of the tests. The defects detected during these tests shall 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 City and the Contractor shall, at the Pre-Production Meeting, jointly develop a Configuration and Performance Review document for review of the pilot vehicle. This document shall 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 performance qualification

This test shall be jointly conducted by the Contractor and the engine manufacturer (including but not limited to charge air cooler performance, air to boil test, loss of coolant, fuel system electrical inputs and engine protection system).

- Transmission performance qualifications

This test shall 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.

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 City must verify compliance that more than 60 percent of the costs of all components are produced in the United States. Finally, the City must execute the required certificates.

Resident Inspection Process for Serial Production

At the discretion of the City, a decision is made to perform resident inspection using the City'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.

The decision to have the resident inspection performed by City personnel results in a firm understanding and knowledge of the bus and affords the opportunity to identify parts that will be needed for general maintenance down the road.

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 City 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 City'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
- Gradability test
- Service brake test
- Parking brake test
- Turning effort test
- Turning radius test
- Shift quality
- 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 engine/powerplant 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 City 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 consult of the City'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
Gradability 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)
City 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 City'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 City shall conduct acceptance tests on each delivered bus. These tests shall be completed within 15 days after bus delivery and shall be conducted in accordance with the City'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 City. The post-delivery tests shall include visual inspection, along with a verification of system(s) functionality and overall bus operations. No post-delivery test shall 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 City shall record details of all defects on the appropriate test forms and shall 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 shall 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 City 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 City 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).

SECTION 9: FORMS AND CERTIFICATIONS

9.1 Proposer's Checklist

RFP 19-16 BRT Vehicle Procurement

Package 1: Technical Proposal

- ☐ 1. Letter of Transmittal
- ☐ 2. Technical Proposal
- ☐ 3. Acknowledgement of Addenda
- ☐ 4. Contractor Service and Parts Support Data
- ☐ 5. Form for Proposal Deviation (without price data)
- ☐ 6. Form for Technical Specification Conformance
- ☐ 7. Vehicle Questionnaire
- ☐ 8. References and non-priced information
- ☐ 9. Engineering organization chart, engineering change control procedure, field modification process
- ☐ 10. Manufacturing facility plant layout, other contracts, staffing
- ☐ 11. Production and delivery schedule and other Contract commitments for the duration of this Contract.
- ☐ 12. Quality Assurance Program
- ☐ 13. Proposed Warranty (Table 10 Subsystem and Component Warranty)

Package 2: Price Proposal

- ☐ 1. Letter of Transmittal
- ☐ 2. Vehicle Pricing Schedule (including buses, spare parts package, engineering, manuals, special tools, and test equipment)
- ☐ 3. Training Curriculum Pricing
- ☐ 4. Life Cycle Cost, include the cost and frequency of replacement (in years and/or miles) of the following components: A/C blower motor, A/C condenser motor, alternator, batteries set, brake application valve, engine/transmission PPA, power steering gear box assembly, radiator, shocks, starter, and transmission unit.
- ☐ 5. Form for Proposal Deviation (with price data)

Package 3: Qualifications Package

- ☐ 1. Pre-Award Evaluation Data Form
- ☐ 2. A copy of the three (3) most recent audited financial statements or a statement from the Proposer regarding how financial information may be reviewed by the City
- ☐ 3. Letter for insurance
- ☐ 4. Letter from a surety for a Performance Guarantee (if applicable)
- ☐ 5. Proposal Form
- ☐ 6. All federal certifications: Buy America Certification, Debarment and Suspension Certification for Prospective Contractor, Debarment and Suspension Certification (Lower-Tier Covered Transaction), Non-Collusion Affidavit, Lobbying Certification, Certificate of Compliance with Bus Testing Requirement, DBE Approval Certification, and Federal Motor Vehicle Safety Standards

Package 4: Proprietary/Confidential Information

☐ 1. Proprietary/Confidential Information

There may be items in the first three packages that are included in Package 4 because they are considered to be proprietary/confidential information. When this occurs, the Proposer must note that fact in packages 1 through 3.

9.2 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."

Birmingham, AL

RFP 19-16 BRT Vehicle Procurement

Request No.: **Proposer:** **RFP Section:** **Page:**		
Questions, clarifications, or approved equal:		
City Action:	Approved See addendum	Denied See response below
City response:		

9.3 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.

Birmingham, AL

RFP 19-16 BRT Vehicle Procurement

The undersigned acknowledges receipt of the following addenda to the documents: Addendum No.: Dated: Addendum No.: Dated: Addendum No.: Dated: Addendum No.: Dated:
Proposer: Name: Title: Phone: Street Address: City, State, Zip
_____ _____ Authorized Signature Date

9.4 Contractor Service and Parts Support Data

Birmingham, AL

RFP 19-16 BRT Vehicle Procurement

Location of nearest Technical Service Representative to City

Name:

Address:

Telephone:

Describe technical services readily available from said representative:

Location of nearest Parts Distribution Center to City:

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 City:

9.5 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." This form may be submitted in a spreadsheet format.

Birmingham, AL

RFP 19-16 BRT Vehicle Procurement

Form for Proposal Deviation		
Proposer Name:		
No. = Deviation Number RFP Section = Section of the RFP where the deviation is being requested Description = Complete description of deviation or request for approved equal		
No.	**RFP Section**	**Description**

9.6 Vehicle Pricing Schedule

Birmingham, AL

RFP 19-16 BRT Vehicle Procurement

	All prices are to be in United States dollars	
	Unit Price	**Extension**
Fifteen (15) 40-foot low floor CNG buses		
Manuals	Lump Sum	
Spare parts package		
Test equipment and special tools		
Training curriculum (see form Training Curriculum Pricing)	Lump Sum	
Sales tax (if applicable)	N/A	N/A
Delivery charges		
TOTAL PROPOSED PRICE		
ADA equipment (included in above unit prices)		

This form is to be completed and included in the Price Package.

9.7 Training Curriculum Pricing

Birmingham, AL

RFP 19-16 BRT Vehicle Procurement

Module	Class Size (max.)	Recommended Hours	Unit Price
Maintenance Training			
Orientation			
Electrical / Electronics			
Engine and Accessories			
Transmission Controls			
Air Conditioning			
Doors			
Mobility Aid Lift			
Brakes			
Air Systems			
Suspension, Steering, and Axles			
Body			
Parts			
Driving instructions			
Operator Training			
Operator Compartment			
Walk Around Inspection			
Driving Instructions			
Total Proposed Price			

This form is to be completed and included in the Price Package.

9.9 Pre-Award Evaluation Data Form

This form is to be completed and included in the Qualification Package. Attach additional pages if required.

Birmingham, AL

RFP 19-16 BRT Vehicle Procurement

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 City (This may require execution of an acceptable non-disclosure agreement between the City 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 above information is confidential and will not be divulged to any unauthorized personnel.

The undersigned certifies to the accuracy of all information:
Name and title:
Company:

_____

Authorized signature Date

9.10 Federal Certifications

9.10.1 Buy America Certification

This form is to be submitted with an offer exceeding the small purchase threshold for federal assistance programs, currently set at $100,000.

Certificate of Compliance

The Proposer hereby certifies that it will comply with the requirements of 49 USC Section 5323(j)(2)(C), Section 165(b)(3) of the Surface Transportation Assistance Act of 1982, as amended, and the regulations of 49 CFR 661.11:

Name and title:
Company:

_____

Authorized signature Date

Certificate of Non-Compliance

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

Name and title:
Company:

_____

Authorized signature Date

9.10.2 Debarment and Suspension Certification for Prospective Contractor

Primary covered transactions must be completed by Proposer for contract value over $25,000.

Choose one alternative:

☐ The Proposer, [insert name], certifies to the best of its knowledge and belief that it and its principals:

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any federal department or City;
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 or 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 a governmental 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 Proposal had one or more public transactions (federal, state or local) terminated for cause or default.

OR

☐ The Proposer is unable to certify to all of the statements in this certification, and attaches its explanation to this certification. (In explanation, certify to those statements that can be certified to and explain those that cannot.)

The Proposer 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 Title 31 USC § Sections 3801 are applicable thereto.

Executed in [insert city and state]**.**

Name:

_____

Authorized signature Date

9.10.3 Debarment and Suspension Certification (Lower-Tier Covered Transaction)

This form is to be submitted by each Subcontractor receiving an amount exceeding $25,000.

The prospective lower-tier participant (Proposer) certifies, by submission of this Proposal, that neither it nor its "principals" as defined at 49 CFR § 29.105(p) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal department or City.

If the prospective Proposer is unable to certify to the statement above, it shall attach an explanation, and indicate that it has done so by placing an "X" in the following space: _____

THE PROPOSER, _____, CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF EACH STATEMENT OF ITS CERTIFICATION AND EXPLANATION, IF ANY. IN ADDITION, THE PROPOSER UNDERSTANDS AND AGREES THAT THE PROVISIONS OF 31 USC §§ 3801 *ET SEQ*. APPLY TO THIS CERTIFICATION AND EXPLANATION, IF ANY.

Name and title of the Proposer's authorized official:

_____

Authorized signature Date

9.10.4 Non-Collusion Affidavit

This affidavit is to be filled out and executed by the Proposer; if a corporation makes the bid, then by its properly executed agent. The name of the individual swearing to the affidavit should appear on the line marked "Name of Affiant." The affiant's capacity, when a partner or officer of a corporation, should be inserted on the line marked "Capacity." The representative of the Proposer should sign his or her individual name at the end, not a partnership or corporation name, and swear to this affidavit before a notary public, who must attach his or her seal.

State of _____, County of _____

I, _____, being first duly sworn, do hereby state that
(Name of Affiant)

I am _____ of _____
(Capacity) (Name of Firm, Partnership or Corporation)

whose business is

_____

and who resides at

_____

and that

_____
(Give names of all persons, firms, or corporations interested in the bid)

is/are the only person(s) with me in the profits of the herein contained Contract; that the Contract is made without any connection or interest in the profits thereof with any persons making any bid or Proposal for said Work; that the said Contract is on my part, in all respects, fair and without collusion or fraud, and also that no members of the Board of Trustees, head of any department or bureau, or employee therein, or any employee of the Authority, is directly or indirectly interested therein.

_____
Signature of Affiant Date

Sworn to before me this _____ day of _____, 20_____. _____ Notary public My commission expires	– Seal

9.10.5 Lobbying Certification

This form is to be submitted with an offer exceeding $100,000.

The Proposer certifies, to the best its knowledge and belief, that:

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

2. If any funds other than federal appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of any City, 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 instruction, as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96).

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

THE PROPOSER, _____, CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF EACH STATEMENT OF ITS CERTIFICATION AND DISCLOSURE, IF ANY. IN ADDITION, THE PROPOSER UNDERSTANDS AND AGREES THAT THE PROVISIONS OF 31 USC §§ 3801 ET SEQ. APPLY TO THIS CERTIFICATION AND DISCLOSURE, IF ANY.

Name of the bidder or Proposer's authorized official: _____

Title:
_____

_____
Signature Date

Per paragraph 2 of the included form Lobbying Certification, add Standard Form–LLL, "Disclosure Form to Report Lobbying," if applicable.

9.10.6 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 City 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

9.10.7 DBE Approval Certification

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

Name and title of the Proposer's authorized official:

_____

Authorized signature Date

9.10.8 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

9.11 Other Certifications

9.11.1 Proposal Form

Proposer shall complete the following form and include it in the Qualifications Package.

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 City of Birmingham in response to Request for Proposal No.19-16 in its entirety.

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

9.11.2 Notice of Award

By execution below, City of Birmingham accepts Proposal as indicated above.

Contracting officer:

_____

_____

Authorized signature Date

9.12 Form for Technical Specification Conformance

This form must be completed and included in the Technical Proposal. Every instance where Technical Specifications are not met (i.e. instances where "No" is selected) a description of the Deviation must be included in the Form for Proposal Deviation. This form may be submitted in a spreadsheet format.

Birmingham, AL

RFP 19-16 BRT Vehicle Procurement

Section	Specification	Meets Specification?	
		Yes	No
6.1	Scope	□	□
6.2	Definitions	□	□
6.3	Referenced Publications	□	□
6.4	Legal Requirements	□	□
6.5	Overall Requirements	□	□
6.6	Physical Size	□	□
6.6.1	Bus Length	□	□
6.6.2	Bus Width	□	□
6.6.3	Bus Height	□	□
6.6.4	Ramp Clearances	□	□
6.6.5	Ground Clearance	□	□
6.6.6	Step and Floor Height	□	□
6.6.7	Interior Headroom	□	□
6.6.8	Weight	□	□
6.6.9	Capacity	□	□
6.7	Service Life	□	□
6.8	Maintenance and Inspection	□	□
6.10.2	Technical/Service Representatives	□	□
6.9	Interchangeability	□	□
6.10	Training	□	□
6.10.1	Training Curriculum	□	□
6.11	Operating Environment	□	□
6.12	Noise	□	□
6.12.1	Interior Noise	□	□
6.12.2	Exterior Noise	□	□
6.13	Fire Safety	□	□
6.13.1	Materials	□	□
6.13.2	Fire Suppression	□	□

6.14	Power Requirements	□	□
6.14.1	Top Speed	□	□
6.14.2	Gradeability	□	□
6.14.3	Acceleration	□	□
6.15	Operating Range	□	□
6.16	Propulsion System	□	□
6.16.1	Mounting	□	□
6.16.2	Propulsion System Service	□	□
6.17	Engine	□	□
6.17.1	Electronic Control System	□	□
6.17.2	Fast Idle Device	□	□
6.18	Cooling System	□	□
6.18.1	Engine Cooling	□	□
6.18.1.1	Radiator	□	□
6.18.1.2	Coolant	□	□
6.18.1.3	Drive Design	□	□
6.18.1.4	Mounting	□	□
6.18.2	Charge Air Cooling	□	□
6.18.3	Transmission Cooling	□	□
6.19	Transmission	□	□
6.20	Retarder	□	□
6.21	Hydraulic Systems	□	□
6.22	Fluid Lines	□	□
6.22.1	Fittings and Clamps	□	□
6.22.2	Charge Air Piping	□	□
6.22.3	Radiator Piping	□	□
6.22.4	Oil and Hydraulic Lines	□	□
6.22.5	Fuel Lines	□	□
6.23	Fuel System Design and Construction	□	□
6.23.1	Fuel Containers/Cylinders	□	□
6.23.2	Installation	□	□
6.23.3	Labeling	□	□
6.23.4	Pressure Relief Devices	□	□
6.23.5	Valves	□	□
6.23.6	Fuel Filler	□	□
6.23.7	Fueling System	□	□
6.23.8	Defueling System	□	□
6.24	Emissions and Exhaust	□	□

6.24.1	Exhaust System	□	□
6.24.2	Exhaust After Treatment	□	□
6.24.3	Particulate After Treatment	□	□
6.25	Design	□	□
6.26	Altoona Testing	□	□
6.27	Distortion	□	□
6.28	Resonance and Vibration	□	□
6.28.1	Engine Compartment Bulkheads	□	□
6.28.2	Crashworthiness	□	□
6.29	Corrosion	□	□
6.30	Towing	□	□
6.31	Jacking	□	□
6.32	Hoisting	□	□
6.33	Floor	□	□
6.33.1	Floor Design	□	□
6.33.2	Floor Strength	□	□
6.33.3	Floor Construction	□	□
6.34	Rear Step Area to Rear Area	□	□
6.35	Wheel Housing	□	□
6.36	Suspension General Requirements	□	□
6.36.1	Alignment	□	□
6.37	Springs and Shock Absorbers	□	□
6.37.1	Suspension Travel	□	□
6.37.2	Damping	□	□
6.37.3	Lubrication	□	□
6.37.4	Kneeling	□	□
6.38	Wheels	□	□
6.39	Tires	□	□
6.40	Steering Axle	□	□
6.40.1	Steering Wheel	□	□
6.40.2	Turning Effort	□	□
6.40.3	Steering Column Tilt	□	□
6.40.4	Steering Wheel Telescopic Adjustment	□	□
6.40.5	Non-Drive Axle	□	□
6.41	Drive Axle	□	□
6.42	Turning Radius	□	□
6.43	Brakes	□	□
6.43.1	Brake Actuation	□	□

6.43.2	Friction Material	□	□
6.43.3	Hubs and Discs	□	□
6.43.4	Parking Emergency Brake	□	□
6.44	Passenger Door Interlocks	□	□
6.45	Pneumatic System	□	□
6.45.1	Air Compressor	□	□
6.45.2	Air Lines and Fittings	□	□
6.45.3	Air Reservoirs	□	□
6.45.4	Air System Dryer	□	□
6.46	Electrical, Electronic, and Data Communication Systems	□	□
6.46.1	Modular Design	□	□
6.46.2	Environmental and Mounting Requirements	□	□
6.46.3	Hardware Mounting	□	□
6.47	Electrical General Requirements	□	□
6.47.1	Batteries	□	□
6.47.2	Battery Cables	□	□
6.47.3	Jump Start	□	□
6.47.4	Battery Compartment	□	□
6.47.5	Auxiliary Electronic Power Supply	□	□
6.47.6	Master Battery Switch	□	□
6.47.7	Low-Voltage Generation and Distribution	□	□
6.47.8	Circuit Protection	□	□
6.47.9	Grounds	□	□
6.47.10	Low Voltage/Low Current Wiring and Terminals	□	□
6.47.11	Electrical Components	□	□
6.47.12	Electrical Compartments	□	□
6.48	Electronic General Requirements	□	□
6.48.1	Wiring and Terminals	□	□
6.48.2	Discrete Inputs/Outputs	□	□
6.48.3	Shielding	□	□
6.48.4	Communications	□	□
6.48.5	Radio Frequency	□	□
6.48.6	Audio	□	□
6.49	Multiplexing	□	□
6.50	Data Communications	□	□
6.50.1	Drivetrain Level	□	□
6.50.1.1	Diagnostics, Fault Detection, and Data Access	□	□
6.50.1.2	Programmability (Software)	□	□

6.50.2	Multiplex Level	□	□
6.50.2.1	Diagnostics, Fault Detection, and Data Access	□	□
6.50.2.2	Programmability (Software)	□	□
6.51	Operator's Area Controls General Requirements	□	□
6.51.1	Operator's Platform	□	□
6.51.2	Operator Lighting	□	□
6.51.3	Glare	□	□
6.51.4	Visors/Sun Shades	□	□
6.51.5	Driver's Amenities	□	□
6.52	Driver's Seat	□	□
6.52.1	Dimensions	□	□
6.52.1.1	Seat Pan Cushion	□	□
6.52.1.2	Seat Pan Cushion Slope	□	□
6.52.1.3	Seat Base Adjustment	□	□
6.52.1.4	Seat Suspension	□	□
6.52.1.5	Seat Back	□	□
6.52.1.6	Headrest	□	□
6.52.1.7	Seat Back Lumbar Support	□	□
6.52.1.8	Seat Back Angle Adjustment	□	□
6.52.2	Seat Belt	□	□
6.52.3	Armrest	□	□
6.52.4	Seat Control Locations	□	□
6.52.5	Seat Structure and Materials	□	□
6.52.6	Pedestal	□	□
6.53	Driver's Controls	□	□
6.53.1	Normal Bus Operation Instrumentation and Controls	□	□
6.53.2	Driver Foot Controls	□	□
6.53.3	Brake and Accelerator Pedals	□	□
6.53.4	Driver Foot Switches	□	□
6.53.4.1	Turn Signal Controls	□	□
6.53.4.2	Other Floor-Mounted Controls	□	□
6.54	Mirrors	□	□
6.54.1	Exterior Mirrors	□	□
6.54.2	Curbside and Street-Side Mirrors	□	□
6.54.3	Interior Mirrors	□	□
6.55	Windows	□	□
6.56	Windshield	□	□
6.56.1	Windshield Glazing	□	□

6.56.2	Windshield Wipers	□	□
6.56.3	Windshield Washers	□	□
6.57	Driver's Side Window	□	□
6.58	Side Windows	□	□
6.58.1	Emergency Exit (Egress) Configuration	□	□
6.58.2	Configuration	□	□
6.58.3	Materials	□	□
6.58.4	Rear Window	□	□
6.59	Heating, Ventilating, and Air Conditioning	□	□
6.60	HVAC Capacity and Performance	□	□
6.61	Pull Down Performance	□	□
6.62	HVAC Controls and Temperature Uniformity	□	□
6.63	Air Flow Passenger Area	□	□
6.64	Air Flow Operator's Area	□	□
6.65	Controls for the Climate Control System	□	□
6.66	HVAC Air Filtration	□	□
6.67	Roof Ventilators	□	□
6.68	HVAC Maintainability	□	□
6.69	Fans, Motors, and Pumps	□	□
6.70	Body Design	□	□
6.70.1	Materials	□	□
6.71	Exterior Panels and Finishes	□	□
6.71.1	Exterior Panel Repair and Replacement	□	□
6.72	Roof-Mounted Equipment	□	□
6.73	Rain Gutters	□	□
6.74	License Plate Provisions	□	□
6.75	Wheel House Fenders/Wheel Covers	□	□
6.76	Splash Aprons	□	□
6.77	Access Doors	□	□
6.78	Bumper Location	□	□
6.78.1	Front Bumper	□	□
6.78.2	Rear Bumper	□	□
6.78.3	Bumper Material	□	□
6.79	Finish and Color	□	□
6.80	Decals, Numbering, and Signing	□	□
6.81	Exterior Lighting	□	□
6.81.1	High and Low Beam	□	□
6.81.2	Brake and Tail Light	□	□

6.81.3	Standard Turn Signals	□	□
6.81.4	Clearance Lamps	□	□
6.81.5	Backup Light/Alarm	□	□
6.81.6	Doorway Lighting	□	□
6.81.7	Service Area Lighting	□	□
6.82	Interior Panels and Finishes General Requirements	□	□
6.83	Interior Access Panels and Doors	□	□
6.83.1	Access Doors with Locks	□	□
6.83.2	Floor Panels	□	□
6.84	Operator Area Barrier	□	□
6.85	Modesty Panels	□	□
6.85.1	Front End	□	□
6.85.2	Rear Bulkhead	□	□
6.85.3	Headlining	□	□
6.85.4	Interior Panel Fastening	□	□
6.86	Insulation	□	□
6.87	Floor Covering	□	□
6.88	Passenger Interior Lighting	□	□
6.88.1	Seating Areas	□	□
6.88.2	Vestibules/Doors	□	□
6.88.3	Step and Ramp Lighting	□	□
6.88.4	Farebox Lighting	□	□
6.89	Fare Collection	□	□
6.90	Passenger Seating Arrangements	□	□
6.90.1	Seat Style	□	□
6.90.2	Dimensions	□	□
6.90.2.1	Hip-to-Knee Room	□	□
6.90.2.2	Foot Room	□	□
6.90.2.3	Aisles	□	□
6.90.3	Structure and Design	□	□
6.90.4	Construction and Material	□	□
6.91	Passenger Assists	□	□
6.91.1	Front Doorway	□	□
6.91.2	Vestibule	□	□
6.91.3	Rear Doorway	□	□
6.91.4	Overhead	□	□
6.91.5	Longitudinal Seat Assists	□	□
6.91.6	Wheel Housing Barriers/Assists	□	□

6.92	Passenger Doors	□	□
6.92.1	Materials and Construction	□	□
6.92.2	Dimensions	□	□
6.92.3	Door Glazing	□	□
6.92.4	Door Projection	□	□
6.92.5	Door Height Above Pavement	□	□
6.92.6	Closing Force	□	□
6.92.7	Door Actuators	□	□
6.92.8	Emergency Operation	□	□
6.92.9	Door Control	□	□
6.92.10	Operator-Controlled Front and Rear Doors	□	□
6.93	Accessibility Provisions	□	□
6.93.1	Loading System	□	□
6.93.2	Wheelchair Accommodations	□	□
6.93.3	Interior Circulation	□	□
6.94	Destination Signs	□	□
6.95	Passenger Information and Advertising	□	□
6.96	Passenger Stop Request and Signal	□	□
6.97	Public Address System	□	□
6.98	Radio Handset and Control System	□	□
6.99	Emergency Alarm	□	□
6.100	Integrated Technologies	□	□
6.100.1	Event Data Recorder	□	□
6.100.2	Camera Surveillance System	□	□
6.100.3	Automatic Vehicle Locator	□	□
6.100.4	Automatic Vehicle Annunciator	□	□
6.100.5	Automatic Passenger Counter	□	□
6.100.6	Transit Signal Priority	□	□
6.101	Approved Equals	□	□

9.13 Vehicle Questionnaire

This form must be completed and included in the Technical Proposal.

GENERAL COACH DATA SHEET

40-Foot CNG Low Floor Bus

Bus Manufacturer: _____

Bus Model Number: _____

Basic Body Construction Type: _____

General Dimensions

Overall length	Over bumpers		feet		inches
	Over body		feet		inches
Overall width	Over body excluding mirrors and lights		feet		inches
	Over body including mirrors		feet		inches
	Over tires		feet		inches
Overall Height (maximum)			feet		inches

Angle of approach		degrees
Angle of departure		degrees
Breakover angle		degrees
Breakover angle (rear)		degrees

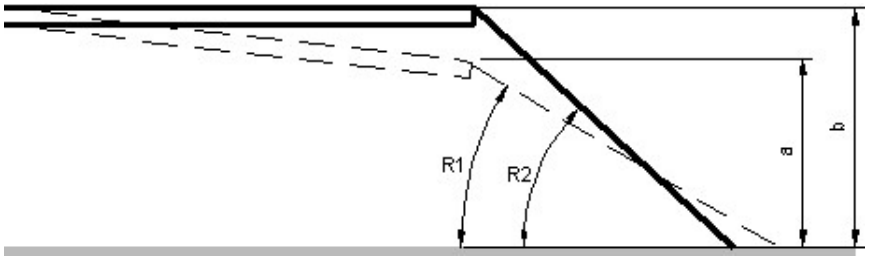
Doorway clear opening (at widest point)

Front door		inches
Rear door		inches

	Width with grab handles		**Width** without grab handles		**Height**	
Front door		inches		inches		inches
Rear door		inches		inches		inches

Front axle floor height above ground (centerline of bus)		inches
Rear axle floor height above ground (centerline of bus)		inches

Step height from ground (measured at center of doorway) _____ inches



	Front doorway		Ramp angle		Rear doorway	
Kneeled		inches (a)		degrees (R1)		inches (a)
Unkneeled		inches (b)		degrees (R2)		inches (b)

Interior head room (floor to ceiling at center of aisle)

Front axle location		inches
Rear axle location		inches
Rear settee (in front of seat)		inches

Aisle width

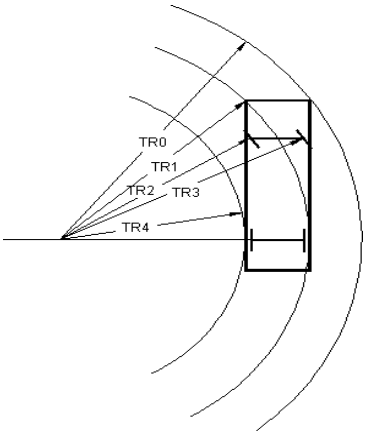
Minimum width on floor between front axle wheel housings		inches
Minimum width on floor between rear axle wheel housings		inches

Minimum ground clearance

Outside axles zones		inches
Inside axles zones		inches

Horizontal turning envelope (see diagram below)

Outside body turning radius, TR0 (including bumper)		feet		inches
Inside body turning radius innermost point, TR4 (including bumper)		feet		inches



Wheel base

Front axle to rear axle		inches

Overhang, centerline of axle over bumper

Front		inches
Rear		inches

Floor

Maximum interior floor slope (from horizontal)		degrees

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		Inches
Maximum hip-to-knee space		inches
Provide a proposed floor layout plan		

Bus weight

	Curb weight		**Curb weight plus seated load***		**GVWR**	
Front axle		lbs		lbs		lbs
Rear axle		lbs		lbs		lbs
Total		lbs		lbs		lbs

**Including operator and passengers at 150 lbs per person*

Steering Axle (□ Front □ Rear)

Manufacturer	
Type and weight rating	
Model number	

Drive axle (□ Front □ Rear)

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	
Front axle brake chamber model	
Rear axle brake chamber model	
Front axle slack adjuster	
Manufacturer	
Model number	
Rear axle slack adjuster	
Manufacturer	
Model number	
Front axle brake drum / rotor	
Manufacturer	
Rear axle brake drum / rotor	
Manufacturer	

Air compressor

Manufacturer	
Type	
Model number	
Rated capacity	cfm

Capacity at idle		cfm
Maximum warranted speed		rpm
Idle speed		rpm
Drive type		
Governor cut-in pressure		psi
Governor cut-out pressure		psi

Air Reservoir Capacity

Manufacturer				
Supply reservoir number and size		/		cubic inches total
Primary reservoir number and size		/		cubic inches total
Secondary reservoir number and size		/		cubic inches total
Parking reservoir number and size		/		cubic inches total
Accessory reservoir number and size		/		cubic inches total
Other reservoir number and size		/		cubic inches total

Cooling System

	Radiator	Charge air cooler
Manufacturer		
Type		
Model number		
Number of tubes		
Fins per inch		
Fin thickness (inches)		
Fin construction		

Total cooling system capacity		gallons
Radiator fan manufacturer		
Fan speed / control type (mech/elect/hyb)		
Surge tank capacity		gallons
Surge tank material		
Overheat alarm temperature		degrees F
Shutdown temperature settings		degrees F

Electrical

Primary interior lighting system

Manufacturer	
Type	
Model number	

Alternator

Manufacturer	
Type	
Model number	
Output at idle	amps

Voltage regulator

Manufacturer	
Model number	

Auxiliary inverter (120/240)

Manufacturer	
Model number	
Inverter technology	
Output voltage(s)	

Starter motor

Manufacturer	
Voltage	
Model number	

Energy storage

Batteries – low voltage

Manufacturer	
Type	
Model number	
Cold cranking amps	

Batteries / energy storage – high voltage

Manufacturer	
Type	

Model number	
Energy density	
Specific power	
Operating temperature range	
Cooling / heating system	

Ultra-capacitor

Manufacturer	
Model number	

Ultra-capacitor ratings: Provide data sheet for energy efficiency, estimated calendar life, cycle life, voltage (each capacitor and each module), working and peak power, and weight

Engine

Manufacturer	
Model number / version	
Horsepower / torque rating	

Engine information / graphs to be attached with this form:

Engine speed vs. road speed

Torque vs/ engine speed

Horsepower vs. engine speed

Fuel consumption vs. engine speed

Vehicle speed vs time (both loaded and unloaded)

Vehicle speed vs. grade (both loaded and unloaded)

Acceleration vs. time

Change of acceleration vs. time

Fire suppression / methane detection system

Manufacturer				
Model number				
Number of detectors		fire		methane
Type of detector	□ Thermal □ Optical			
Battery backup	□ Yes □ No			

Bumpers

Manufacturer	

Type	

Fuel and exhaust system

Fuel type	
Operating range and route profile	

Fuel tanks (liquid fuels)

Manufacturer				
Capacity (total and usable)		gallons /		gallons
Construction material				
Quantity and location of tanks				

Fuel tanks (gaseous fuels)

Manufacturer				
Capacity (total and usable)		SCF /		SCF
Construction material				
Quantity and location of tanks				

Exhaust system

Manufacturer	
Muffler manufacturer (if applicable)	

Air suspension

	Front	Rear
Air spring manufacturer		
Air spring quantity per axle		
Shock absorber manufacturer		
Shock absorber quantity per axle		

Steering

Pump manufacturer	
Pump model number	
Steering gear manufacturer	
Steering gear model number	
Steering gear type	

Steering wheel diameter		inches
Maximum effort at steering wheel*		

** Unloaded stationary coach on dry asphalt pavement*

Transmission

Manufacturer	
Type	
Model number	
Number of forward speeds	
Traction motor horsepower rating	
Type ventilation / cooling	

Propshaft

Manufacturer	

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**
Front door		
Rear door		

Actuating mechanism (air, electric, spring, other)

Manufacturer	
Front door	
Rear door	

Heating and Ventilating Equipment

Heating system capacity		Btu
Air conditioning system capacity		Btu
Ventilating capacity		CFM per passenger
Manufacturer and model		
Refrigerant type		

Driver's heater

Manufacturer	
Type	
Model number	
Capacity	

Floor heaters

Manufacturer	
Type / number	
Model number	
Capacity	

Wheelchair passenger loading system

Manufacturer		
Type (hydraulic, electric, or both)		
Model number		
Capacity		lbs
Width of ramp		inches
Length of ramp		inches
Operating hydraulic pressure		psi
System fluid capacity		quarts
Type of fluid used		
Hydraulic cylinders size and number		

Cycle times

	Normal idle		Fast idle	
Stowed to ground		seconds		seconds
Ground to stow		seconds		seconds

Wheelchair securement equipment

	Forward facing	Rear facing
Manufacturer		
Model number		

Public address system

	Manufacturer	Model number	Number
Amplifier			
Microphone			
Internal speakers			
External speaker			

Electronics

Event data recorder manufacturer	
Event data recorder model number	
Video system manufacturer	
Video system model number	
Number of cameras	
Farebox manufacturer	
Farebox model number	
Fare validation device manufacturer	
Face validation device model number	
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 / AVA system manufacturer	
AVL / AVA system model number	
Passenger information system manufacturer	

Passenger information system model number	
Signal prioritization system manufacturer	
Signal prioritization system model number	

Coach body fittings

Passenger windows manufacturer	

Exterior / interior mirrors

Size	
Manufacturer	
Model number	
Manufacturer part numbers	

Operator's Seat

Manufacturer	
Model number	

Bicycle racks

Manufacturer	
Model number	

Paint System

Manufacturer	
Type	

Operator control layout diagram

SECTION 10: CONTRACT

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SECTION 11: APPENDIXES

Appendix A: Guidelines for Calculating Liquidated Damages

Calculation of Liquidated Damages

Prior to its Solicitation, the City should document and file for the record its derivation of the amount of liquidated damage that is entered in "Liquidated Damages for Late Delivery of the Bus." The following identifies some suggested areas for consideration by which an City may be damaged if buses are not delivered as contracted.

For determining amounts for liquidated damages, the following guidance is provided:

1. The liquidated damage amount must not be punitive but shall be based upon damages that the City would incur as a result of the delay.

2. The liquidated damage amount must be calculated on the basis of damages that the City would incur and be substantiated by experience data.

3. A definition of days and any exempted days for delay should be included.

Cost to Retain Old Fleet

If the purpose of the procurement is to replace older buses that are being retired, there can be two areas of damage that are additive: extra cost of maintenance and cost of purchasing or renting additional buses to meet fleet availability requirements.

1. **Extra cost of maintenance.** The *difference* in maintenance costs, old buses minus new ones, is a realistic damage, assuming that older buses will be continued in service for the duration and not replaced with alternative leased buses.
2. **Cost to obtain additional buses to meet fleet availability.** Reliability of the older buses is not expected to be as good as for new ones, and they can be expected to be out of service for maintenance or repair for longer periods than new ones. Therefore, additional buses may be needed to ensure that required service on routes is met.

Cost to Obtain Alternative Fleet

The damage may be attributed to requirements to obtain an alternative fleet for the duration of the delay. Such may be precipitated because a sales agreement on the old buses being replaced is expected to have been executed prior to the Contract delivery date for new buses or because the new buses are needed for new or expanded services.

1. **Cost to replace old buses being sold.** This approach is an alternative to the cost of retaining the old fleet of (1) above. It is suggested that the liquidated damage be the lower of this alternative and that of (1).

2. **Cost to meet requirements for new or expanded service.** Under this approach, the liquidated damage would simply be the daily costs of the alternative fleet as calculated above.

Increased Contract Administrative Costs

Delays in delivery will increase the period that the Contract must be administered and possibly increase the effort or waste the effort of either in-house staff or consultants for in-plant inspection and to assist in taking delivery and acceptance.

7. **Increased Contract period.** The amount of the damage can be calculated as the average daily cost of Contract administration, apart from any technical services.

8. **Increased technical services.** Technical services for in-plant inspection and to assist in taking delivery and acceptance will have been budgeted consistent with the Contract schedule. The extra budget for these services could be determined as a daily rate.

Fines

Damages may include fines for which a court has already imposed or can be expected to be imposed on the Procuring Authority not meeting required emission (noise or air quality) reductions or features mandated by the Americans with Disabilities Act. Include this element only if the City can prove its vulnerability for such fines and a purpose of the procurement is to comply with such laws or ordinances.

Fuel Consumption

If the new buses are expected to consume less fuel per passenger capacity, then the difference in fuel consumption costs per day may be included.

Appendix B: Guidelines for Calculating Early Delivery Incentives

Any provision of incentive payments for early delivery should be made on the basis of savings that may be reasonably expected to accrue to the City. Prior to its Solicitation, the City should document and file for the record its derivation of the amount of any incentive that would be entered in the option provided in "Liquidated Damages for Late Delivery of the Bus." It is suggested that any savings be shared between the Contractor and the City on the basis of some predetermined ratio, not exceeding an amount approximately that of the anticipated profit under the Contract. The following provides suggested areas in which an City may accrue savings for early delivery.

Savings to Retire Old Fleet Early

If the purpose of the procurement is to replace older buses that are being retired, there can be savings in maintenance costs. The *difference* in maintenance costs, old buses minus new ones, could be a savings if the old fleet can be retired early.

Decreased Contract Administrative Costs

Early delivery can decrease the period that the Contract must be administered. The amount of savings can be calculated as the average daily cost of Contract administration, apart from any technical services.

Fines

If the City is being fined or can be expected to be imposed for failure to meet court-mandated emissions standards or requirements of the Americans with Disabilities Act, and early delivery reduces any such fines, savings will accrue. This element should be included *only* if the City can prove its vulnerability to such fines and a purpose of the procurement is to comply with such laws or ordinances.

Fuel Consumption

If the new buses are expected to consume less fuel per passenger capacity, then the *difference* in fuel consumption costs per day may be included as a savings if the old fleet can in fact be replaced by the early delivered fleet.

Appendix C: Examples of Evaluation Criteria

EXAMPLE 1: EVALUATION OF PROPOSALS AND SELECTION PROCESS

A. Evaluation/Selection Committee

An Evaluation/Selection Committee (Committee), which may include City staff, consortium members, and possibly one or more outside experts, will review and screen the Proposals submitted according to the pre-established criteria as set forth below.

B. Pre-Proposal Meeting (maximum of 5 points)

Attendance at the Pre-Proposal Meeting on [insert date].

C. Technical Evaluation Criteria(maximum of 80 points)

Proposals will be evaluated using the following principal selection criteria:

1. **Product design and performance (0–30 points):**The information provided by the Proposer in its technical submittal relating to the buses to be provided will be utilized to evaluate the Proposal in relation to this factor. Vehicle construction and system design, as well as documented reliability, may be used in this evaluation, as well as other design and performance elements of the components that comprise those systems. At a minimum, test results, safety and maintenance factors, and cost of normal operation for the bus design and system components proposed, may be considered in determining a final value for this factor.
2. **Proposer's reputation and performance (0–30 points):**The Committee will consider the capability and reputation of the Proposer as presented in the Proposal or as is determined by review of information available from references or other resources. The evaluation may look at the Proposer's overall organizational and financial capabilities and consider key components such as organizational reporting structure, quality control, quality assurance, research and development, technical, training and parts support, response time, product capabilities, ability to furnish multiple bus configurations, bonding capacity, and financial history, as well as other considerations, in reaching a final point determination. The committee may also look at judgments, liens, Fleet Defect history, warranty claims and the steps that the manufacturer took to resolve these concerns in assessing the overall reputation of the manufacturer.

9. **Delivery schedule (0–20 points):**The Committee will review the proposed delivery schedule for the City's minimum purchase of coaches. Delivery schedules that fulfill the delivery requirements, with evidence that the schedule can be accomplished, may receive higher points for this category.

D. Cost Proposal Evaluation (maximum of 20 points)

As described below, the proposed cost as submitted by the Proposer on the City's form will be assigned a maximum of 20 points. The Contractor is *required* to use the City's form, without alteration, for submittal of its cost Proposal. *Please DO NOT use your own forms.*

The cost will be evaluated in the following manner:

1. **Cost Proposal Criteria (0–20 points)**

    a. The Cost Proposal criteria will be based on the "Total of Both the Low-Floor and Standard Floor Bus," Line 3.C. of Appendix B as noted in Section 8.B.6, "Sum of Total Base Offer per Bus."
    b. The lowest average Cost Proposal will receive 20 points. Every other Proposal previously found to be in the Competitive Range will be given points proportionately in relation to the lowest price. This point total will be calculated by dividing the lowest price by the total price of the Proposal being evaluated and the result multiplied by the maximum weight for price (20 points) to arrive at a Cost Proposal score.

        Example: Lowest Proposed Price / Proposer's Proposed Price × 20 = Proposal Score

        The application of the above formula will result in a uniform assignment of points relative to the criterion of price.

A. Evaluation Methodology

The maximum number of points achievable in each of the aforementioned areas is as follows:

- **Attendance at Pre-Proposal Meeting:** 0–5 points
- **Product design and performance:**0–30 points
- **Manufacturer's reputation and performance:**0–30 points
- **Delivery schedule:**0–20 points
- **Cost proposal:**0–20 points

TOTAL POSSIBLE POINTS: 105

EXAMPLE 2: EVALUATION PROCESS

Following receipt of the Proposals, the Proposals will be evaluated for compliance with the following minimum requirements. Those Proposals that do not evidence compliance may not be considered beyond the preliminary review.

Minimum Requirements

- The Proposer must be an existing vehicle manufacturer with an existing manufacturing facility.
- The Proposal must be for a high-capacity vehicle with a nominal length not to exceed 45 ft.
- The vehicle must be constructed from composite material.
- The proposed vehicle must have the capability for either a CNG propulsion system or for a gasoline/hybrid propulsion system.
- The proposed vehicle must have a minimum of 44 seats.

Proposals found to be compliant with the minimum qualifications will then be evaluated to determine those Proposals that represent technically acceptable offers.

Each Proposal will be rated according to the following ratings:

Rating	Definition
Exceptional	Exceeds evaluation standard in a way beneficial to the City, and has no significant weaknesses. Innovative, comprehensive and complete in all details. Low-risk. Complies with all primary program objectives for the procurement.
Acceptable	Meets evaluation standards, and any weaknesses are readily correctable. Limited risk. Complies with many of the primary program objectives for the procurement.
Marginal	Fails to meet evaluation standard; however, any significant deficiencies are correctable. Lacks essential information to support Proposal. Moderate risk. Complies with only one or two of the program objectives for the procurement.
Unacceptable	Fails to meet evaluation standard, and the deficiency is uncorrectable. Proposal would have to undergo a major revision to become acceptable. Demonstrated lack of understanding of the City's requirements or omissions of major areas. Unacceptable risk. Complies with none or one of the program objectives for the procurement.

Performance risk is the evaluation of each Proposer's present and past work to assess confidence in the Proposer's ability to perform against a proposed Contract. The following definitions are used when assessing performance risk:

Rating	Definition
High	Significant doubt exists, based on the Proposer's performance record, that the Proposer can perform the proposed effort.
Moderate	Some doubt exists, based on the Proposer's performance record, that the Proposer can perform the proposed effort.
Low	Little doubt exists, based on the Proposer's performance record, that the Proposer can perform the proposed effort.
Not applicable	No significant performance record is identifiable.

The City may require clarifications or oral interviews with Proposers. Discussions may also be held with Proposers to determine acceptability of proposed Deviations and/or to address deficiencies and weaknesses of the Proposal. See "City Rights" for additional information.

After completion of the evaluations, the City shall request pricing from those firms that have submitted technically acceptable Proposals. The firms will be given approximately one week to submit pricing. The received pricing will then be reviewed. The City does not anticipate negotiation of price offers. The award will be made to the Proposer that possesses the appropriate facility, as well as the managerial, financial and technical capabilities necessary to fulfill the requirements of the Contract, and whose Proposal conforms to Solicitation requirements and is judged by an integrated assessment of the evaluation criteria to be most advantageous to the City, when price and other factors are considered.

For the purposes of this procurement, all evaluation factors other than price, when combined, are significantly more important than the cost/price area in this acquisition. Therefore, the City may select other than the lowest-priced technically acceptable Proposal if it is determined that the additional technical merit offered is worth the additional cost in relation to other Proposals received. For evaluation purposes, if Proposals become more technically equivalent, then price becomes relatively more important.

The City is more concerned with obtaining superior technical features than with making an award at the lowest overall price to the City. However, the City will not make an award at a significantly higher overall cost to the City to achieve slightly superior technical features.

The City reserves the right to reject any or all Proposals, to waive informalities or irregularities to the extent permitted by law in any Proposal received, and to be the sole judge of the merits of the respective Proposals received.

Evaluation Criteria

The award will be based upon the factors listed below in addition to price and may not necessarily be made to the lowest-price Proposer. Factors are ranked in order of importance, with the most important factor listed first.

- Minimum vehicle performance requirements
- Vehicle structure
- Advanced design provisions
- Proposed technical Deviations
- Manufacturing process
- Qualifications of the Proposer
- Past performance and current commitments
- Maintainability
- Proposed operating cost and reliability
- Emissions
- System safety provisions
- Technical support
- Project management
- Deviations from Contract terms and conditions

The primary sub-criteria under each factor are the following:

- **Performance requirements:**
  - Vehicle performance
  - Reduced exterior sound levels
  - Minimum range requirements
  - Compliance with general performance requirements
- **Vehicle structure:**
  - Previous service experience of the vehicle, if applicable
  - Current and/or planned durability testing, including existing test results
  - Physical dimensions
  - Interior layout, including compliance with ADA requirements
  - Layout of the operator's compartment, including the operator's field of view
  - Available ergonomic information
  - Functional enhancements, including integration of electronic controls and minimizing the number of gauges and switches
- **Advanced design provisions:** This addresses the design characteristics, including how the design complies with the program's design objectives.

- **Proposed technical deviations:** This addresses the effect and acceptability of proposed technical deviations, including proposed benefits to the City and Deviations that will result in cost reductions.
- **Manufacturing process:** This addresses the proposed manufacturing process, including a detailed description of the proposed facilities where the Work would be done.
- **Proposed quality assurance program**
- **Qualifications of the Proposer:**
    - Organization chart showing the organization proposed for this Contract
    - History of the Proposer, including information about manufacturing capabilities
    - Experience in producing the same or similar vehicles as those being proposed, with emphasis on experience in producing CNG and gasoline/hybrid vehicles
    - Experience in producing composite structure vehicles
    - Maintenance and warranty experience, including a qualified staff to provide the necessary services
    - Proposer's ISO certification(s) or equivalent
- **Proposer's facilities to be used for significant portions of the Work, including Subcontractors' facilities:**
    - Location of the facility and whether the facility is owned or leased
    - Work to be performed at the facility
    - Capacity and resources available at the facility for fulfilment of this Contract
    - Length of time the facility has been in operation to do the kind of Work proposed to be performed at the facility.
- **Past performance and current commitments:**
    - Reference list
    - Proposer's Work under way, or for which the Proposer is committed
- **Maintainability:**
    - Maintainability of the proposed powerplant
    - Maintainability of proposed component parts
    - Maintenance requirements
    - Skills needed to perform maintenance Work
    - Required special equipment, tools or maintenance facility requirements that must be implemented to maintain the vehicles
    - Proposed diagnostic equipment needed to maintain the vehicles
    - Proposed "built-in" diagnostic equipment, if offered
    - Reasonableness of proposed scheduled maintenance requirements
    - Proposed spare parts package required to support the schedule maintenance and replacement of major components
- **Proposed operating costs and reliability:**
    - Expected reliability and service life of major proposed components
- **Projected emissions of the vehicle**
- **System safety provisions:**
    - Proposed safety features
    - Knowledge of state codes and regulations affecting vehicles
    - Vehicle code changes required for the vehicle to legally operate in the state, if any
- **Technical support:**
    - Identification of proposed parts and service center
    - Service center staffing and qualifications

  - Availability of electronic maintenance documentation and comprehensive plan for providing technical updates for the life of the proposed vehicles
  - Proposed availability of spare parts, including methodology for storing parts locally and for expediting needed parts
  - Proposed training plans and instruction program
  - Proposed diagnostic equipment required to maintain the vehicles
  - Provision of advanced features such as wireless self-diagnostics and/or database management.
- **Project management:**
  - Proposed general project schedule and plan to ensure schedule compliance or to expedite the delivery schedule
  - Experience of the proposed project management team, including the experience of key personnel.
  - Experience of technical personnel supporting each area of technical expertise as required by the Contract specifications, including test and system integration personnel
  - Experience of the proposed key contact for the project, including the level of authority that this individual will have to make decisions that are "binding" on the Proposer
  - Plan for the coordination of major Suppliers and Subcontractors, if any
  - Major component Suppliers and the products to be provided by each for this Contract
  - The interface relationships between engineering, manufacturing, program control, quality control and test departments
  - Proposed critical path schedule for the production of the pilot vehicle and remaining vehicles as well as the methodology for controlling the schedule
- **Proposed Deviations from nontechnical terms and conditions:**
  - Rationale for the proposed Deviation
  - Benefit and/or risk to City if the request is granted

Certifications

The certifications will be reviewed for proper execution and responsiveness.

Type of Contract to be Awarded

The City intends to award a fixed-price Contract per unit for up to fifteen (15) vehicles. The services of the Contractor will be based on the scope of Work as outlined in "Section 1: Description of Work."

Period for Acceptance

The Proposal shall be valid for [insert number of days proposal is valid] calendar days from the date stipulated in the RFP for receipt of Proposals. If this offer is accepted within that time period, the Proposer agrees to furnish all services and items as stipulated in the RFP and in any accompanying amendments.

Appendix D: Sample Contract

CONTRACT

1. Contract Documents and Order of Precedence

The Contract consists of the documents listed below. In case of any conflict among these documents, the order of precedence shall be:

1. Form of Contract
2. "Section 4: Special Provisions"
3. "Section 3: General Conditions," and "Section 5: Federal Requirements"
4. "Section 6: Technical Specifications," "Section 7: Warranty Requirements," and "Section 8: Quality Assurance"
5. Contractor's Best and Final Offer (including Contractor Proposal)

City may issue a conformed Contract that comprises all of the changes, Deviations and addenda that were a part of the negotiation process. In that case, the above order of precedence would be applicable. Absent a conformed Contract, it may be appropriate to include the Contractor's final Proposal and BAFO as accepted by the City as the first document in the order of precedence. It should be noted that this alternative could present more risk to the City as the Contractor's BAFO and Proposal could contradict the RFP requirements and would prevail over them.

In this instance, the order of precedence might be as follows:

1. Form of Contract
2. Contractor's Best and Final Offer (including Contractor Proposal)
3. Addenda
4. "Section 4: Special Conditions"
5. "Section 3: General Conditions," and "Section 5: Federal Requirements"
6. "Section 6: Technical Specifications," "Section 7: Warranty Requirements," and "Section 8: Quality Assurance"

A modification or change to any Contract document shall take its precedence from the term it amends. All other documents and terms and conditions shall remain unchanged.

2. Compensation

The City shall pay [insert dollar amount in both words and numbers of the base Contract], and the Contractor shall accept the amount as full compensation for all costs and expenses of completing the Work in accordance with the Contract, including but not limited to all labor and material required, overhead, storage and shipping, risks and obligations, taxes (as applicable), fees and profit, and any unforeseen costs.

3. Contract Term and Period of Performance

The effective date of this Contract shall be the effective date set forth in the Notice to Proceed (NTP). The Contractor shall commence work after the effective date of the Contract, upon receipt of the NTP.

The base Contract will contain orders for fifteen (15) low floor 40-ft BRT buses. The Contract delivery date for the vehicles, in accordance with the delivery schedule set forth in "Delivery Schedule," shall be [insert date].

If any option is exercised, the option vehicles or other option items shall be delivered in accordance with the schedule contained in the Notice of Exercise of Option.

4. Notices

Any Notice legally required to be given by one party to another under the Contract shall be in writing, dated and signed by the party giving such Notice or by a duly authorized representative of such party.

Notices shall not be effective unless transmitted by any method that provides confirmation of transmission and delivery, such as fax, certified mail or registered mail and addressed to:

[Insert City name, address, point of contact and Contract number]

[Insert Contractor name, address and point of contact]

5. Entire Agreement

This Contract constitutes the complete and entire agreement between the City and Contractor and supersedes any prior representations, understandings, communications, commitments, agreements or Proposals, oral or written, that are not incorporated as a part of the Contract.

[City to inserts its normal signature format in accordance with its governing law and regulations. The City should ensure that the signature format conforms to state law and City policy.]

_____ Contractor name	_____ City name
_____ Signature of authorized official	_____ Signature of authorized official
_____ (Print or type name and title)	_____ (Print or type name and title)
_____ Date	_____ Date
_____ Tax ID number	Approved as to form by: _____ Insert name and title

Appendix E: Sample Performance Bond Form

FAITHFUL PERFORMANCE BOND

Birmingham, AL

CONTRACT NO. ____

RFP 17-XX BRT Vehicle Procurement

PERFORMANCE BOND

WHEREAS the City of Birmingham has awarded to _____ ("Principal"), Contract No. _____, Up To fifteen (15) low floor 40-ft CNG BRT buses AND

WHEREAS Principal is required under the terms of the Contract to furnish a Bond for the faithful performance of the Contract;

NOW, THEREFORE, we _____, as Principal, and _____, ("Surety"), as Surety, are held and firmly bound unto City of Birmingham in the sum of [insert amount], in lawful money of the United States of America, for payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severably, firmly by these presents. In case suit is brought upon this Bond, Surety shall pay reasonable attorneys' fees to City of Birmingham in an amount to be fixed by the court. In no event shall the surety be liable under this Bond for an amount greater than the aggregate penal sum designated in this paragraph.

The condition of this obligation is such that, if the hereby-bonded Principal or its heirs, executors, administrators, successors, assigns, or Subcontractors shall in all things stand to and abide by and well and truly keep and perform all the undertakings, terms, covenants, conditions and agreements in the Contract and any alteration thereof, made as therein provided, all within the time and in the manner therein-designated and in all respects according to their true intent and meaning, then this obligation shall become null and void; otherwise, it shall be and remain in full force and effect.

Further, Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or modification of the Contract, or of the Goods to be furnished thereunder, shall in any way affect its obligations under this Bond, and it does hereby waive notice of any such change, extension of time, alteration, or modification of the Contract or of the Goods and Technical Services to be performed thereunder.

IN WITNESS WHEREOF, three identical counterparts of this instrument, each of which shall for all purposes be deemed an original hereof, have been duly executed by Principal and Surety named herein, on the ___ day of _____, 20__, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

_____

By _____
("Principal")

_____

By _____
("Surety")

_____

By _____

Appendix F: Sample Assignment of an Option to Purchase Agreement

City of Birmingham, "Assignor", hereby assigns to _____ of _____, "Assignee," its option to purchase from, "Seller", _____ floor transit Vehicles ("Option Vehicles") at a price and under the terms and conditions contained in Assignor's Contract No. [Insert Contract number], dated with Seller ("Contract").

Such option commenced, per terms of Contract, on, and may be exercised at any time on or before.

With respect to the Option Vehicles assigned hereunder and this Assignment, Assignee agrees to perform all covenants, conditions and obligations required of Assignor under said Contract and agrees to defend, indemnify and hold Assignor harmless from any liability or obligation under said Contract. Assignee further agrees to hold Assignor harmless from any deficiency or Defect in the legality or enforcement of the terms of said Contract or option to purchase thereunder. Assignee agrees and understands that Assignor is not acting as a broker or agent in this transaction and is not representing Seller or Assignee, but rather is acting as a principle in assigning its interest in the above-referenced option to purchase the Option Vehicles under the Contract to Assignee.

Assignee hereby unconditionally releases and covenants not to sue Assignor upon any claims, liabilities, damages, obligations or judgments whatsoever, in law or in equity, whether known or unknown, or claimed, which they or either of them have or claim to have or which they or either of them may have or claim to have in the future against Assignor, with respect to the Option Vehicles or any rights whatsoever assigned hereunder.

Dated this _____ day of _____, 20___

_____ _____
Assignor Assignee

I hereby accept and approve the terms of this agreement and agree to hold Assignor harmless from any further liability or obligation under our agreement.

_____
Seller

Appendix G: Example of a Software Escrow Agreement

ESCROW AGREEMENT

THIS AGREEMENT ("Escrow Agreement") is made and entered into as of this day of, 20__ by and among [insert name of Contractor], an Alabama corporation ("Licensor"), City of Birmingham ("Licensee"), and _____, a national banking association, as escrow agent ("Escrow Agent").

WHEREAS, Licensor and Licensee have entered into an agreement pursuant to which Licensor has licensed to Licensee the use of specified computer programs and related materials, being described with particularity therein (the "License Agreement"), which License Agreement is attached hereto as Exhibit D; and

WHEREAS, the Escrow Agent can provide third-party software escrow protection by storing, retaining and allowing limited access to proprietary computer software, related media and materials.

NOW, THEREFORE, in consideration of the promises and mutual covenants contained herein and for other good and valuable consideration, receipt of which is hereby acknowledged, the parties hereby agree as follows:

1. DEPOSIT OF DOCUMENTATION

(a) The term "Documentation" as used in this Escrow Agreement means the computer source code for the application software magnetic media provided pursuant to the License Agreement (the "System Software") owned by Licensor and, in turn, licensed to Licensee, and such other related technical documentation and materials as shown in Exhibit A.

(b) Licensor agrees to deposit with the Escrow Agent a complete copy of the Documentation as provided in Exhibit A on or before _____ , 20__.

(c) As Licensor creates new releases of the System Software or any part thereof, Licensor shall promptly deposit one copy of each of the Documentation applicable thereto in escrow with the Escrow Agent. Concurrently with each such deposit, Licensor shall deliver to the Escrow Agent and Licensee a revised Exhibit A, and shall deliver to Licensee a certificate in the form attached hereto as Exhibit B. Licensor shall maintain in escrow the latest field-supported releases of the Documentation or the last emergency maintenance release, whichever is most current; provided, however, all Documentation deposited in the escrow account pursuant to this Escrow Agreement shall remain in escrow so long as Licensor is obligated under the License Agreement to provide the System Software to Licensee.

(d) All copies of source codes delivered hereunder shall be clearly marked, both on the sealed container in which the magnetic media comprising such copies are contained and on the magnetic media themselves, to indicate the Documentation and the version thereof represented by such copies.

2. STORAGE AND SECURITY

(a) The Escrow Agent shall act as custodian of the Documentation until this escrow is terminated pursuant to Section 3 of this Escrow Agreement. The Escrow Agent shall establish, under its control, a secure receptacle for the purpose of storing the Documentation. The Escrow Agent shall exercise reasonable care to keep the Documentation protected from electric or magnetic current that could damage the Documentation, and shall provide the same degree of care of the Documentation as it maintains for its software including without limitation source code and valuable documents and those of clients stored in the same location; provided,

however, that the Escrow Agent shall have no liability with respect to any damage to the Documentation unless such damage is the result of the fault of the Escrow Agent.

(b) The Documentation deposited with the Escrow Agent by Licensor pursuant to this Escrow Agreement shall remain the exclusive property of the Licensor, except as otherwise provided herein.

(c) Except as provided in this Escrow Agreement or the attached Exhibits or as required by applicable law, the Escrow Agent agrees that:

(1) The Escrow Agent shall not divulge, disclose or otherwise make available to any person other than Licensor, or make any use whatsoever of the Documentation except in accordance with this Escrow Agreement;

(2) The Escrow Agent shall not permit any person access to the Documentation, except as may be necessary for the Escrow Agent's authorized representatives to perform its function under this Escrow Agreement; and

(3) Access to the Documentation by Licensor shall be granted by the Escrow Agent only to those persons duly authorized in writing by a competent officer of Licensor.

(d) The Escrow Agent shall have no obligation or responsibility to verify or determine that the Documentation deposited with the Escrow Agent by Licensor does, in fact, consist of those items which Licensor is obligated to deliver under this or any other agreement, and the Escrow Agent shall bear no responsibility whatsoever to determine the existence, relevance, completeness, currency or accuracy of the Documentation at any time.

(e) The Escrow Agent's sole responsibility shall be to accept, store, protect and deliver the Documentation deposited with the Escrow Agent by Licensor in accordance with the terms and conditions of this Escrow Agreement.

(f) If the Escrow Agent should at any time be confronted with inconsistent claims or demands by the other parties to this Escrow Agreement, then, subject to the provisions of Section 8, it shall have the right to interplead the parties in any court of competent jurisdiction and request that the court determine the respective rights of the parties with respect to this Escrow Agreement and the Documentation and, upon doing so, the Escrow Agent automatically shall be released from any obligation or liability as a consequence of any such claims or demands.

3.RELEASE FROM ESCROW

(a) The Escrow Agent shall release the Documentation (or any designated part thereof) at any time in accordance with a written notice signed by both Licensor and Licensee and specifying the particular item or items of Documentation to be released and the party to whom release shall be made.

(b) The Escrow Agent shall release the Documentation 16 (sixteen) days following receipt of a notice from Licensee (the "Licensee Notice") given in accordance with Section 10 hereof, unless the Escrow Agent receives a counter-notice in accordance with Section 3(c) hereof, given in accordance with Section 10 hereof. The Licensee Notice shall state that a Licensee Release Condition, as hereinafter defined, has occurred and shall state with particularity the nature of such Licensee Release Condition. The Licensee Notice shall be given to Licensor in accordance with Section 10 hereof at the same time and by the same means that it is transmitted to the Escrow Agent, and proof of such transmission shall be submitted to the Escrow Agent along with the Licensee Notice. A "Licensee Release Condition" shall mean: (1) any material breach by Licensor of any material term or condition of the License Agreement, if such material

breach has not been cured within the 30 (thirty) day period following Licensor's receipt of written notice thereof pursuant to the License Agreement; or (2) Licensor fails to support the System Software licensed to Licensee as required by the License Agreement; or (3) Licensor fails to fulfill its warranty obligations pursuant to the License Agreement.

(c) If Licensor disputes the existence of a Licensee Release Condition, Licensor shall give to Licensee and the Escrow Agent a counter-notice in accordance with Section 10 hereof, within 15 (fifteen) days of the date on which the Licensee Notice was given to the Escrow Agent and Licensor.

(d) If the Escrow Agent is given a counter-notice under Section 3(c) hereof, it shall not release the requested item or items of the Documentation until and unless it receives an order and instruction, in writing, signed either by representatives of both Licensee and Licensor, or by an arbitrator as provided in Section 8 hereof.

Any receipt of the Documentation (or any designated part thereof) by Licensee pursuant to this Section 3 shall be subject to the terms and conditions of the License Agreement, such that Licensee shall accord the same security and protection to the Documentation or any part as it is obligated to give to the System Software.

The Escrow Agent shall release to Licensor all Documentation held by it upon termination of the License Agreement pursuant to clause (2) of the first sentence of Section 4 or, if that day is not a business day, on the next succeeding business day.

4. TERMINATION

(a) This Escrow Agreement shall terminate upon the earlier of: (1) the release by the Escrow Agent of all the Documentation pursuant to the terms of this Agreement; or (2) (month/day/year) (or if the Escrow Agent receives documentation satisfactory to it to the effect that the term of the License Agreement has been extended pursuant to the provisions thereof, then such date as is 180 (one hundred eighty) days following the expiration date of the term of the License Agreement, as extended from time to time). No party shall have any liability hereunder (except pursuant to Section 2(c)) for acts or omissions occurring after termination of this Escrow Agreement. Upon such termination, the Escrow Agent shall return the Documentation then in escrow to Licensor after the payment of all costs, fees and expenses due to the Escrow Agent, including fees and expenses of its agents and attorneys.

(b) Licensee and Licensor may terminate this Escrow Agreement by mutual written agreement upon 15 (fifteen) days' advance written notice to the Escrow Agent.

(c) This Escrow Agreement cannot be changed or terminated orally and may be changed only with the prior written consent of all of the parties hereto. This Escrow Agreement is not intended to modify or supersede any of the arrangements of Licensor and Licensee as set forth in the License Agreement.

(d) The Escrow Agent may resign as escrow agent at any time upon 30 (thirty) days' notice to Licensor and Licensee, but only if a successor escrow agent has been appointed prior to the effective date of the Escrow Agent's resignation. Upon receipt of notice of resignation, Licensor and Licensee promptly shall use their best efforts to designate a successor escrow agent to serve in accordance with the terms of this Agreement. If a successor escrow agent has not been appointed within a 60 (sixty) day period, the Escrow Agent may apply to a court of competent jurisdiction to have a successor appointed. Upon receipt of an affidavit signed by an officer of Licensor and an officer of Licensee directing the disposition of the Documentation to a successor escrow agent, the Escrow Agent shall promptly comply with that affidavit.

5. INDEMNIFICATION

The Escrow Agent shall not be liable to any party under this Escrow Agreement in connection with the performance of its duties hereunder, except for liability resulting from the Escrow Agent's fault. Licensor and Licensee shall, jointly and severally, indemnify and hold the Escrow Agent harmless against any loss, damage or expense, including legal fees, that it may incur to anyone as a result of acting as escrow agent under this Agreement, except for any loss, liability, damage or expense arising from the Escrow Agent's fault. If Licensor or Licensee makes any payment (an "Indemnification Payment") to the Escrow Agent pursuant to the provisions of the preceding sentence, then the party making the Indemnification Payment (the "Paying Party") shall be entitled to contribution from the other (the "Contributing Party") in an amount such that following contribution by the Contributing Party, the Paying Party and the Contributing Party shall each bear the portion of the Indemnification Payment as is proportionate to the relative fault of each of them with respect to the event that gave rise to the Indemnification Payment; provided, however, that if neither the Paying Party nor the Contributing Party is at fault, the Paying Party shall be entitled to contribution from the Contributing Party in an amount equal to one-half of the Indemnification Payment. The provisions of the preceding sentence shall not in any way limit the liability of Licensor or Licensee to the Escrow Agent pursuant to the second sentence of this Section 5 or any other provision of this Agreement.

6. GOOD FAITH RELIANCE

The Escrow Agent may rely and act upon written instructions, instruments or signatures believed by the Escrow Agent in good faith to be genuine and may assume that any person purporting to give any written notice, respect, advice or instruction in connection with or relating to this Escrow Agreement has been duly authorized to do so. The Escrow Agent's duties shall be determined with respect to this Agreement and applicable laws only, and the Escrow Agent is not charged with knowledge of or duties under any other document, including the License Agreement.

7. FEES

(a) In consideration of performing its functions as Escrow Agent, the Escrow Agent shall be compensated as set forth on Exhibit C. The fees set forth on Exhibit C will be billed periodically by the Escrow Agent to:

_____

_____

(b) The fees set forth in Exhibit C are for ordinary services as escrow holder. In the event the Escrow Agent is required to incur any additional or extraordinary legal fees as a result of being escrow holder, including intervention in any litigation or proceeding, the Escrow Agent shall receive full compensation for any such reasonable legal fees that are documented to the Licensor and/or Licensee's satisfaction.

8. ARBITRATION

Any dispute or controversy between Licensor and Licensee regarding the release of the Documentation shall be settled by arbitration to be held in the City of *(insert city and state),* in accordance with the rules of the American Arbitration Association.

Licensor and Licensee shall jointly select an arbitrator within 10 (ten) days following the giving of a counter-notice under Section 3(c) hereof. If during that 10 (ten) day period, Licensor and Licensee do not jointly select an arbitrator, then the arbitrator shall be administratively appointed by the Birmingham, AL Regional Office of the American Arbitration Association, and neither the Licensor nor Licensee shall have the right to object to such appointment. Any arbitration pursuant to this Section 8 shall be conducted on an expedited basis and shall be binding upon Licensor and Licensee. Licensor and Licensee shall use their respective best efforts to conclude such arbitration within 45 (forty-five) days from the date an arbitrator is elected pursuant to this Section 8. The prevailing party in any arbitration pursuant to this Section 8 shall be entitled to recover from the other party all reasonable out-

of-pocket expenses in connection with such arbitration including but not limited to the fees of the arbitrator, reasonable legal fees and disbursements and business-class travel and lodging expenses. Escrow Agent shall be entitled to fully rely upon the decision and rulings of such arbitrator.

9. ENTIRE AGREEMENT

This Escrow Agreement, including Exhibits A, B and C hereto, constitutes the entire agreement among the parties concerning the subject matter hereof and shall supersede all previous communications, representations, understandings and agreements, either oral or written among the parties. This Escrow Agreement is intended to be and shall be treated as an agreement separate and distinct from the License Agreement.

10. NOTICE

All notices required or permitted by this Escrow Agreement shall be sufficiently served by mailing the same by certified or registered mail, return receipt requested, to the parties at their respective addresses, as follows:

(a) Escrow Agent:

_____

_____

_____

Attn: _____

Ref: _____

(b) Licensor:

_____

_____

_____

Attn: _____

(c) Licensee:

_____

_____

_____

Attn: _____

11. COUNTERPARTS

This Escrow Agreement may be executed in one or more counterparts, each of which shall be deemed an original, and all of which taken together shall constitute one and the same instrument.

12. GOVERNING LAW

This Escrow Agreement shall be governed by and construed in accordance with the laws of the State of Alabama, without regard to its choice-of-laws or conflicts-of-law provisions.

13. SEVERABILITY

In the event any of the provisions of this Escrow Agreement shall be held by a court of competent jurisdiction to be contrary to any state or federal law, the remaining provisions of this Escrow Agreement will remain in full force and effect.

14. HEADINGS

The section headings in this Escrow Agreement do not form a part of it, but are for convenience only and shall not limit or affect the meaning of the provisions.

15. MISCELLANEOUS

(a) If in doubt as to its duties hereunder, Escrow Agent may consult with counsel of its choice.

(b) Nothing in this Agreement shall impose on the Escrow Agent the duty to qualify to do business or act as fiduciary in any jurisdiction other than

IN WITNESS WHEREOF, the parties have executed this Escrow Agreement on the date first above written.

As Escrow Agent: _____
Name and title

_____ _____
Signature Date

As Licensor: _____
Name and title

_____ _____
Signature Date

As Licensee: _____
Name and title

_____ _____
Signature Date

EXHIBIT A
DOCUMENTATION

EXHIBIT B
CERTIFICATE AS TO DEPOSIT OF ADDITIONAL SOURCE CODES

_____("Licensor") hereby certifies to_____("Licensee) that Licensor has delivered to Escrow Agent on _____, 20__, to be held in escrow pursuant to the terms of the Escrow Agreement dated as of_____, 20__, among Licensor, Licensee and Escrow Agent, one copy of each of the following Source Codes:

[describe source codes]

Dated:_____, 20__

CONTRACTOR
As Licensor: _____
Name and title

_____ _____
Signature Date

EXHIBIT C
FEES

EXHIBIT D

[Insert Form of License Agreement per Introductory paragraph of Escrow Agreement.]

References

SAE #	Title	Date Published
J10	Methods of Test for Paints - Part J10: Determination of Deposition Efficiency of Coating Powders	Sep 15, 1998
J211	Instrumentation for Impact Test—Part 2: Photographic Instrumentation	May 1, 2001
J287	Driver Hand Control Reach	Feb 1, 2007
J366	Exterior Sound Level for Heavy Trucks and Buses	Feb 1, 1987
J382	Windshield Defrosting Systems Performance Requirements - Trucks, Buses, and Multipurpose Vehicles.	Jan 1, 1994
J534	Lubrication Fittings	May 1, 2008
J537	Storage Batteries	Sep 1, 2000
J541	Voltage Drop for Starting Motor Circuits	Oct 1, 1996
J587	License Plate Illumination Devices (Rear Registration Plate Illumination Devices)	Sep 1, 2003
J593	Backup Lamps (Reversing Lamps)	Sep 1, 2005
J673	Automotive Safety Glasses	Oct 1, 2005
J680	Location and Operation of Instruments and Controls in Motor Truck Cabs, Recommended Practice	Sep 1, 1988
J686	Motor Vehicle License Plates	Oct 1, 1999
J689	Curbstone Clearance, Approach, Departure, and Ramp Breakover Angles—Passenger Car and Light Truck	Aug 1, 2009
J833	Human Physical Dimensions	May 1, 2003
J844	Nonmetallic Air Brake System Tubing	Nov 1, 2004
J941	Motor Vehicle Drivers' Eye Locations	Mar 1, 2010
J994	Alarm—Backup—Electric Laboratory Performance Testing	Mar 1, 2009
J1050	Describing and Measuring the Driver's Field of View	Jan 1, 2003
J1113	Electromagnetic Compatibility Component Test Procedure Part 42, Conducted Transient Emissions	Oct 1, 2006
J1127	Low Voltage Battery Cable	Mar 1, 2010
J1128	Low Voltage Primary Cable	Dec 1, 2005
J1149	Metallic Air Brake System Tubing and Pipe	Aug 1, 2007
J1292	Automobile and Motor Coach Wiring	Jan 1, 2008
J1455	Recommended Environmental Practices for Electronic Equipment Design in Heavy-Duty Vehicle Applications	Jun 1, 2006
J1587	Joint SAE/TMC Electronic Data Interchange between Microcomputer Systems in Heavy-Duty Vehicle Applications, Recommended Practice	Jan 1, 1996
J1708	Serial Data Communications Between Microcomputer Systems in Heavy-Duty Vehicle Applications	Oct 1, 2008
J1986	Balance Weight and Rim Flange Design Specifications, Test Procedures, and Performance Recommendations	Jan 1, 2006
J1939	Data Link Layer	Dec 1, 2006
J1995	Engine Power Test Code - Spark Ignition and Compression Ignition - Gross Power Rating, Standard;	Jun 1, 1990
J2402	Road Vehicles—Symbols for Controls, Indicators, and Tell-tales	Jan 1, 2010

J2711	Recommended Practice for Measuring Fuel Economy and Emissions of Hybrid-Electric and Conventional Heavy-Duty Vehicles	Sept 1, 2002

Abbreviation and Acronyms

A/C air conditioning
ABS anti-lock braking system
AC alternating current
ACQ alkaline copper quaternary
ADA Americans with Disabilities Act
Ah amp hour
ALR auto-locking retractor
APA The Engineered Wood Association, formerly the American Plywood Association
APC automatic passenger counter
APTA American Public Transportation Association
ASTM ASTM International, formerly the American Society for Testing and Materials
ATC automatic traction control
AVL automatic vehicle location
AWG American Wire Gauge
BAFO Best and Final Offer
BMS Battery Management System
BRT bus rapid transit
CARB California Air Resources Board
CCS climate control system
CCTV closed-circuit television
cfm cubic feet per minute
CGA Compressed Gas Association
CNG compressed natural gas
dB decibel
DBE disadvantaged business enterprise
DC direct current
DDU driver display unit
DEF diesel exhaust fluid
DOT Department of Transportation
DPF diesel particulate filter
ECM Engine Control and Monitoring
ECS emission control system
ELR emergency locking retractor
EMI electromagnetic interference
EPA Environmental Protection City
ESS energy storage system
FEA Finite Element Analysis
FMEA failure mode effects analysis
FMCSA Federal Motor Carrier Safety Administration
FMCSR Federal Motor Carrier Safety Regulations
FMVSS Federal Motor Vehicle Safety Standards
FTA Federal Transit Administration
GAWR gross axle weight rated
GPS global positioning system
GVW gross vehicle weight

GVWR	gross vehicle weight rated
H-point	hip-point
HDS	hybrid drive system
HMI	human-machine interface
HSC	hybrid system controller
HV	high voltage
HVAC	heating, ventilation and air conditioning
I/O	input/output
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Standards Organization
kJ	kilojoule
LEL	LED emergency light
LV	low voltage
mA	milliampere
MDT	mobile data terminal
MPa	mega-Pascal
NC	normally closed
NFPA	National Fire Protection Association
NGV	natural gas vehicle
NOx	nitrogen oxide
NO	normally open
NTP	notice to proceed
OEM	original equipment manufacturer
OSI	Open Systems Interconnect
PA	public address
PMO	project management oversight
PPV	price per vehicle
PRD	pressure relief device
psi	pounds per square inch
RF	radio frequency
RFI	radio frequency interference
RTC	real-time clock
SAE	SAE International, formerly the Society of Automotive Engineers
scf	standard cubic feet
SLW	seated load weight
SOC	state of change
UL	Underwriters Laboratories
UNECE	United Nations Economic Commission for Europe
V DC	volts of direct current
Wh	watt-hours
VIN	vehicle information number