



State of Oklahoma
Office of Management and Enterprise
Services
Central Purchasing

Solicitation Cover
Page

1. Solicitation #: 0900000377

2. Solicitation Issue Date: 06/18/2019

3. Brief Description of Requirement:

The Oklahoma Office of Management and Enterprise Services (OMES) Central Purchasing Division (CP) is issuing this Request for Proposal to select qualified suppliers for ADA transit vehicles in order for State and Purchasing Entities to utilize.

4. Response Due Date¹: 08/07/2019

Time: 3:00 PM CST/CDT

5. Issued by and return sealed bid to²: **Solicitation 0900000377**

U.S. Postal Delivery Address: 5005 N. Lincoln Blvd

OKC, OK 73105

Common Carrier Delivery Address: 5005 N. Lincoln Blvd

OKC, OK 73105

Electronic Submission Address: None

6. Solicitation Type (type "X" at one below):

- ☐ Invitation to Bid
☒ Request for Proposal
☐ Request for Quote

7. Contracting Officer:

Name: Jennifer McCaulla

Phone: 405-521-4772

Email: Jennifer.McCaulla@omes.ok.gov

¹ Amendments to solicitation may change the Response Due Date (read GENERAL PROVISIONS, section 3, "Solicitation Amendments")

² If "U.S. Postal Delivery" differs from "Carrier Delivery, use "Carrier Delivery" for courier or personal deliveries

TABLE OF CONTENTS

A GENERAL PROVISIONS..... 5

B. SPECIAL PROVISIONS10

C. SOLICITATION SPECIFICATIONS.....15

D. EVALUATION16

E. INSTRUCTIONS TO BIDDER18

F. CHECKLIST21

G. FEDERAL TRANSIT ADMINISTRATION SPECIAL PROVISIONS22

H. PRICE AND COST23



Responding Bidder Information

*"Certification for Competitive Bid and Contract" **MUST** be submitted along with the response to the Solicitation.*

1. RE: Solicitation # 0900000377

2. Bidder General Information:

FEI / SSN : _____ Supplier ID: _____

Company Name: _____

3. Bidder Contact Information:

Address: _____

City: _____ State: _____ Zip Code: _____

Contact Name: _____

Contact Title: _____

Phone #: _____ Fax #: _____

Email: _____ Website: _____

4. Oklahoma Sales Tax Permit¹:

☐ YES – Permit #: _____

☐ NO – Exempt pursuant to Oklahoma Laws or Rules – Attach an explanation of exemption

5. Registration with the Oklahoma Secretary of State:

☐ YES - Filing Number: _____

☐ NO - Prior to the contract award, the successful bidder will be required to register with the Secretary of State or must attach a signed statement that provides specific details supporting the exemption the supplier is claiming (www.sos.ok.gov or 405-521-3911).

6. Workers' Compensation Insurance Coverage:

Bidder is required to provide with the bid a certificate of insurance showing proof of compliance with the Oklahoma Workers' Compensation Act.

☐ YES – Include with the bid a certificate of insurance.

☐ NO – Exempt from the Workers' Compensation Act pursuant to 85A O.S. § 2(18)(b)(1-11) – Attach a written, signed, and dated statement on letterhead stating the reason for the exempt status.²

¹ For frequently asked questions concerning Oklahoma Sales Tax Permit, see <https://www.ok.gov/tax/Businesses/index.html>

² For frequently asked questions concerning workers' compensation insurance, see <https://www.ok.gov/wcc/Insurance/index.html>

7. Disabled Veteran Business Enterprise Act

- ☐ YES – I am a service-disabled veteran business as defined in 74 O.S. §85.44E. Include with the bid response 1) certification of service-disabled veteran status as verified by the appropriate federal agency, and 2) verification of not less than 51% ownership by one or more service-disabled veterans, and 3) verification of the control of the management and daily business operations by one or more service-disabled veterans.
- ☐ NO – Do not meet the criteria as a service-disabled veteran business.

Authorized Signature

Date

Printed Name

Title



**Certification for Competitive
Bid and/or Contract
(Non-Collusion Certification)**

NOTE: A certification shall be included with any competitive bid and/or contract exceeding \$5,000.00 submitted to the State for goods or services.

Agency Name: Office of Management & Enterprise Services Agency Number: 09000

Solicitation or Purchase Order #: 0900000377

Supplier Legal Name: _____

SECTION I [74 O.S. § 85.22]:

A. For purposes of competitive bid,

1. I am the duly authorized agent of the above named bidder submitting the competitive bid herewith, for the purpose of certifying the facts pertaining to the existence of collusion among bidders and between bidders and state officials or employees, as well as facts pertaining to the giving or offering of things of value to government personnel in return for special consideration in the letting of any contract pursuant to said bid;
2. I am fully aware of the facts and circumstances surrounding the making of the bid to which this statement is attached and have been personally and directly involved in the proceedings leading to the submission of such bid; and
3. Neither the bidder nor anyone subject to the bidder's direction or control has been a party:
 - a. to any collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding,
 - b. to any collusion with any state official or employee as to quantity, quality or price in the prospective contract, or as to any other terms of such prospective contract, nor
 - c. in any discussions between bidders and any state official concerning exchange of money or other thing of value for special consideration in the letting of a contract, nor
 - d. to any collusion with any state agency or political subdivision official or employee as to create a sole-source acquisition in contradiction to Section 85.45j.1. of this title.

B. I certify, if awarded the contract, whether competitively bid or not, neither the contractor nor anyone subject to the contractor's direction or control has paid, given or donated or agreed to pay, give or donate to any officer or employee of the State of Oklahoma any money or other thing of value, either directly or indirectly, in procuring this contract herein.

SECTION II [74 O.S. § 85.42]:

For the purpose of a contract for services, the supplier also certifies that no person who has been involved in any manner in the development of this contract while employed by the State of Oklahoma shall be employed by the supplier to fulfill any of the services provided for under said contract.

The undersigned, duly authorized agent for the above named supplier, by signing below acknowledges this certification statement is executed for the purposes of:

☐ the competitive bid attached herewith and contract, if awarded to said supplier;

OR

☐ the contract attached herewith, which was not competitively bid and awarded by the agency pursuant to applicable Oklahoma statutes.

Supplier Authorized Signature

Certified This Date

Printed Name

Title

Phone Number

Email

Fax Number

A. GENERAL PROVISIONS

A.1. Definitions

As used herein, the following terms shall have the following meaning unless the context clearly indicates otherwise:

- A.1.1. "Acquisition" means items, products, materials, supplies, services, and equipment an entity acquires by purchase, lease purchase, lease with option to purchase, or rental;
- A.1.2. "Addendum" means a written restatement of or modification to a Contract Document executed by the Supplier and State.
- A.1.3. "Bid" means an offer in the form of a bid, proposal, or quote a bidder submits in response to a solicitation;
- A.1.4. "Bidder" means an individual or business entity that submits a bid in response to a solicitation;
- A.1.5. "Solicitation" means a request or invitation by the State Purchasing Director or a state agency for a supplier to submit a priced offer to sell acquisitions to the state. A solicitation may be an invitation to bid, request for proposal, or a request for quotation; and
- A.1.6. "Supplier" or "vendor" means an individual or business entity that sells or desires to sell acquisitions to state agencies.

A.2. Bid Submission

- A.2.1. Submitted bids shall be in strict conformity with the instructions to bidders and shall be submitted with a completed Responding Bidder Information, OMES-FORM-CP-076, and any other forms required by the solicitation.
- A.2.2. Bids shall be submitted to the Central Purchasing Division in a single envelope, package, or container and shall be sealed, unless otherwise detailed in the solicitation. The name and address of the bidder shall be inserted in the upper left corner of the single envelope, package, or container. SOLICITATION NUMBER AND SOLICITATION RESPONSE DUE DATE AND TIME MUST APPEAR ON THE FACE OF THE SINGLE ENVELOPE, PACKAGE, OR CONTAINER.
- A.2.3. The required certification statement, "Certification for Competitive Bid and/or Contract (Non-Collusion Certification)", OMES-FORM-CP-004, must be made out in the name of the bidder and must be properly executed by an authorized person, with full knowledge and acceptance of all its provisions.
- A.2.4. All bids shall be legible and completed in ink or with electronic printer or other similar office equipment. Any corrections to bids shall be identified and initialed in ink by the bidder. Penciled bids and penciled corrections shall NOT be accepted and will be rejected as non-responsive. In addition to a hard copy submittal, the bidder will also be required to submit an electronic copy. Electronic responses must be submitted in the identical format contained in the solicitation (for example Microsoft Word, Microsoft Excel, but not Adobe PDF). In the event the hard copy of the price worksheets and electronic copy of the price worksheets do not agree, the electronic copy will prevail.
- A.2.5. All bids submitted shall be subject to the Oklahoma Central Purchasing Act, Central Purchasing Rules, and other statutory regulations as applicable, these General Provisions, any Special Provisions, solicitation specifications, required certification statement, and all other terms and conditions listed or attached herein—all of which are made part of this solicitation.

A.3. Solicitation Amendments

- A.3.1. If an "Amendment of Solicitation", OMES-FORM-CP-011, is issued, the bidder shall acknowledge receipt of any/all amendment(s) to solicitations by signing and returning the solicitation amendment(s). Amendment acknowledgement(s) may be submitted with the bid or may be forwarded separately. If forwarded separately, amendment acknowledgement(s) must contain the solicitation number and response due date and time on the front of the envelope. The Central Purchasing Division must receive the amendment acknowledgement(s) by the response due

date and time specified for receipt of bids for the bid to be deemed responsive. Failure to acknowledge solicitation amendments may be grounds for rejection.

- A.3.2. No oral statement of any person shall modify or otherwise affect the terms, conditions, or specifications stated in the solicitation. All amendments to the solicitation shall be made in writing by the Central Purchasing Division.
- A.3.3. It is the bidder's responsibility to check the OMES/Central Purchasing Division website frequently for any possible amendments that may be issued. The Central Purchasing Division is not responsible for a bidder's failure to download any amendment documents required to complete a solicitation.

A.4. Bid Change

If the bidder needs to change a bid prior to the solicitation response due date, a new bid shall be submitted to the Central Purchasing Division with the following statement "This bid supersedes the bid previously submitted" in a single envelope, package, or container and shall be sealed, unless otherwise detailed in the solicitation. The name and address of the bidder shall be inserted in the upper left corner of the single envelope, package, or container. SOLICITATION NUMBER AND SOLICITATION RESPONSE DUE DATE AND TIME MUST APPEAR ON THE FACE OF THE SINGLE ENVELOPE, PACKAGE, OR CONTAINER.

A.5. Certification Regarding Debarment, Suspension, and Other Responsibility Matters

By submitting a response to this solicitation:

- A.5.1. The prospective primary participant and any subcontractor certifies to the best of their knowledge and belief, that they and their principals or participants:
 - A.5.1.1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal, State or local department or agency;
 - A.5.1.2. Have not within a three-year period preceding this proposal been convicted of or pled guilty 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) contract; or for violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
 - A.5.1.3. 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 A.5.1.2. of this certification; and
 - A.5.1.4. Have not within a three-year period preceding this application/proposal had one or more public (Federal, State, or local) contracts terminated for cause or default.
- A.5.2. Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to its solicitation response.

A.6. Bid Opening

Sealed bids shall be opened by the Central Purchasing Division at 5005 N. Lincoln Blvd. Suite 300, Oklahoma City, Oklahoma, 73105 at the time and date specified in the solicitation as Response Due Date and Time.

A.7. Open Bid / Open Record

Pursuant to the Oklahoma Public Open Records Act, a public bid opening does not make the bid(s) immediately accessible to the public. The procurement or contracting agency shall keep the bid(s) confidential, and provide prompt and reasonable access to the records only after a contract is awarded or the solicitation is cancelled. This practice protects the integrity of the competitive bid process and prevents excessive disruption to the procurement process. The interest of achieving the best value for the State of Oklahoma outweighs the interest of vendors immediately knowing the contents of competitor's bids. [51 O.S. § 24A.5(5)]

Additionally, financial or proprietary information submitted by a bidder may be designated by the Purchasing Director as confidential and the procurement entity may reject all requests to disclose information designated as confidential pursuant to 62 O.S. (2012) § 34.11.1(H)(2) and 74 O.S. (2011) § 85.10. Bidders claiming any portion of their bid as proprietary or confidential must specifically identify what documents or portions of documents they consider confidential and identify applicable law supporting their claim of confidentiality. The State Purchasing Director shall make the final decision as to whether the documentation or information is confidential pursuant to 74 O.S. §

85.10. Otherwise, documents and information a bidder submits as part of or in connection with a bid are public records and subject to disclosure after contract award or the solicitation is cancelled.

A.8. Late Bids

Bids received by the Central Purchasing Division after the response due date and time shall be deemed non-responsive and shall NOT be considered for any resultant award.

A.9. Legal Contract

- A.9.1. Submitted bids are rendered as a legal offer and any bid, when accepted by the Central Purchasing Division, shall constitute a contract.
- A.9.2. The Contract resulting from this solicitation may consist of the following documents in the following order of precedence:
 - A.9.2.1. Any Addendum to the Contract;
 - A.9.2.2. Purchase order, as amended by Change Order (if applicable);
 - A.9.2.3. Solicitation, as amended (if applicable); and
 - A.9.2.4. Successful bid (including required certifications), to the extent the bid does not conflict with the requirements of the solicitation or applicable law.
- A.9.3. Any contract(s) awarded pursuant to the solicitation shall be legibly written or typed.

A.10. Pricing

- A.10.1. Bids shall remain firm for a minimum of sixty (60) days from the solicitation closing date.
- A.10.2. Bidders guarantee unit prices to be correct.
- A.10.3. In accordance with 74 O.S. §85.40, ALL travel expenses to be incurred by the supplier in performance of the Contract shall be included in the total bid price/contract amount.

A.11. Manufacturers' Name and Approved Equivalents

Unless otherwise specified in the solicitation, manufacturers' names, brand names, information and/or catalog numbers listed in a specification are for information and not intended to limit competition. Bidder may offer any brand for which they are an authorized representative, and which meets or exceeds the specification for any item(s). However, if bids are based on equivalent products, indicate on the bid form the manufacturer's name and number. Bidder shall submit sketches, descriptive literature, and/or complete specifications with their bid. Reference to literature submitted with a previous bid will not satisfy this provision. The bidder shall also explain in detail the reason(s) why the proposed equivalent will meet the specifications and not be considered an exception thereto. Bids that do not comply with these requirements are subject to rejection.

A.12. Clarification of Solicitation

- A.12.1. Clarification pertaining to the contents of this solicitation shall be directed in writing to the Central Purchasing Contracting Officer specified in the solicitation, and must be prior to the closing date of the solicitation.
- A.12.2. If a bidder fails to notify the State of an error, ambiguity, conflict, discrepancy, omission or other error in the SOLICITATION, known to the bidder, or that reasonably should have been known by the bidder, the bidder shall submit a bid at its own risk; and if awarded the contract, the bidder shall not be entitled to additional compensation, relief, or time, by reason of the error or its later correction. If a bidder takes exception to any requirement or specification contained in the SOLICITATION, these exceptions must be clearly and prominently stated in their response.
- A.12.3. Bidders who believe proposal requirements or specifications are unnecessarily restrictive or limit competition may submit a written request for administrative review to the contracting officer listed on the solicitation. This request must be made prior to the closing date of the solicitation.

A.13. Negotiations

- A.13.1. In accordance with Title 74 §85.5, the State of Oklahoma reserves the right to negotiate with one, selected, all or none of the vendors responding to this solicitation to obtain the best value for the State. Negotiations could entail discussions on products, services, pricing, contract terminology or any other issue that may mitigate the State's risks. The State shall consider all issues negotiable and not artificially constrained by internal corporate policies. Negotiation may be with one or more vendors, for any and all items in the vendor's offer.
- A.13.2. Firms that contend that they lack flexibility because of their corporate policy on a particular negotiation item shall face a significant disadvantage and may not be considered. If such negotiations are conducted, the following conditions shall apply:
- A.13.3. Negotiations may be conducted in person, in writing, or by telephone.
- A.13.4. Negotiations shall only be conducted with potentially acceptable offers. The State reserves the right to limit negotiations to those offers that received the highest rankings during the initial evaluation phase.
- A.13.5. Terms, conditions, prices, methodology, or other features of the bidders offer may be subject to negotiations and subsequent revision. As part of the negotiations, the bidder may be required to submit supporting financial, pricing, and other data in order to allow a detailed evaluation of the feasibility, reasonableness, and acceptability of the offer.
- A.13.6. The requirements of the Request for Proposal shall not be negotiable and shall remain unchanged unless the State determines that a change in such requirements is in the best interest of the State Of Oklahoma.

A.14. Rejection of Bid

The State reserves the right to reject any bids that do not comply with the requirements and specifications of the solicitation. A bid may be rejected when the bidder imposes terms or conditions that would modify requirements of the solicitation or limit the bidder's liability to the State. Other possible reasons for rejection of bids are listed in OAC 260:115-7-32.

A.15. Award of Contract

- A.15.1. The State Purchasing Director may award the Contract to more than one bidder by awarding the Contract(s) by item or groups of items, or may award the Contract on an ALL OR NONE basis, whichever is deemed by the State Purchasing Director to be in the best interest of the State of Oklahoma.
- A.15.2. Contract awards will be made to the lowest and best bidder(s) unless the solicitation specifies that best value criteria is being used.
- A.15.3. In order to receive an award or payments from the State of Oklahoma, suppliers must be registered. The vendor registration process can be completed electronically through the OMES website at the following link: <https://www.ok.gov/dcs/vendors/index.php>.

A.16. Contract Modification

- A.16.1. The Contract is issued under the authority of the State Purchasing Director who signs the Contract. The Contract may be modified only through a written Addendum, signed by the State Purchasing Director and the supplier.
- A.16.2. Any change to the Contract, including but not limited to the addition of work or materials, the revision of payment terms, or the substitution of work or materials, directed by a person who is not specifically authorized by the Central Purchasing Division in writing, or made unilaterally by the supplier, is a breach of the Contract. Unless otherwise specified by applicable law or rules, such changes, including unauthorized written Addendums, shall be void and without effect, and the supplier shall not be entitled to any claim under this Contract based on those changes. No oral statement of any person shall modify or otherwise affect the terms, conditions, or specifications stated in the resultant Contract.

A.17. Delivery, Inspection and Acceptance

- A.17.1. Unless otherwise specified in the solicitation or awarding documents, all deliveries shall be F.O.B. Destination. The supplier(s) awarded the Contract shall prepay all packaging, handling,

shipping and delivery charges and firm prices quoted in the bid shall include all such charges. All products and/or services to be delivered pursuant to the Contract shall be subject to final inspection and acceptance by the State at destination. "Destination" shall mean delivered to the receiving dock or other point specified in the purchase order. The State assumes no responsibility for goods until accepted by the State at the receiving point in good condition. Title and risk of loss or damage to all items shall be the responsibility of the supplier until accepted by the receiving agency. The supplier(s) awarded the Contract shall be responsible for filing, processing, and collecting any and all damage claims accruing prior to acceptance.

- A.17.2. Supplier(s) awarded the Contract shall be required to deliver products and services as bid on or before the required date. Deviations, substitutions or changes in products and services shall not be made unless expressly authorized in writing by the Central Purchasing Division.

A.18. Invoicing and Payment

- A.18.1. Upon submission of an accurate and proper invoice, the invoice shall be paid in arrears after products have been delivered or services provided and in accordance with applicable law. Invoices shall contain the purchase order number, a description of the products delivered or services provided, and the dates of such delivery or provision of services. An invoice is considered proper if sent to the proper recipient and goods or services have been received.
- A.18.2. State Acquisitions are exempt from sales taxes and federal excise taxes.
- A.18.3. Pursuant to 74 O.S. §85.44(B), invoices will be paid in arrears after products have been delivered or services provided.
- A.18.4. Payment terms will be net 45. Interest on late payments made by the State of Oklahoma is governed by 62 O.S. § 34.72.
- A.18.5. Additional terms which provide discounts for earlier payment may be evaluated when making an award. Any such additional terms shall be no less than ten (10) days increasing in five (5) day increments up to thirty (30) days. The date from which the discount time is calculated shall be the date of a proper invoice.

A.19. Tax Exemption

State agency acquisitions are exempt from sales taxes and federal excise taxes. Bidders shall not include these taxes in price quotes.

A.20. Audit and Records Clause

- A.20.1. As used in this clause, "records" includes books, documents, accounting procedures and practices, and other data, regardless of type and regardless of whether such items are in written form, in the form of computer data, or in any other form. In accepting any Contract with the State, the successful bidder(s) agree any pertinent State or Federal agency will have the right to examine and audit all records relevant to execution and performance of the resultant Contract.
- A.20.2. The successful supplier(s) awarded the Contract(s) is required to retain records relative to the Contract for the duration of the Contract and for a period of seven (7) years following completion and/or termination of the Contract. If an audit, litigation, or other action involving such records is started before the end of the seven (7) year period, the records are required to be maintained for two (2) years from the date that all issues arising out of the action are resolved, or until the end of the seven (7) year retention period, whichever is later.

A.21. Non-Appropriation Clause

The terms of any Contract resulting from the solicitation and any Purchase Order issued for multiple years under the Contract are contingent upon sufficient appropriations being made by the Legislature or other appropriate government entity. Notwithstanding any language to the contrary in the solicitation, purchase order, or any other Contract document, the procuring agency may terminate its obligations under the Contract if sufficient appropriations are not made by the Legislature or other appropriate governing entity to pay amounts due for multiple year agreements. The Requesting (procuring) Agency's decisions as to whether sufficient appropriations are available shall be accepted by the supplier and shall be final and binding.

A.22. Choice of Law

Any claims, disputes, or litigation relating to the solicitation, or the execution, interpretation, performance, or enforcement of the Contract shall be governed by the laws of the State of Oklahoma.

A.23. Choice of Venue

Venue for any action, claim, dispute or litigation relating in any way to the Contract shall be in Oklahoma County, Oklahoma.

A.24. Termination for Cause

- A.24.1. The supplier may terminate the Contract for default or other just cause with a 30-day written request and upon written approval from the Central Purchasing Division. The State may terminate the Contract for default or any other just cause upon a 30-day written notification to the supplier.
- A.24.2. The State may terminate the Contract immediately, without a 30-day written notice to the supplier, when violations are found to be an impediment to the function of an agency and detrimental to its cause, when conditions preclude the 30-day notice, or when the State Purchasing Director determines that an administrative error occurred prior to Contract performance.
- A.24.3. If the Contract is terminated, the State shall be liable only for payment for products and/or services delivered and accepted.

A.25. Termination for Convenience

- A.25.1. The State may terminate the Contract, in whole or in part, for convenience if the State Purchasing Director determines that termination is in the State's best interest. The State Purchasing Director shall terminate the Contract by delivering to the supplier a Notice of Termination for Convenience specifying the terms and effective date of Contract termination. The Contract termination date shall be a minimum of 60 days from the date the Notice of Termination for Convenience is issued by the State Purchasing Director.
- A.25.2. If the Contract is terminated, the State shall be liable only for products and/or services delivered and accepted, and for costs and expenses (exclusive of profit) reasonably incurred prior to the date upon which the Notice of Termination for Convenience was received by the supplier.

A.26. Insurance

The successful supplier(s) awarded the Contract shall obtain and retain insurance, including workers' compensation, automobile insurance, medical malpractice, and general liability, as applicable, or as required by State or Federal law, prior to commencement of any work in connection with the Contract. The supplier awarded the Contract shall timely renew the policies to be carried pursuant to this section throughout the term of the Contract and shall provide the Central Purchasing Division and the procuring agency with evidence of such insurance and renewals.

A.27. Employment Relationship

The Contract does not create an employment relationship. Individuals performing services required by this Contract are not employees of the State of Oklahoma or the procuring agency. The supplier's employees shall not be considered employees of the State of Oklahoma nor of the procuring agency for any purpose, and accordingly shall not be eligible for rights or benefits accruing to state employees.

A.28. Compliance with the Oklahoma Taxpayer and Citizen Protection Act of 2007

By submitting a bid for services, the bidder certifies that they, and any proposed subcontractors, are in compliance with 25 O.S. 1313 and participate in the Status Verification System. The Status Verification System is defined in 25 O.S. §1312 and includes but is not limited to the free Employment Verification Program (E-Verify) through the Department of Homeland Security and available at www.dhs.gov/E-Verify.

A.29. Compliance with Applicable Laws

The products and services supplied under the Contract shall comply with all applicable Federal, State, and local laws, and the supplier shall maintain all applicable licenses and permit requirements.

A.30. Special Provisions

Special Provisions set forth in SECTION B apply with the same force and effect as these General Provisions. However, conflicts or inconsistencies shall be resolved in favor of the Special Provisions.

B. SPECIAL PROVISIONS

B.1. DEFINITIONS

As used herein, the following terms shall have the following meaning unless the context clearly indicates otherwise:

- B.1.1. "Acquisition" means items, products, materials, supplies, services, and equipment an entity acquires by purchase, lease purchase, lease with option to purchase, or rental;
- B.1.2. "Addendum" means a written restatement of or modification to a Contract Document executed by the Supplier and State.
- B.1.3. "Bid" means an offer in the form of a bid, proposal, or quote a bidder submits in response to a solicitation;
- B.1.4. "Bidder" means an individual or business entity that submits a bid in response to a solicitation;
- B.1.5. "Solicitation" means a request or invitation by the State Purchasing Director or a state agency for a supplier to submit a priced offer to sell acquisitions to the state. A solicitation may be an invitation to bid, request for proposal, or a request for quotation; and
- B.1.6. "Supplier" or "vendor" means an individual or business entity that sells or desires to sell acquisitions to state agencies.
- B.1.7. "DBA" – Decibels with reference to 0.0002 microbar as measured on the "A" scale.
- B.1.8. "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.
- B.1.9. "Standee Line" – A line marked across the coach aisle in line with the driver's barrier to designate the forward area which passengers may occupy when the coach is moving.
- B.1.10. "Free Floor Space" – Floor area available to standees, excluding ingress/egress areas, are under seats, area occupied by feet of seated passengers, and the vestibule area.
- B.1.11. "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.
- B.1.12. "Seated Load" – One hundred and fifty (150) pounds (68kg) for every designed passenger seating position and for the driver.
- B.1.13. "Gross Load" – Total of curb weight, seated load, and standees at 150 pounds (68 kg) per individual passenger.
- B.1.14. "SLW (Seated Load Weight)" – Curb weight plus seated load.
- B.1.15. "GVWR (Gross Vehicle Weight Rated)" – Curb weight plus the maximum vehicle weight to which the bus can be safely loaded.
- B.1.16. "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.
- B.1.17. "Fireproof" – Materials that will not burn or melt at temperatures less than 2,000 degrees Fahrenheit (1,093 C)
- B.1.18. "Fire-Resistant" – Materials that comply with Federal Motor Vehicle Safety Standard (FMVSS) 571,302 – Flammability of interior materials, or having a flame spread index less than 150 as measured in a radiant panel flame test per ASTM-E162-75.
- B.1.19. "Human Dimensions" - The human dimensions used are defined in SAE Recommended Practice J833
- B.1.20. "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.
- B.1.21. "Heavy Heavy-Duty Gas Engine" – Heavy heavy-duty gas engines have sleeved cylinder liners, are designed for multiple rebuilds, and a rated horsepower that generally exceeds 250.
- B.1.22. "Operator's Eye Range" – The 95th-percentile ellipse defined in SAE Recommended Practice J941, except that the height of the ellipse should be determined from the seat at its reference height.
- B.1.23. "Head Injury Criteria" – The resultant acceleration at the center of gravity of the head form expressed as a multiple of g, the acceleration of gravity (t1 and t2 = any two points in time during impact).
- B.1.24. "ATSM" – American Society of Testing Materials
- B.1.25. "SAE" – Society of Automotive Engineers
- B.1.26. "ANSI" – American National Standards Institute
- B.1.27. "ASHRAE" - American Society of Heating, Refrigerating, and Air Conditioning

- B.1.28. "SPI" – Society of the Plastics Industry
- B.1.29. "USDHEW" - United States Department of Health, Education, and Welfare
- B.1.30. "JIC" – Joint Industrial Council
- B.1.31. "BMCS" – Bureau of Motor Carrier Safety
- B.1.32. "FMVSS" – Federal Motor Vehicle Safety Standards
- B.1.33. "ABS" - Antilock Braking System
- B.1.34. "ADA" – American with Disabilities Act
- B.1.35. "ANSI" – American National Standards Institute
- B.1.36. "ASHRAE" – American Society of Heating, Refrigerating and Air Conditioning Engineers
- B.1.37. "ASTM" – American Society for Testing and Materials
- B.1.38. "CAN/CGA" – Canadian Gas Association
- B.1.39. "CFR" – Code of Federal Regulations
- B.1.40. "CGA" – Compressed Gas Association
- B.1.41. "CHP" – California Highway Patrol
- B.1.42. "CNG" - Compressed Natural Gas
- B.1.43. "DOE" – US Department of Energy
- B.1.44. "DOT" – US Department of Transportation
- B.1.45. "EMI" – Electromagnetic Interface
- B.1.46. "EPA" – Environmental Protection Agency
- B.1.47. "FMEA" – Failure Modes and Effects Analysis
- B.1.48. "FMCSR" – Federal Motor Carrier Safety Regulations
- B.1.49. "FMVSS" – Federal Motor Vehicle Safety Standards
- B.1.50. "FTA" – Federal Transit Administration
- B.1.51. "IAS" – International Approval Services
- B.1.52. "I/O" – Input/Output
- B.1.53. "ISO" – International Organization for Standardization
- B.1.54. "JIC" – Joint Industrial Council
- B.1.55. "LED" – Light Emitting Diode
- B.1.56. "LEL" – Lower Explosive Limit
- B.1.57. "LNG" – Liquefied Natural Gas
- B.1.58. "MAWP" – Maximum Allowable Working Pressure
- B.1.59. "MPH" – Miles Per Hour
- B.1.60. "NAFTP" – National Alternative Fuel Training Program
- B.1.61. "NATEF/SAE" – National Automotive Technicians Education Foundation/Automotive Service Excellence
- B.1.62. "NFPA" – National Fire Protection Association
- B.1.63. "NGV" – Natural Gas Vehicle
- B.1.64. "NHTSA" – National Highway Traffic Safety Administration
- B.1.65. "OEM" – Original Equipment Manufacturer
- B.1.66. "OSHA" – Occupational Safety and Health Administration
- B.1.67. "PRD" – Pressure Relief Device
- B.1.68. "RFI" – Radio Frequency Interface
- B.1.69. "SPI" – Society of the Plastics Industry
- B.1.70. "TRC" – Texas Railroad Commission

B.1.71. "UL" – Underwriters Laboratories

B.1.72. "USDOT" – United States Department of Transportation

B.2. CONTRACT PERIOD

- B.2.1.** Under Oklahoma law, the State may not contract for a period longer than one (1) year (the "Initial Term"). By mutual consent of the parties hereto, it is intended that there shall be three (3) options to renew, subject to the terms and conditions set forth herein. Each for duration of one (1) year.
- B.2.2.** After the Initial Term, the Agreement may be renewed annually upon mutual written consent of the parties. Prior to each renewal, the State shall subjectively consider the value of this Contract to the State, the Supplier's performance under the Contract and shall review certain other factors, including but not limited to the a) terms and conditions of Contract Documents to determine validity with current State and other applicable statutes and rules; b) then current products pricing and price discounts offered by Supplier, and c) then current products and support offered by Supplier.
- B.2.3.** If the State determines changes to a Contract Document are required as a condition precedent to renewal, the State and Supplier will cooperate in good faith to evidence such required changes in an Amendment.
- B.2.4.** The State, at its sole option, may choose to exercise an extension for ninety (90) days beyond the final renewal option period, at the Contract pricing rate. If this option is exercised, the State shall notify the Supplier in writing prior to contract end date. The State, at its sole option, may choose to exercise subsequent ninety (90) day extensions, by mutual consent and at the Contract pricing rate, to facilitate the finalization of related terms and conditions of a new award or as needed for transition to a new Supplier.
- B.2.5.** In the alternative, the State Purchasing Director reserves the right to extend any Contract awarded if it is determined to be in the best interest of the State.

B.3. MANDATORY NATURE OF CONTRACT

- B.3.1.** The contract resulting from this procurement will be considered mandatory use for purchases by all State Agencies.
- B.3.2.** All state agencies must use the contract for the products specified herein unless the ordering agency has received a written exception from the Contracting Officer. The State of Oklahoma reserves the right to conduct separate procurements to establish contracts for the same or similar products for any agency's specific needs.

B.4. TYPE OF CONTRACT

- B.4.1.** This contract is for indefinite delivery and indefinite quantity.
- B.4.2.** This contract may be awarded to multiple suppliers for a variety of brands and manufacturers.

B.5. AUTHORIZED USERS

- B.5.1.** Proposals shall cover requirements during the specified period for all State Departments, Boards, Commissions, Agencies and Institutions. The Oklahoma Statutes state that Counties, School Districts, Municipalities and other public bodies may avail themselves of the contract subject to the approval of the successful vendor(s). Each purchasing entity will place orders directly with the winning Bidder(s).
- B.5.1.1.** CHECK APPROPRIATE BOX
- B.5.1.1.1. ☐ Yes, proposal permits usage by entities other than State Agencies.
- B.5.1.1.2. ☐ No, proposal permits usage by State Agencies only.

B.6. STATE PURCHASE CARD

- B.6.1.** The State currently has a VISA card to enable selected State employees to purchase needed goods and services using a State of Oklahoma purchasing card. The State prefers that the successful Bidder will accept this purchasing card as a form of payment. There shall be no additional cost to a requesting entity for use of purchasing cards as a payment method.
- B.6.2.** Acceptance of the State of Oklahoma Purchase Card (P-Card) requires that no charges be posted to the P-Card prior to the shipping of goods. Only the total of goods shipped may be charged to the P-Card upon shipping. All back-ordered goods cannot be charged until received by the supplier and shipped to the State of Oklahoma end user. Upon shipment, an itemized invoice must be emailed to the order requestor within two (2) business days of the charge.
- B.6.2.1.** SIGNATURE OF ACCEPTANCE: _____ DATE: _____
- B.6.2.2.** NAME: _____

B.7. Ordering

B.7.1. Any supplies and/or services to be furnished under this contract shall be ordered by issuance of written purchase orders by State agencies and authorized entities or by the use of Oklahoma's P-card program which is currently with Visa. There is no limit on the number of purchase orders that may be issued. Delivery to multiple destinations may be required. All orders are subject to the terms and conditions of this contract. Any order dated prior to expiration of this contract shall be performed. In the event of conflict between a purchase order and this contract, the contract shall have precedence.

B.8. GRATUITIES

B.8.1. The right of the successful bidder to perform under this contract may be terminated by written notice if the Contracting Officer determines that the successful bidder, or its agent or another representative offered or gave a gratuity (e.g., an entertainment or gift) to an officer, official or employee of Central Purchasing.

B.9. ENERGY CONSERVATION

B.9.1. Oklahoma is an energy conservation State and we welcome any comments on the Bidders response that would indicate energy savings.

B.10. WARRANTY

B.10.1. The Successful bidder agrees the products furnished under this contract shall be covered by the most favorable commercial warranties the Bidder gives to any customer for such products; and rights and remedies provided herein are in addition to and do not limit any rights afforded to the State of Oklahoma by any other clause of this contract.

B.11. PATENTS AND ROYALTIES

B.11.1. The Supplier, without exception, shall indemnify and save harmless the State of Oklahoma and its employees from liability of any nature or kind, including cost and expenses for or on account of any copyrighted, patented or unpatented invention, process, or article manufactured or used in the performance of the contract including its use by the State of Oklahoma. If the Supplier uses any design, device or materials covered by letters, patent or copyright, it is mutually agreed and understood without exception that the RFP prices shall include all royalties or cost arising from the use of such design, device, or materials in any way involved in the work.

B.12. PROPERTY LOSS

B.12.1. The Supplier shall reimburse the government entity for such property loss or damage caused by Supplier, it's employees or for anyone whose acts the Supplier may be liable.

B.13. CONTRACT MANAGEMENT FEE

B.13.1. As empowered by State Statute 74 O.S. §85.33 A, the Office of Management and Enterprise Services imposes, and Suppliers agree to pay a contract management fee in the sum of one percent (1 %) of the combined total quarterly expenditures under this contract. This contract management fee is to be noted on the quarterly "Contract Usage Report" and paid by the Supplier, to OMES, Central Purchasing Division within 45 calendar days from the completion of the quarterly reporting period stated under the section titled "Contract quarterly reporting periods". To ensure the payment is credited properly, the supplier must identify the check as a "contract management fee", the contract number and the quarter reporting.

B.13.2. The contract management fee check should be sent to:

Office of Management and Enterprise Services

Attention: Accounts Receivable

5005 N. Lincoln Boulevard

Oklahoma City, OK 73105

B.14. CONTRACT USAGE REPORTING REQUIREMENTS

B.14.1. Bidder's Report of Sales: Reports shall provide the amounts sold to all political entities that include but are not limited to State Agencies, Counties, Cities, Schools, and Municipalities.

B.14.2. The Contract Usage Report will be sent, electronically, (format: .XLS) and regardless of quantity, within forty-five (45) calendar days upon completion of the quarterly reporting period to:

B.14.2.1. Strategic.Sourcing@omes.ok.gov.

B.14.3. Contract quarterly reporting periods for management fees and usage reports shall be as follows:

REPORTING QUARTER	DUE DATE
January 1 through March 31	May 15 th

April 1 through June 30	August 14 th
July 1 through September 30	November 14 th
October 1 through December 1	February 14 th

- B.14.4.** Failure to provide contract management fees and/or usage reports may result in a whole or partial cancellation or suspension of this Contract. The Supplier shall notify the contracting officer to any delay in providing any usage report or remittance.

B.15. PRICE ADJUSTMENTS

- B.15.1.** Manufacturer's price increases, or other increases in the cost of doing business may not be passed on to the State of Oklahoma. Any price decrease effectuated during the contract period by reason of market change shall be passed on to the State of Oklahoma. No price reduction on a statewide contract may be offered to an agency unless that reduction is offered to all agencies.

B.16. EXTENSION OF RETAIL PRICE WITH REBATES OVER CONTRACT PRICE

- B.16.1.** If the Retail Price is lower than the contract price due to promotions or discounts, the Supplier shall charge the State the Retail Price.
- B.16.2.** Any other instance that causes the Retail Price to be lower than the Contract Price, the Supplier shall charge the State the Retail Price.

B.17. REQUIRED DELIVERY

- B.17.1.** Delivery should be made within 120 calendar days after receipt of order by the successful supplier. If circumstances beyond the control of the supplier cause delivery to be more than 120 calendar days, the supplier shall notify the ordering agency immediately. Vehicles with a build date in excess of 120 calendar days should be noted in the Solicitation Response.
- B.17.2.** The base price for a vehicle is to include delivery to the delivery address for the ordering agency. Vehicles are to be delivered to the ordering agency with a full tank of gas. IF the ordering agency elects to pick up the vehicle at the dealers location, that vehicle is to be turned over to the ordering agency with a full tank of gas.

B.18. PRODUCT AVAILABILITY

- B.18.1.** Vehicles must be a current product model and available for general marketing purposes at the opening of this solicitation. Bidders must use best effort to assure product availability through the duration of the contract period.
- B.18.2.** The awarded dealer will provide vehicles for length of the contract period without any price increases. The only exception will be made if a model is discontinued or is replaced by a new model. Awarded suppliers shall notify the Contracting Officer of the new model and provide pricing sheets with vehicle information within 30 days of discontinuation. The new model will be added if approved by the Contracting Officer.

B.19. AUTHORIZED REPRESENTATIVE & DOCUMENTATION

- B.19.1.** Bidders may offer any brand for which they are an authorized representative, which meets or exceeds the specification. Only Oklahoma licensed dealers may submit proposals for this contract. Per Oklahoma State Statute, Title 74, Section 564, any person or firm engaged in the sale or distribution of motor vehicles within the State of Oklahoma must possess a current, valid Motor Vehicle Dealer License. Bidders should submit a copy of both their Oklahoma dealer's license and a copy of the Manufacturer's license for each manufacturer they are bidding.
- B.19.2.** At the request of any State Agency, County, City, Municipality, School District, suppliers must provide written documentation that guarantees that purchased buses meet all Federal, State, and State Board of Education standards for the year it was manufactured.

B.20. NEWS RELEASES

- B.20.1.** The successful Bidder is not permitted to issue any news releases pertaining to any aspect of the services provided under this contract without prior written consent of the Oklahoma State Purchasing Director. Failure to adhere to this requirement may result in termination of the contract resulting from this solicitation.

B.21. LIMITED CONTACT

- B.21.1.** Pursuant to 260: 115-7-30(e) The State Purchasing Director may limit contact regarding a solicitation between bidders and agency personnel during the solicitation process. The limitation of contact may be described in the solicitation. All communication between bidders and agency personnel regarding a solicitation shall be documented and filed in the acquisition file.
- B.21.2.** All questions and communications shall be directed to the Contracting Officer.

C. SOLICITATION SPECIFICATIONS

C.1. INTRODUCTION

The Oklahoma Office of Management and Enterprise Services (OMES) Central Purchasing Division (CP) is issuing this Request for Proposal (RFP) to select qualified suppliers for ADA transit vehicles in order for State and Purchasing Entities to utilize.

It is the intent of these specifications to set forth minimum standards for the procurement of light transit vehicles that comply with Title 49 Code of Federal Regulations, Part 38 Subpart B, entitled "Americans with Disabilities Act (ADA) Accessibility Specifications for Buses, Vans and Systems." All dimensions and equipment shall comply with the standards as set forth within the 49 CFR. The vehicles shall be new, the most current production model available, and must be compete with manufacturer's standard equipment and accessories, fully serviced and ready for operation. The vehicle shall be equipped to meet all Federal Motor Vehicle Safety Standards and Procedures (FMVSSP) that apply. If these specifications contradict any listed in the Federal Regulations, they are superseded by those of the Federal Regulations.

To take advantage of administrative and cost savings and to ensure that all federal requirements are met, this procurement is assignable to other agencies, organizations, and Tribal Governments funded by the Federal Transit Administration.

Any brand names and specifications mentioned within this document are for reference only. Proposals will only be considered when brochures/specifications are included for each component provided with proposals for evaluation.

C.2. MANDATORY SPECIFICATIONS

- C.2.1.** 24', 12 Passenger, Front Lift, Metal Bus (Attachment A)
- C.2.2.** 24', 12 Passenger, Rear Lift MSFAB (Attachment B)
- C.2.3.** 24', 15 Passenger, Rear Lift, Composite Transit (Attachment D)
- C.2.4.** 24', 15 Passenger, Rear Lift, Metal Transit Bus (Attachment E)
- C.2.5.** 24', 20 Passenger, Front Lift, Composite Transit Bus (Attachment F)
- C.2.6.** 26', 20 Passenger, Front Lift, Metal Transit (Attachment G)
- C.2.7.** 45' CNG Commuter Coach (Attachment H)
- C.2.8.** ADA Minivan (Attachment I)
- C.2.9.** Low 17' Low Floor, Purpose Built Bus (Attachment J)
- C.2.10.** Low Floor, Paratransit Cutaway Bus (Attachment K)
- C.2.11.** Low Floor, CNG Transit (Attachment L)
- C.2.12.** 45' Diesel Commuter Coach (Attachment M).
- C.2.13.** Heavy Duty Transit Low Floor Diesel Bus 30, 35, & 40 (Attachment N)
- C.2.14.** Front Ramp Full Size Conversion Van (Attachment O)
- C.2.15.** Low Floor ADA Trolley (Attachment P)
- C.2.16.** Rear Lift Full Size Conversion Van (Attachment Q)
- C.2.17.** Heavy-Duty Transit Low-Floor CNG Bus 30, 35, & 40 (Attachment R)

D. EVALUATION

D.1. EVALUATION AND AWARD

D.1.1. Bids shall be evaluated on the “best value” determination.

D.1.2. The State reserves the right to request demonstrations and clarifications from any or all-responding Bidders.

D.2. PROPOSAL CLARIFICATION QUESTIONS

The State reserves the right, at its sole discretion, to request clarifications of technical Bids or to conduct discussions for the purpose of clarification with any or all Bidders. The purpose of any such discussions shall be to ensure full understanding of the Bid. If clarifications are made because of such discussion, the Bidder(s) shall put such clarifications in writing. The clarification shall not alter or supplement the Bid.

D.3. COMPETITIVE NEGOTIATIONS OF OFFERS

The State reserves the right to negotiate with one, selected, all or none of the Bidders responding to this Solicitation to obtain the best value for the State. Negotiations could entail discussions on products, services, pricing, contract terminology or any other issue material to an award decision or that may mitigate the State's risks. The State shall consider all issues negotiable and will not be artificially constrained by internal corporate policies. Negotiation may be with one or more Bidders, for any and all items in the Bid.

Firms that contend that they lack flexibility because of their corporate policy on a particular negotiation item shall face a significant disadvantage and may not be considered. If such negotiations are conducted, the following conditions shall apply:

D.3.1. Negotiations may be conducted in person, in writing, or by telephone.

D.3.2. Negotiations shall only be conducted with potentially acceptable Bids. The State reserves the right to limit negotiations to those Bids that received the highest rankings during the initial evaluation phase.

D.3.3. Terms, conditions, prices, methodology, or other features of the Bid may be subject to negotiations and subsequent revision. As part of the negotiations, the Bidder may be required to submit supporting financial, pricing, and other data in order to allow a detailed evaluation of the feasibility, reasonableness, and acceptability of the Bid.

D.3.4. The requirements of this Solicitation shall not be negotiable and shall remain unchanged unless the State determines that a change in such requirements is in the best interest of the State Of Oklahoma.

D.3.5. BEST and FINAL - The State may request best and final Bids if deemed necessary, and shall determine the scope and subject of any best and final request. However, the Bidder should not expect an opportunity to strengthen its bid and should submit its best bid based on the terms and condition set forth in this solicitation.

D.4. EVALUATION PROCESS

D.4.1. Determination of Solicitation Responsiveness

A Responsive Bid is a Bid that meets all of the following Solicitation requirements:

- Responding Bidder Information Sheet complete Form 076
- Certification for Competitive Bid and Contract (Non-Collusion) Form 004
- Pricing Proposal (Attachments A-R) submitted
- Technical Proposal (Attachments A-R) submitted
- Federal Transit Administration Special Provisions (Attachment S) submitted if applicable
- Past Performance Information (Attachment S) submitted
- Amendments, if issued are acknowledged.

Meeting all requirements outlined above allows the offer to proceed in the evaluation process. Failure to meet all of the above may result in the proposal being disqualified from further evaluation.

Note: The following evaluation process is not presented in any sequence as any selection process may overlap the other in the evaluation.

D.4.2. Evaluation of Bid

The Technical section of the Bid is evaluated based on the Solicitation specifications.

D.4.3. Evaluation of Cost

Cost comparisons are performed.

D.4.4. Best Value Evaluation of Products/Services

The award of Contract pursuant to this Solicitation to a Bidder is based upon which Bidder best meets the needs of the State.

The State reserves the right to negotiate with one or more Bidders, at any point during the evaluation and may negotiate any and all content of the Bid.

D.4.5. Each Bidder should be prepared to participate in oral presentations and demonstrations to define the Bid, to introduce the Bidder's team, and to respond to any and all questions regarding the Bid if requested by the State prior to award.

E. INSTRUCTIONS TO BIDDER

E.1. INTRODUCTION

Prospective Bidders are urged to read this Solicitation carefully. Failure to do so shall be at the Bidder's risk. Provisions, terms, and conditions may be stated or phrased differently than in previous solicitations. Irrespective of past interpretations, practices or customs, Bids shall be evaluated and any resultant contract(s) shall be administered in accordance with the plain meaning of the contents hereof. The Bidder is cautioned that the requirements of this Solicitation can be altered only by written Amendment approved by the State and that verbal communications from whatever source are of no effect. In no event shall the Bidder's failure to read and understand any term or condition in this Solicitation constitute grounds for a claim after award of the Contract.

E.2. PREPARATION OF BID

E.2.1. Any usage amounts specified are estimates only and are not guaranteed to be purchased.

E.2.2. Information shall be entered on the form provided or a copy thereof.

E.3. SUBMISSION OF BID

E.3.1. All Bids must be submitted to OMES – CP to the attention of the Contracting Officer as identified on the front page of this Solicitation. It is the Bidder's sole responsibility to submit information in the Bid as requested by this Solicitation. The Bidder's failure to submit required information may cause its Bid to be rejected.

E.3.2. The Bid should be paginated and indexed in alpha order with reference to specific sections of this Solicitation. All Bids shall be legibly written or typed. Any corrections to Bids shall be initialed. Penciled Bids and penciled corrections shall not be accepted and shall be rejected as non-responsive. Unnecessarily elaborate brochures or other presentations beyond those necessary to present a complete and effective Bid are not desired.

E.3.3. Each Bidder must submit one (1) original and one (1) copy of the Bid on flash/thumb drive for a total of two (2) electronic documents in a "machine readable" format. One (1) flash/thumb drive shall be marked as the original and will be considered the official response in evaluating responses for scoring, Open Records Requests, and protest resolution. Each Bid must be submitted in a single sealed envelope, package, or container.

E.3.4. All information relating to price/costs are to be sent in a separate envelope, on a separate flash/thumb drive clearly marked as "Price/Cost"

E.3.5. The name and address of the Bidder shall be inserted in the upper left corner of the single sealed envelope, package, or container. The solicitation number and solicitation response due date and time must appear on the face of the single envelope, package, or container.

E.3.6. Bids shall be in strict conformity with the instructions to Bidder, and shall be submitted with a completed "Responding Bidder Information" OMES Form 076, and any other forms completed as required by this Solicitation.

E.3.7. The required certification statement, "Certification for Competitive Bid and/or Contract (Non-Collusion Certification)", OMES Form 004, must be made out in the name of the Bidder and must be properly executed by an authorized person, with full knowledge and acceptance of all its provisions.

E.3.8. All Bids submitted shall be consistent with the Oklahoma Central Purchasing Act and associated Rules and subject to the Information Services Act and other statutory laws and regulations as applicable.

E.3.9. By submitting a Bid, Bidder agrees not to make any claims for damages or have any rights to damages, because of any misunderstanding or misrepresentation of the specifications or because of any misinformation or lack information.

E.3.10. If a Bidder fails to notify the State of an error, ambiguity, conflict, discrepancy, omission or other error in this Solicitation, known to the Bidder, or an error that reasonably should have been known by the Bidder, the Bidder shall submit a Bid at its own risk; and if awarded the Contract, the Bidder shall not be entitled to additional compensation, relief, or time by reason of the error or its later correction. If a Bidder takes exception to any requirement or specification contained in this Solicitation, these exceptions must be clearly and prominently stated in the Bid.

E.3.11. Bidders should note that this Solicitation reflects changes in the existing operation to increase efficiencies and streamline business environments in the State of Oklahoma. All previous solicitations or resultant contracts should not be either depended upon, perceived or interpreted to have any relevance to this Solicitation..

E.4. PROPRIETARY AND CONFIDENTIAL

E.4.1. Unless otherwise specified in the Oklahoma Open Records Act, Central Purchasing Act, or other applicable law, documents and information a Bidder submits as part of or in connection with a Bid are public records and subject to disclosure. If a Bidder claims any portion of its Bid as financial or proprietary confidential information, the Bidder must specifically identify what documents or portions of documents are considered confidential and identify applicable law supporting the claim of confidentiality. In addition, the Bidder shall submit the information separate and apart from the Bid and mark it Financial or Proprietary and Confidential. Pursuant to the Oklahoma State

Finance Act, the State Purchasing Director shall make the final decision as to whether the separately submitted information is confidential.

- E.4.2.** If the State Purchasing Director does not acknowledge the information as confidential, OMES – CP will return or destroy the information with proper notice to the Bidder and the information will not be considered in the evaluation. A Bid marked, in total, as financial or proprietary and/or Confidential shall not be considered.

E.5. COMMUNICATIONS REGARDING SOLICITATION

- E.5.1.** The Contracting Officer listed on the cover page of this solicitation is the only individual in which the Bidder should be in contact with concerning any issues with this solicitation. Failure to comply with this requirement may result in the Bid being considered non-responsive and not considered for further evaluation.

E.6. ADMINISTRATIVE REVIEW

- E.6.1.** Bidders who believe solicitation requirements or specifications are unnecessarily restrictive or limit competition may submit a request for administrative review, in writing, to the procurement specialist listed herein. To be considered a request for review must be received no later than 3:00 P.M. Central Time on **July 18, 2019**. The State shall promptly respond in writing to each written review request, and where appropriate, issue all revisions, substitutions or clarifications through a written amendment to this Solicitation. Requests for administrative review of technical or contractual requirements shall include the reason for the request, supported by information, and any proposed changes to the requirements.

E.7. GENERAL SOLICITATION QUESTIONS

- E.7.1.** Bidder may submit general questions concerning the specifications of this Solicitation. All questions must be submitted in writing by **July 20, 2019**. Questions must be sent electronically to the Contracting Officer at Jennifer.McCaulla@omes.ok.gov.
- E.7.2.** Questions received via any other means will not be addressed.
- E.7.3.** These questions shall be answered directly in the form of an amendment and posted on the OMES - CP website. Bidders are advised that any questions received after 3:00 P.M. Central Time on (**July 20, 2019**) shall not be answered.

E.8. ELECTRONIC FUNDS TRANSFER (EFT)

- E.8.1.** The State of Oklahoma passed legislation in 2012 requiring funds disbursed from the State Treasury be sent electronically. If awarded a contract will your company accept payment for invoices from the State by EFT:
- E.8.1.1.** _____ Yes, Bidder will accept payment by EFT.
- E.8.1.2.** _____ No, Bidder will not accept payment by EFT.

E.9. BID DELIVERABLES

- E.9.1.** Section One – Introduction
- E.9.1.1.** Letter of Introduction
- E.9.1.2.** Completed “Responding Bidder Information” OMES Form 076.
- E.9.1.3.** Completed “Certification for Competitive Bid and Contract” OMES Form 004.
- E.9.1.4.** Oklahoma Dealer’s License
- E.9.1.5.** Manufacturer’s license for each manufacturer offered.
- E.9.1.6.** Signed Amendment(s), if any.
- E.9.1.7.** Any exceptions to solicitation terms and conditions.
- E.9.2.** Section Two – Past Performance Information
- E.9.2.1.** Please refer to Attachment T for complete instructions. A form to be forwarded to the references (past clients) is provided in that attachment. These forms must be filled out and sent directly to the State by the references.
- E.9.2.2.** It is required that a listing of the references which you have asked to complete the surveys is also included in Attachment S, and listing must be submitted with the response.
- E.9.3.** Section Three – Response to Specifications/Requirements and Pricing
- Provide detailed response to specifications/requirements in this Solicitation.
- E.9.3.1.** Please refer to Attachment A-R for complete instructions, and respond to this section using the template provided in that attachment.

E.10. NOTICE OF AWARD

- E.10.1.** A notice of award in the form of a purchase order or other Contract Documents resulting from this Solicitation shall be furnished to the successful Bidder and shall result in a binding Contract.

F. CHECKLIST

- Pricing Proposal (Attachments A-R)
- Technical Proposal (Attachment A-R)
- Federal Transit Administration Special Provisions (Attachment S)
- Past Performance Information (Attachment T)
- Altoona Test (full report)
- Bus testing, either provided justification specified for exemption or provide the test report.
- Oklahoma Dealer's License
- Manufacturer's license for each manufacturer
- Wiring diagram, Maintenance and Inspection schedule, Operator's Manual, Warranty Information and Papers

G. FEDERAL TRANSIT ADMINISTRATION SPECIAL PROVISIONS

- G.1.** The Federal Transit Administration (FTA) Special Provisions has been provided on a separate Attachment S. These provision must be completed and submitted for each type of vehicle that is included in your response. For example, your response contains proposal for three (3) different vehicles, the total number of FTA Special Provisions submitted with your response must be three (3).

H. PRICE AND COST

H.1. Pricing Proposal – Attachments A-R

H.1.1. Prices are to be listed at the end of the individual Specification Sections.

A. SPECIFICATIONS FOR 24' 12 PASSENGER, FRONT LIFT METAL TRANSIT VEHICLE

A.1. DELIVERY

- A.1.1.** Vehicle must be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following:
 - A.1.1.1.** The vehicle must have a full tank of fuel when delivered.
 - A.1.1.2.** Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
 - A.1.1.3.** All parts added, as part of the modification process shall be new.
 - A.1.1.4.** Headlights properly aligned
 - A.1.1.5.** Engine Tuned
 - A.1.1.6.** All accessories properly adjusted
 - A.1.1.7.** Electrical, braking and suspension systems inspected
 - A.1.1.8.** Both batteries Charged
 - A.1.1.9.** Front-end alignment must be done after body is put on chassis. Chamber, caster and toe must be adjusted to the center of OEM specs. Ford chassis buses must have adjustable caster, camber bushings installed. Standard OEM bushings will not be accepted. Each bus must come with documentation stating before and after actual alignment readings of bus.
 - A.1.1.10.** All wheels balanced, including spare
 - A.1.1.11.** All lubricants checked, and greased if needed
 - A.1.1.12.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
 - A.1.1.13.** Warranty papers and owner's guide
 - A.1.1.14.** Exterior and interior cleaned and washed.
- A.1.2.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.
- A.1.3.** Under no circumstances are tow vehicles to be attached to any buses.
- A.1.4.** Each vehicle must be delivered to the agency submitting the P.O.

A.2. CERTIFICATE OF ORIGINS

- A.2.1.** Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order five business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery is not acceptable.

A.3. NOTIFICATION

- A.3.1.** Vendor shall notify buyer of vehicle delivery ten business days prior. NOTE: If these specifications contradict any listed in the Federal Regulations, they are superseded by those of the Federal Regulations.

A.4. NO PROTOTYPES

- A.4.1.** Must be a Current production Model, B Pillar type bus that has been in Production for a minimum of one year.

A.5. BODY STRUCTURE

- A.5.1.** The vehicle shall have a purpose-built body, which will provide for a minimum floor to ceiling distance of **75"** at the center aisle.
- A.5.2.** The floor frame must be welded or bolted to the sidewall frame, and the sidewall frame must be welded or bolted to the roof frame.
- A.5.3.** Steel roll cage must form a complete Unitized body and a steel support cage behind front and rear cap to prevent flexing. All steel joints must have gussets for additional strength. All steel parts shall either be galvanized, powder coated or primed to prevent rusting.
- A.5.4.** Composite construction is not acceptable.

- A.5.5.** Construction methods utilizing double-sided tape to secure sidewall skin will not be accepted.
- A.5.6.** If utilizing aluminum for the roof or sidewall skin it must be a minimum of .060" thick with AZDEL SuperLite backing or equivalent.
- A.5.7.** All surfaces and hardware having sharp edges, corners, or angles that could cause injury shall be covered and padded with heavy-duty vinyl-foam type material.
- A.5.8.** The roof will be constructed of the same reinforced materials as the body of the vehicle and of sufficient strength to prevent vibration, drumming and flexing.
- A.5.9.** If exterior roof or sidewall skin is made of Fiberglass it must be a Minimum of 3/16" thick this is not including any FRP, Luan, plywood or foam backings.
- A.5.10.** Fiberglass Roof must be a one piece molded unit that has molded sides to connect to side walls. Bending a flat sheet of fiberglass to connect to walls is NOT ALLOWED.
- A.5.11.** If exterior roof or sidewall skin is made of Galvanized steel it must be a minimum of .024" thick with AZDEL SuperLight backing or equivalent.
- A.5.12.** Roof design shall prevent pooling of water on the roof.

A.6. OEM CHASSIS FRAME

- A.6.1.** The rear overhang, measured from the center of the rear axle to the outer edge of the rear bumper, cannot exceed 1/3 of the overall vehicle length.
- A.6.2.** Further, ODOT will not allow re-certification of the chassis OEM GVWR and GAWR.
- A.6.3.** Any vehicle that exceeds the OEM GVWR and/or GAWR will not be accepted. NOTE: Supplier must provide detailed documentation if chassis modification must be made to accommodate length of wheelbase from OEM. This documentation shall include, but not limited to type of modification, frame supports, out sourcing of frame work, drive shafts, or quality control.

A.7. DOORS

- A.7.1.** Passenger Entry Door: Passenger entry door must have a Two (2)-panel door design providing a minimum 32" X 80" clear opening. A&M door actuator, or equivalent.
 - A.7.1.1.** Door is located in coach body and electrically power operated controlled by the driver.
 - A.7.1.2.** Each door panel shall be actuated together by a single electric powered overhead actuator.
 - A.7.1.3.** Actuator is equipped with an emergency manual release lever.
 - A.7.1.4.** Vertical door shafts shall be an integral part of the door panels.
 - A.7.1.5.** The top portion of the shaft shall be designed to prevent door panels from rotating out of alignment.
 - A.7.1.6.** Shafts shall pivot on a top-mounted, bronze thrust bushing and a lower stud-mounted alignment pivot, accommodated with a glass-filled molded bearing equal to A&M door actuator, or equivalent.
 - A.7.1.7.** Perimeter door edges shall be sealed with neoprene 2" leading edge seals.
 - A.7.1.8.** Seals shall overlap front and rear to provide an air and watershed.
 - A.7.1.9.** Upper and lower edges of doors shall be tightly sealed against entrance of air drafts and water, including spray from vehicle washing.
 - A.7.1.10.** Operating controls should be located within easy reach of the driver.

A.8. PASSENGERS DOOR INTERLOCK

- A.8.1.** Electric Passenger door in coach body will only work when transmission in Park.

A.9. WHEELCHAIR LIFT DOORS

- A.9.1.** A double door entrance shall be provided on the right (curb) side of the vehicle in front of the vehicle's rear wheels.
- A.9.2.** The door opening shall be at minimum width of 48" and height of 70" to accommodate the wheelchair lift specified within this document.
- A.9.3.** Clearance between the top of the door opening and the raised lift platform shall be a minimum of 68".
- A.9.4.** Each door shall be equipped with an A.L. Hansen Type 23 Door Check or equivalent which is a Top Mounted Spring Loaded Device that will securely hold the door in the open position while the wheelchair lift is in operation. (Sliding door is not acceptable).
- A.9.5.** Each door must have a window which shall be the same height as the passenger windows.

A.10. COACH BODY DOOR LOCKS

A.10.1. All doors shall be equipped with a lock.

A.11. DRIVER'S DOOR AND CO-DRIVER'S DOOR

A.11.1. Must have Power windows, Power door locks

A.12. RUNNING BOARDS

A.12.1. Extra Heavy-duty Running Boards that are bolted to Coach Body for added step strength

A.12.2. Steps must be able to hold over 400lbs.

A.13. HANDRAIL

A.13.1. Handrails (left and right) of the front passenger door shall be provided. Cross-sectional diameter of handrail shall be between 1 ¼" and 1½".

A.13.2. Entrance handrails shall not be padded.

A.13.3. Must have at minimum a wall thickness of 18 gauge steel.

A.13.4. Two overhead ceiling-mounted handrails with mounting brackets at 24" on centers placed over the aisle shall be provided for the full length of the vehicle's passenger aisle way, except in wheelchair lift area and over passenger entry door.

A.13.5. All handrails must be Powder coated Steel that will not rattle or Flex and mounting bolts shall be bolted into Structural steel.

A.13.6. Color of Handrails shall be bright yellow (to assist the visually impaired),

A.13.7. **Wood mounting** is not allowed.

A.14. GRAB RAILS

A.14.1. Must have grab rails with the following:

A.14.1.1. Shall be installed in the entrance to the vehicle running parallel to the steps in a configuration which allows persons with disabilities to grasp while entering or exiting the vehicle.

A.14.1.2. Cross-sectional diameter of grab rail shall be between 1 ¼" and 1½"

A.14.1.3. Must be at minimum a wall thickness of 18 gauge steel.

A.14.1.4. All Grab rails must be Powder Coated Steel that will not Rattle or Flex and mounting bolts shall be bolted into Structural steel.

A.14.1.5. Color of grab rails shall be bright yellow_(to assist the visually impaired),

A.14.1.6. **Wood mounting** is not allowed.

A.15. STANCHIONS

A.15.1. Must be at minimum a wall thickness of 18 gauge steel.

A.15.2. All stanchions must be Powder Coated Steel that will not Rattle or Flex and mounting bolts shall be bolted into Structural steel.

A.15.3. **Wood mounting** is not allowed.

A.15.4. Color of stanchions shall be bright yellow (to assist the visually impaired),

A.15.5. A stanchion and vinyl padded modestly panel shall be provided at entrance door in front of first passenger seat.

A.15.6. A stanchion from the floor to roof shall be installed on the interior left side of the front passenger door approximately 14 inches inside the vehicle.

A.15.7. A horizontal handrail shall be installed between the stanchion and the right wall approximately 30 inches above the floor.

A.15.8. A stanchion shall be located in the rear of the driver's seat at the edge of the aisle and a handrail shall extend from the stanchion to the side wall of the vehicle behind the driver's seat.

A.15.9. The stanchion shall not interfere with a rearward travel of the driver's power seat adjustment.

A.16. MODESTY PANEL

A.16.1. A modesty panel shall be positioned at the rear edge of the step well.

- A.16.2. This will be made up of a stanchion at the inner rear corner of the step well with a rail running from that stanchion to the wall at windowsill height and the modesty panel installed therein.
- A.16.3. Panel shall have no less than 1 ½" between the bottom of the panel and the floor to facilitate cleaning of the floor.
- A.16.4. Fastening of the panel shall be by bolts or rivets.
- A.16.5. **Screws** will not be acceptable.

A.17. STEPWELL

- A.17.1. Must be made of Galvanized, Primed or Powder Coated steel,
- A.17.2. Must have two steps covered with the same slip resistant floor covering as specified within this document.
- A.17.3. maximum 12" minimum 10" from ground to first step,
- A.17.4. 9" riser, Tread depth minimum 8½".
- A.17.5. All steps to get up to floor level must be in step well area.

A.18. INTERIOR

- A.18.1. All interior panels shall be vinyl coated with AZDEL SuperLite backing, vinyl coated metal, FRP or equivalent with same durability and cleaning ease.
- A.18.2. Vendor shall provide a list of available colors at their quoted price and may also include a list of colors available at additional cost.
- A.18.3. Interior shall be trimmed with an attractive molding, covering all seams.
- A.18.4. All surfaces and items or hardware in passenger compartment having sharp edges, corners, or angles that could cause injury shall be passed with heavy-duty vinyl covered foam-type material.
- A.18.5. Door and instrument panel is to be painted or otherwise finished to match overall tones of interior panels

A.19. DRIVERS AREA

- A.19.1. The drivers area shall consist of an ergonomically designed molded dash console, located conveniently to the driver's seated position and in full view of the driver.
- A.19.2. Supplemental control panels mounted above the driver's head or above windshield are not accepted.
- A.19.3. All switches are to be properly labeled and illuminated.
- A.19.4. The instrument control panel shall be painted or otherwise finished with non-reflective, anti-glare black finish.

A.20. STORAGE COMPARTMENT

- A.20.1. Vehicle must have a large overhead driver storage compartment.
- A.20.2. This compartment must have a lip on the inside to protect objects from opening compartment door. Also shall provide easy access to clearance lights connectors through top of Storage Compartment. And provide a door latch to hold door open.

A.21. FLOOR ASSEMBLY

- A.21.1. The floor shall consist of 3/4 inch Advantech Engineered flooring or equivalent with Undercoating.
- A.21.2. Construction of sufficient strength and support to not allow flexing of the finished or surface floor. The chassis, body and flooring shall be attached in such a manner as to act as one unit without any movement or flexing at the joints.
- A.21.3. Shall have Floor Coving material at wall.

A.22. SLIP-RESISTANT FLOOR COVERING

- A.22.1. Floor covering shall be slip resistant vinyl flooring, constructed with aluminum oxide, silicon carbide and optional PVC chip blended throughout a high quality vinyl wear surface.
- A.22.2. Top coating is not acceptable.
- A.22.3. Backing to be polyester/cellulose material with fiberglass fiber reinforced center scrim for additional durability.
- A.22.4. Bacteriostats will be incorporated providing all exposed surfaces with excellent anti-bacterial properties.
- A.22.5. Must be Altro Chrome with a minimum thickness of 2.2 millimeters or equivalent
- A.22.6. Color to be selected from current Altro color range by each agency.

- A.22.7.** The whole floor will be a uniform thickness throughout the vehicle, eliminating the need for ribbed surfaces, while exceeding the ADA minimum slip resistance standard rating of .06 static coefficient of friction under dry or wet conditions.
- A.22.8.** Coving material is to be installed to support floor when rolling floor covering up the sidewall of vehicle to the seat track.
- A.22.9.** Seams must be heat welded to provide a permanent waterproof seal against water penetration leading to premature sub-floor failure or curling leading to possible tripping hazards.
- A.22.10.** Landing area and step edgings are to be Altro yellow safety vinyl edging.
- A.22.11.** Edging is to heat welded to the main floor and step tread to provide for a long lasting seam.
- A.22.12.** The floor must be installed according to manufacturer's directions using proper tools, accessories and adhesives.
NOTE: If the flooring is not installed according to the flooring manufacture (heat welded and adhesives) specifications the bus will not be accepted.

A.23. GAUGES

- A.23.1.** Vehicles shall be equipped with the following needle-type gauges (lights in lieu of gauges are not acceptable): and all shall be in easy view of driver.
- A.23.2.** If OEM gauges are not available then Stewart Warner gauges or equivalent shall be used.
 - A.23.2.1.** OEM chassis Voltmeter Plus a Auxiliary Voltmeter Gauge
 - A.23.2.2.** Oil pressure
 - A.23.2.3.** Temperature
 - A.23.2.4.** Fuel level
 - A.23.2.5.** Speedometer
 - A.23.2.6.** Odometer
 - A.23.2.7.** Tachometer
 - A.23.2.8.** Engine hour meter

A.24. BUMPERS

- A.24.1.** Front and rear bumpers shall be securely fastened to the chassis frame to adequately absorb shock from impact. In no case are the bumpers to be fastened directly to the vehicle body.
- A.24.2.** Rear bumper must be an energy absorbing Romeo Rim with Heavy Duty bumper mounting brackets that use four 7/16 grade 8 bolts per bracket or equivalent.
- A.24.3.** Front bumper and grille shall be chrome plated.

A.25. INSULATION

- A.25.1.** Insulation shall be provided in both walls, roof, front cap, rear wall and roof side radius area where roof meets walls.
- A.25.2.** Adequate insulating properties shall be provided to ensure minimum heat, cold and noise penetration into the vehicle interior.
- A.25.3.** Insulation may be accomplished through the use of fiberglass, vacuum design or equivalent.
- A.25.4.** Must have a minimum R-value of 6, and fire resistant.

A.26. AIR CONDITIONING

- A.26.1.** Air conditioning efficiency is of paramount concern to the purchaser. Air conditioning shall be adequate to cool both the passengers and driver areas. Only vehicles offering top of the line commercial transit type air conditioning systems will be considered.
- A.26.2.** The vehicle's electrical system shall be designed and integrated such that ample electrical supply is provided to maintain optimum air conditioning performance without battery discharge.
- A.26.3.** The air conditioning system offered shall have a proven transit performance record and shall be provided by a nationally recognized manufacturer of bus air conditioning.
- A.26.4.** The OEM Dash unit and Rear Air Conditioning unit shall be two separate stand alone systems. Tying into the front OEM dash system is not allowed.
- A.26.5.** Rear evaporator shall have an easy accessible return air filter; having to remove evaporator cover housing to gain access to filter will not be accepted.
 - A.26.5.1.** The rear air conditioning system shall provide a minimum cooling capacity of 65,000 BTU/Hr.
 - A.26.5.2.** A Carrier model AC-833MAX System or equivalent. The Combined Total cooling Capacity of the OEM dash unit and Rear Unit shall be a minimum of 78,000 BTU/hr.
 - A.26.5.3.** Rear Evaporator shall have an easy accessible return air filter; having to remove the evaporator cover housing to gain access to filter will not be accepted.
- A.26.6.** The Rear A/C System must have the following specified components.
 - A.26.6.1.1. Carrier EM-3 Evaporator or equivalent
 - A.26.6.1.2. Carrier CM-3 Condenser or equivalent
 - A.26.6.1.3. Carrier TM-21 Compressor or equivalent
 - A.26.6.1.4. Carrier Flex CLICK SAE J-2064 Type E Color coded hoses or equivalent.
 - A.26.6.1.5. Service Ports for rear Air conditioning System must be easily accessible and located under the bus near the rear A/C Condenser.
- A.26.7.** A conventional dash mounted unit for the front of the driver's area of the vehicle. Both units shall be equipped with multi-speed fans (minimum 2 speeds).
 - A.26.7.1.** Evaporator fans shall produce a minimum of 1600 CFM.
- A.26.8.** The Rear system shall include a skirt mounted commercial condenser. Condenser fan(s) shall produce a minimum of 2400 CFM of airflow over the coils. All components of the condenser unit shall be coated or constructed with a corrosion resistant material to protect the unit from road salts other foreign substances that might be sprayed on the unit.
 - A.26.8.1.** Condenser unit shall be positioned so as not to draw air from under vehicle. NOTE: Air conditioning refrigerant lines, to include their foam covering, will not be exposed to road hazards or elements of the weather. All air conditioning refrigerant lines, which extend from the engine area to the rear evaporator, shall be protected from damage. And all drain lines, hoses and wiring from evaporator shall be covered from view.
- A.26.9. VENTILATION**
 - A.26.9.1.** Vents provided in driver area.
- A.26.10. HEATING**
 - A.26.10.1.** Front & rear heater core factory installed hot water type, of sufficient capacity to warm cabin area and clear windows of snow, ice and fog.
 - A.26.10.2.** An easily accessible clearly marked shut-off ¼ turn ball valves shall be installed in heater supply and return lines which will allow the water to be cut off to the rear heater core.
 - A.26.10.3.** The water lines for the rear heater core shall be protected from damage.
 - A.26.10.4.** Rear heating unit shall provide a minimum of 65,000 BTU's/Hr. this is in addition to front dash unit. State BTU/HR of rear heating unit you are proposing.

A.27. SAFETY EQUIPMENT

- A.27.1.** All miscellaneous equipment must be secured to the vehicle and easily accessible.
- A.27.2.** First aid kit: (24M – National Standard School Bus Metal

A.27.2.1. Must be Certified Safety Mfg. Model S203-045 or equivalent.

A.27.3. Fire extinguisher – Multi-purpose Stored Pressure Dry Chemical Extinguisher.

A.27.3.1. **Must be a** 5 lb. type 3A:40B: C Pro Line, Kiddie Model # FXBND9 or equivalent.

A.27.3.2. Must have a gauge to indicate state of charge and mounted to vehicle using a bracket and having a heavy duty vinyl cover.

A.27.4. Triangle warning devices (3), with storage container.

A.27.4.1. must meet FMVSSP # 125

A.27.5. Bloodborne Pathogens infection control kit.

A.27.5.1. Must be Certified Safety Mfg. Model #FK200-931, or equivalent.

A.27.6. Seat belt cutter

A.28. MIRRORS

A.28.1. Exterior:

A.28.1.1. Heavy Duty Heated Power Mirrors by Velvac Model 2020 Deluxe Head with Turn Signals or equivalent.

A.28.1.2. Mirrors are to be mounted to the driver and copilot doors in the same position as the OEM mirrors.

A.28.2. Interior:

A.28.2.1. Vehicle must have the two (2) following mirrors.

A.28.2.2. Must be OEM Day/night, 10" rear view mirror, confirming to FMVSS No. 111. (This mirror will be deleted if purchaser chooses backup camera as an option).

A.28.2.3. Passenger viewing and backup mirror shall be made of safety glass, having rounded corners and protective edges, and a 6" x 16". This mirror is in addition to the mirror mounted on windshield

A.28.3. Fresnel Lens: 11" x 14" Lens on rear window.

A.29. SEATS

A.29.1. Driver's Seat and Co-Driver's Seat:

A.29.1.1. The driver seat must be a deluxe bucket, OEM high back 6-way power seat.

A.29.1.2. The Co-Driver's Seat must be adjustable fore and aft.

A.29.1.3. Seats must be padded with allergy-free material and upholstered with a durable transit quality level 5-cloth fabric.

A.29.1.4. Both seats must have adjustable lumbar

A.29.1.5. Both seats must have a certified seat belt and shoulder harness with retractor shall be attached to frame.

A.29.1.6. Both seats must have reclining backs and padded armrests. NOTE: Supplier must supply seating diagram reflecting all listed dimensions for approval.

A.30. PASSENGER SEATS

A.30.1. Seating shall be provided for twelve (12) ambulatory passengers.

A.30.2. Wheelchair spaces will each be equipped with a wheelchair securement tie down and occupant restraint system, which meets the Americans with Disabilities Act requirements.

A.30.3. All seats shall be "bucket" semi-contoured transit type.

A.30.4. Seats are to be consistent with what is accepted as transit quality construction. School bus type seats are not acceptable.

A.30.5. Seat frames are to be welded.

A.30.6. Seats must be padded with allergy-free material and upholstered with a durable transit quality level 5-cloth fabric. NOTE: If the seating configuration being proposed is different than that shown in Figure 1, a diagram must be furnished.

A.30.7. Aisle seats must have padded fold up armrests and Anti-Vandal grab handles on the seat backs.

A.30.8. Seats must be Freedman Seating Mid Back type bucket seat or equivalent.

A.30.9. Seat belts to be installed at each seat position, and must be a Retractable under Seat Retractor, type of seat belts.

- A.30.10.** Must include Two (2) Seat Belt Extensions that will fit Passenger Seat Belts.
- A.30.11.** A commercial quality seat belt knife fastened to bus in driver's reach.
- A.30.12.** All seats shall provide a minimum seat width of 17" per passenger, or 34" per two (2) -passenger seats.
- A.30.13.** Minimum depth of seat (front to back contour) 18"
- A.30.14.** All seats including any foldaway seats must be bolted to structural steel.
- A.30.15.** Bolting seats to plywood floor without bolting into structural steel under floor is NOT ALLOWED.
- A.30.16.** All seat tracks must be welded to steel sidewalls and steel floor sections. Riveting or bolting seat tracks to sidewalls is NOT ALLOWED.
- A.30.17.** Seats shall be fully padded and shall be constructed with a no-sag spring bottom suspension. Plywood seat bottoms are unacceptable.
- A.30.18.** Seats shall be covered with a durable transit quality level 5-cloth fabric.
- A.30.19.** Seats shall be spaced on a minimum of 28 1/2" centers, allowing for a minimum of 10" between the front of the bottom cushion and the back of the next forward seat.
- A.30.20.** Minimum aisle width shall be 16".
- A.30.21.** All seats shall meet, as minimum, FMVSSP 302 207 requirements. Any additional requirements would be optional.

A.31. PRIORITY SEATING SIGNS

- A.31.1.** Each vehicle shall contain sign(s), which indicate that, the row of forward –facing seats located in the front of the vehicle are priority seats for persons with disabilities, and that other passengers should make such seats available to those who wish to use them.
- A.31.2.** The signs shall be located on the interior walls directly above the front row of forward-facing seats.
- A.31.3.** Signs must follow FTA 49CFR38 Section 38.27 for the required lettering characters of the signs.

A.32. LIGHTING

- A.32.1.** All manufacturers' lighting added to the vehicle (both interior and exterior) shall be provided with light-emitting diode (LED) lights.
- A.32.2.** Door activated 4 way flashers that are activated when passenger door is opened. This includes 2 additional amber LED flashing lights mounted high on each side of the rear wall.
- A.32.3.** The location, type and hookup of all exterior lights and reflectors to conform to Federal Motor Vehicle Safety Standards and Procedures.
- A.32.4.** The number of interior lights and their light output shall be determined by providing a minimum average of 7 foot-candles of illumination on a 1 square foot plane, at an angle of 45 degrees from horizontal, centered 33 inches above the floor and 24 inches in front of the seat back at each seat position.
- A.32.5.** Floor surface in the aisles shall be a minimum of 10 foot-candles.
- A.32.6.** Each vehicle shall be equipped with OEM daytime running lights.
- A.32.7.** Must have Red LED lights over all emergency exits
- A.32.8.** All interior lighting in the passenger area shall be mounted in the ceiling cove at the sidewall with a minimum of three (3) fixtures on each side of the vehicle. Lighting fixtures shall be installed on the interior walls and ceiling in a manner that does not present a head strike to the passengers.
- A.32.9.** All clearance lights front, rear and side shall have metal armored shields. This shall protect lights from tree limb damage.
- A.32.10.** Tail lights are to be recessed and shall not protrude more than 2 inches from the body; they shall include a pair of amber combinational hazard and signal lights. Rear tail-lamps shall also include a pair of red tail lights and red stop lights, which may be combinational. (Ref: Dialight 46121RB-Red, 46121AB-Amber or equivalent)
- A.32.11.** Side signal lamps, with marker, shall be provided independently or be incorporated into the center of the vehicle. Location must be above and in front of the rear wheel opening and provide visibility from behind the rear wheel opening. (Ref.: Dialight 18001AB811 or equivalent)
- A.32.12.** Clearance marker lights shall be installed surface-mounted, facing the front, rear, and each side at rear. (Ref.: Dialight 15001RB, 15001AB or equivalent)

- A.32.13.** The third brake light shall be center-mounted above the rear window, minimum 18" in length. (Ref.: Dialight 87121RB or equivalent)
- A.32.14.** Two back-up lights, one mounted on each side of the body rear cap. (Ref.: Dialight 46001CB or equivalent)
- A.32.15.** Step lighting shall be mounted to provide light for the entire step-well and an area a minimum of three (3) feet beyond the first step on the ground area outside the bus (Ref.: Dialight 170-81CB or equal). Note: The step lights shall be extinguished when the front door has closed.
- A.32.16.** Raised floor step lighting shall be provided by one strip light mounted in the step riser. Light strip shall be a minimum of 18 inches and recess-mounted to protect from accidental damage by passengers contacting light while using the step. (Ref.: Dialight 87121CB or equivalent).
- A.32.17.** Exterior step light shall be mounted away from wheel splash. (Ref.: Dialight #VSW-CC-19B-35-801 or equivalent)
- A.32.18.** Wheelchair lift area light shall be positioned in the manufacturer's standard location in order to illuminate the area in the immediate vicinity of the wheelchair lift platform for night operation. The light shall be automatically activated only when the wheelchair lift doors are open. (Ref.: Dialight Light #46121CB or equivalent)

A.33. ELECTRICAL WIRING

- A.33.1.** All wiring shall meet the requirements of SAE recommended practice J878a, Type SXL.
- A.33.2.** Connections with 3 to 12 circuits shall be environmentally sealed high impact plastic connectors with pull apart locking tabs.
- A.33.3.** All non-OEM connections containing one or two circuits shall be made with Posi-lick connectors.
- A.33.4.** No butt connectors will be allowed.
- A.33.5.** All added wiring shall be in a loom and securely clipped for maximum protection and routed in separate hangers from the heater hoses or air conditioning hoses.
- A.33.6.** Clips shall be rubber or plastic coated to prevent them from cutting the wiring insulation.
- A.33.7.** All electrical wiring shall be automotive stranded and sufficient size to carry the required current without excessive voltage drop and shall be color, number and function coded at a minimum of eighteen (18) inch intervals.
- A.33.8.** No electrical, stationary or mechanical device may block the removal of the engine cover inside the bus.
- A.33.9.** All wiring passing through the body metal shall have anti-chaffing grommets.
- A.33.10.** Each vehicle shall contain a set of detailed system by system "as built" wiring schematics covering all electrical equipment and electrical circuits installed, complete with wiring codes for each vehicle ordered.
- A.33.11.** Identification on the wiring diagram must tie the diagram to the bus.

A.34. WINDOWS

- A.34.1.** All windows to be of tempered safety glass and water and airtight.
- A.34.2.** Window in driver's door, windshield and entrance door glass are all to be tinted.
- A.34.3.** All the windows in the passenger area are to be factory-installed smoked glass with at minimum 30 percent tint. No Add on Film will be accepted.
- A.34.4.** Windows must be a top horizontal sliding T- transit type that the ventilation openings are located at the top of the window.
- A.34.5.** Must be constructed of corrosion resistant aluminum frames.
- A.34.6.** All windows and emergency exits must meet the performance and operational requirements as outlined in the Federal Motor Vehicle Safety Standards and Procedures.

A.35. EMERGENCY EXITS

- A.35.1.** At least one (1) window on each side at or near the rear of the vehicle shall be equipped with emergency release latches to provide emergency exits.
- A.35.2.** Release instructions shall be provided at or near the release handles and an audible alarm shall be installed near the driver, which will be activated when the window is released.

A.36. BACK-UP ALARM

- A.36.1.** Alarm shall be waterproof ECCO #530 or equivalent.
- A.36.2.** Must be mounted in the rear of the vehicle
- A.36.3.** Must be readily audible outside the vehicle when the transmission is in reverse.

A.37. WHEELCHAIR LIFT

- A.37.1.** An electric powered hydraulic wheelchair lift shall be installed inside the vehicle at the side door.
- A.37.2.** Bus must meet FMVSS 403-404 lift installation requirements.
- A.37.3.** Wheelchair lift shall meet the following MINIMUM requirements.
 - A.37.3.1.** Braun wheel chair Lift NL919FIB-2 (Millennium-2 Series) or equivalent. Ground cable from lift must be connected to vehicle frame.
 - A.37.3.2.** Connecting ground cable to lifts mounting bolts is NOT ALLOWED.
 - A.37.3.3.** 800 pound load capacity lifts assembly.
 - A.37.3.4.** An electric hydraulic pump, powered by vehicle's electrical system.
 - A.37.3.5.** Platform dimensions 34" wide by 51" long.
 - A.37.3.6.** Platform to be constructed of 11 gauge expanded metal.
 - A.37.3.7.** Platform shall be stored in an upright position within the vehicle.
 - A.37.3.8.** Powered operation for (1) unfolding and folding the platforms and (2) raising and lowering the platform.
 - A.37.3.9.** Emergency platforms release to permit the platform to be unfolded manually and lowered by gravity.
 - A.37.3.10.** To prevent the wheelchair from rolling off, a barrier 1 ½" at minimum shall be provided on the outer edges of the platform and have an outboard roll stop that engages and locks before the platform leaves the ground to form a safety barrier when platform is raised or lowered
 - A.37.3.11.** A free floating bridge plate will be replaced between the lift platform and the vehicle. This bridge plate will be hinged in a manner to permit upward movement should a person's foot become entangled.
 - A.37.3.12.** Lift shall be securely bolted to the floor and floor reinforced as necessary to support the load.
 - A.37.3.13.** To permit the lift platform to be raised without electrical power, a hand pump that allows the operator to raise the platform shall be installed.
 - A.37.3.14.** An interior light shall be provided to illuminate the lift area;
 - A.37.3.15.** All moving parts likely to cause personal injury shall be shielded.
 - A.37.3.16.** Working parts, such as cables, pulleys, and shafts, which can be expected to wear, and upon which the lift depends for support of the load, shall have a safety factor of at least six, based on the ultimate strength of the material. Nonworking parts, such as platform, frame, and attachment hardware, which would not be expected to wear, shall have a safety factor of at least three, based on the ultimate strength of the material.
 - A.37.3.17.** Lift shall be installed as specified by the manufacturer and shall be thoroughly tested prior to delivery.
 - A.37.3.18.** Repair manual, parts list and instructions for adjusting hydraulic valves and electrical equipment shall be provided.
 - A.37.3.19.** Lift controls shall be interlocked with the vehicle brakes, transmission, or door, or shall provide other appropriate mechanisms or systems to ensure that the vehicle cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks or systems are engaged.
 - A.37.3.20.** The left control cord must be secured in a manner not to interfere with the door being closed. NOTE: Lift shall be capable for use by STANDEES: Lift shall accommodate persons using walkers, crutches, canes or braces or who otherwise have difficulty using steps. The platform may be marked to indicate a preferred standing position.

A.38. HANDRAILS

- A.38.1.** Platform on lift shall be equipped with handrails on two sides, which move in tandem with the lift, and which shall be graspable and provide support to standees throughout the entire lift operation.
- A.38.2.** Handrails shall have a usable component at least 8" long with the lowest portion a minimum 30" above the platform and the highest portion a maximum 38" above the platform.
- A.38.3.** Capability of withstanding a force of 100 pounds concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure required.
- A.38.4.** Cross-sectional diameter of handrail shall be between 1 ¼" and 1½", and shall have eased edges with corner radii of not less than 1/8".
- A.38.5.** Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

A.39. WHEELCHAIR SECUREMENT

- A.39.1.** Wheelchair parking space shall have clear floor area of 30" wide by 52" long and be equipped with a four-point wheelchair securement tie-down.
- A.39.2.** Occupant restraint system must be Q'Straint Q-8306-SC or equivalent. Shall have a Retractable lap/shoulder belt combo with a Retractable height adjuster that are anchored to floor and wall with L Tracks that meet SAE J2249 and ADA requirements.
- A.39.3.** Tracks shall be recessed into the floor and not shift position under anticipated loads. Any tracks overlapping the access path must be flush with the floor to prevent passengers from tripping.
- A.39.4.** The L tracks and Slide N Click anchors must be bolted to structural steel.
- A.39.5.** Bolting to plywood floor without bolting into structural steel under floor IS NOT ALLOWED.
- A.39.6.** Wheel Chair Securement system must be Q'Straint QRT MAX Automatic Retractor System Q-8306-SC with Slide N Click anchorage system and J-Hooks, or equivalent.
- A.39.7.** There must be 52" at minimum and 54" maximum measured from center to center between front and rear Slide N Click anchor points. And be fully assembled and ready to use.
- A.39.8.** Must have securement pouches attached to wall to store wheelchair securement tie-downs.
- A.39.9.** Must include eight (8) Q'Straint Q5-7580 Webbing Loops or equivalent for Securing Scooters. Wheelchair location must be in the rear of bus, one beside the other. NOTE: Each wheelchair securement location shall have sign designating it as such. Lettering size and type on these signs shall comply with the Americans with disabilities Act Regulations,

A.40. WHEELCHAIR ACCESSIBILITY SYMBOL

- A.40.1.** The vehicle will display the international wheelchair accessibility symbol of a person in a wheelchair that is outlined in white on blue background.
- A.40.2.** This symbol will be placed on all four sides of the bus.

A.41. VEHICLE COLORS

- A.41.1.** Body: Vendor to supply list of colors and prices available.

A.42. WINDOW BLACKOUT PAINT

- A.42.1.** Bus must have window blackout paint. NOTE: See Figure 2

A.43. COLOR OF SEATS

- A.43.1.** Proposals must include all colors available
- A.43.2.** Successful vendor shall coordinate with the agency issuing this purchase order in the selection of material and color of the seats.
- A.43.3.** Seats shall be fully padded.

A.44. VEHICLE FLOOR PLAN

- A.44.1.** A proposed floor plan including all pertinent interior dimensions such as overall length, width, distance between seats, etc.,
- A.44.2.** Shall be submitted with the proposal.

A.45. CHASSIS SPECIFICATIONS

- A.45.1.** Supplier must list chassis specs in the Section "A" Response Sheet.
- A.45.2.** GVWR, axle, spring and tire:
 - A.45.2.1.** 14,500 lb. GVWR minimum
 - A.45.2.2.** Front axle- 5,000 lb. GAWR minimum
 - A.45.2.3.** Rear axle – 9,500 lb. GAWR minimum
 - A.45.2.4.** (Dual wheel are required on rear axle.)
 - A.45.2.5.** Front springs – heavy duty, 5,000 lb minimum
 - A.45.2.6.** Rating combined at ground.
 - A.45.2.7.** Rear springs – heavy duty, 9,500 lb minimum

A.45.2.8. Ratings each, at ground.

A.45.3. It is the Supplier's responsibility to calculate the actual loaded weight, spring and axle ratings so that the vehicle is engineered for safety.

A.46. TIRES

A.46.1. Tire size must meet 14,500 GVWR minimum and must be steel radial with "E" load rating.

A.46.2. Steel or brass valve stems 1.5" in length shall be used on all wheels with elbow extensions on the inside rear dual for access.

A.46.3. Stainless steel or brass valve caps with an inner air seal shall be used.

A.46.4. One mounted spare tire and wheel to match existing tires/wheels to be shipped loose.

A.47. ENGINE GASOLINE

A.47.1. Minimum – (6.8 liter) displacement.

A.47.2. Must Have a CNG Capable Engine with hardened intake and exhaust valves with hardened intake and exhaust valve seats Ford Option # 91G.

A.48. RADIATOR

A.48.1. Heavy Duty, with factory installed recovery system.

A.48.2. The cooling system must be winterized with ethylene glycol for temperatures to –20 degrees F (-28.8889 C).

A.49. TRANSMISSION

A.49.1. At minimum, heavy-duty 5-speed automatic with overdrive, lock-up converter, lock in park and a heavy-duty auxiliary transmission cooler.

A.50. WHEEL WELLS

A.50.1. The wheel housing shall be of sturdy heavy-duty construction of a minimum 14 gauge galvanized steel or stainless steel and provide ample tire clearance during all operating conditions.

A.50.2. Fender and splash aprons (underskirt) of durable construction shall be provided so as to provide maximum deflection of the wheel splash.

A.50.3. There shall be sufficient clearance to enable easy removal of wheels mounted with inflated tires.

A.51. REAR FENDER FLARES

A.51.1. Must have Rubber or Fiberglass Fender Flares.

A.52. DRIVE SHAFT

A.52.1. Drive shaft must be properly supported, balanced and guaranteed not to vibrate. Each drive shaft shall be equipped with a protective metal guard or guards to prevent whipping through the floor or dropping to the ground in the event of a tube or universal joint failure, or if the drive shaft breaks.

A.53. WHEEL COVERS

A.53.1. Bright Metal Stainless Steel Wheel inserts.

A.54. BRAKES

A.54.1. Two (2) braking systems are required. Service brakes shall be dual hydraulic, disc front and disc rear.

A.54.2. The parking brake system shall be operated by a cable to the rear wheels, or Drive Shaft Drum Brake.

A.54.3. The braking system shall be adequate for the GVWR of the vehicle.

A.55. GEAR RATIO

A.55.1. Must be a 4:56 gear ratio

A.56. FUEL CAPACITY

A.56.1. Must be at minimum of 55 gallons

A.57. FUEL PUMP ACCESS DOOR

A.57.1. An aluminum diamond plate access door shall be provided in the floor of the vehicle above the fuel tank to allow the fuel pump to be serviced without removal of the tank. NOTE: Door must be Large enough and centered over fuel pump to allow easy removal of pump.

A.58. SHOCK ABSORBERS

A.58.1. Must have heavy duty, front and rear shock absorbers.

A.58.2. Rear Shock Absorbers upper mounting brackets shall not be covered by any Body Braces that would prevent easy access to Upper Shock Mounting Bolts and Nuts.

A.59. SUSPENSION

A.59.1. Rear shall have Leaf Springs.

A.59.2. Right rear shall have an extra leaf to compensate for weight of wheelchair lift.

A.60. STEERING

A.60.1. Must have power-assisted steering

A.60.2. Must have tilt wheel,

A.60.3. Must have factory installed cruise control.

A.61. AIR CLEANER

A.61.1. Must have a heavy duty, dry type air cleaner

A.62. OIL FILTER

A.62.1. Must have a heavy duty, throw away type oil filter.

A.63. ALTERNATOR

A.63.1. Vehicle shall have Ford OEM 225-amp Alternator or equivalent.

A.64. BATTERIES

A.64.1. Two (2) heavy duty, maintenance free, minimum 650 CCA at 0 degrees F (-17.778 C) Batteries must be wired together in a parallel circuit to increase total battery capacity.

A.64.2. Front OEM battery must have OEM type battery hold down brackets to securely hold battery in place.

A.64.3. Instep Battery Box that is bolted down securely and must be sealed to keep mud and debris from getting on Rear Coach Battery.

A.64.4. Battery must be bolted within this instep box. Cloth holds down straps are not ALLOWED.

A.64.5. Battery box must be sealed to keep mud from getting on batteries. SEE FIGURE 4 & 5

A.65. GROUNDS

A.65.1. A ground of the battery cable size, shall be installed between the engine and chassis frame.

A.65.2. The vehicle body shall be properly grounded to the chassis frame at least 2 (two) places.

A.65.3. Engine and body grounds shall be installed to handle subsystem electrical capacity.

A.65.4. Grounding wires fastened to the frame shall use a bolt with a nut installed in a proper sized hole with dielectric compound applied to the cleaned surfaces, bolt, and cable end.

A.65.5. Lift pump motor shall be grounded directly to chassis frame using a cable of the same size as the pump motor feed wire.

A.65.6. All exterior lights and accessories added by the body manufacture shall be grounded by an in harness ground attached at a fuse panel common grounding point.

A.65.7. For all ground wire connections paint shall be removed at the grounding point to provide a surface, cable end, bolt, and nut where each positive or grounding cable is attached.

A.66. STABILIZER BAR

A.66.1. Heavy Duty Front and rear

A.67. HORN

A.67.1. Must have a dual, electric horn.

A.68. SIGNAL

A.68.1. Directional and self-canceling with hazard warning flashers.

A.69. TOW HOOKS

A.69.1. Shall have 2 tow hooks on Rear.

A.70. WINDSHIELD WIPERS

A.70.1. Minimum two speeds with intermittent feature and washer.

A.71. KEYS

A.71.1. Vehicle must include three (3) sets of keys for the entire bus.

A.72. RADIO

A.72.1. Must have an AM & FM CD radio

A.72.2. Radio must be of same manufacture as chassis. Radio must be mounted in the Chassis OEM Location in dash.

A.72.3. Must have a minimum of six speakers two (2) OEM speakers in front chassis doors. The coach body's four (4) speakers shall be a 3-way standard speaker.

A.73. PAINTING, DECALS AND MONOGRAMS

A.73.1. All signs required by State and federal law shall be affixed to each vehicle exterior and interior.

A.73.2. It is up to the bus dealer/manufacture to add such signs and decals upon delivery of vehicle.

A.73.3. No decals, name plates, or painted identification of the bus dealer/manufacture are to be added to the vehicle.

A.74. UNDERCOATING

A.74.1. Floor and wheel housing, anti-rust factory installed.

A.75. WARRANTY REQUIREMENTS

A.75.1. The contractor warrants and guarantees to the original Procuring Agency each complete bus and specific subsystem and components for 100% parts and labor as follows:

A.75.1.1. OEM standard factory warranties for chassis and engine.

A.75.1.2. Complete bus body and body structure, exterior, wiring, flooring installation, and paint are warranted to be free from defects, related defects and to maintain structural integrity for a period of Five (5) year or 100,000 miles.

A.75.1.3. Add-on components shall have component manufacture's standard warranty.

A.75.1.4. Warranty shall begin on the date that the vehicle delivery is accepted by the agency issuing the purchase order.

A.75.1.5. The wheelchair lift shall have a five (5) year unlimited mileage and unlimited cycles.

A.75.1.6. The air-conditioning system shall have a minimum 2 years unlimited mileage.

A.75.1.7. The Chassis powertrain should be warrantied for a five (5) years or 100,000 miles.

A.75.1.8. Any parts under warranty must be available and delivered to the purchasing transportation provider or their repair shop within 5 days of the time they requested/ordered them. The bus vendor/manufacture shall bear all reasonable financial costs of shipment of parts.

A.75.1.9. The warranty, as well as any recall notifications, shall cover each vehicle of the ultimate purchaser or recipient agency. The vendor shall provide a copy of any recall notice to the purchasing agency.

A.76. BUS TESTING

A.76.1. Certification shall be provided that in accordance with 49 CFR Part 665,

A.76.2. Bus Testing, the vehicle either does not need to be tested (with justification specified for exemption) or has been tested at the bus testing facility and a test report is included.

A.77. BUS WATER TESTING

A.77.1. The roofs, windows, windshield and all doors of all coaches shall be water tested, as follows:

- A.77.1.1.** The water test shall consist of a series of nozzles that are strategically located around the perimeter of the vehicle so as to the nozzles spray water over the entire surface of the vehicle.
- A.77.1.2.** The nozzles shall eject a volume of water no less than 2.6 gallons per minute under a pressure of no less than twenty-two (22) pounds per square inch measured at the nozzle tip.
- A.77.1.3.** There shall be no less than twenty (20) nozzles installed in the water test area, each capable of directing a force of water as indicated above.
- A.77.1.4.** The Vendor/Manufacturer shall be required to water test each vehicle, under the conditions set forth above, for no less than five (5) minutes, in order to determine whether or not there are any body leaks at the window areas, door areas, roof panels, etc.
- A.77.1.5.** The Vendor/Manufacturer shall take the necessary corrective action when body leaks are found to exist as a result of the above test, and conduct a second water test to recheck for body leaks following corrective action.

A.78. ALTOONA TESTING

A.78.1. Vehicle must be tested in the 7-year/200,000 mile category at the Altoona Bus Testing Facility in Duncansville, PA. And a copy of the full report must be submitted with the Proposals.

A.79. GENERAL

A.79.1. All equipment cataloged as standard for the basic vehicle, unless superseded by these specifications, must be furnished and included in the purchase price of each vehicle. Complete printed specifications, published literature, and photos, or illustrations of the basic units that the Supplier proposes to furnish with this Proposal must accompany each Proposal.

A.80. QUALITY OF MATERIALS

A.80.1. Welding procedures and materials shall be in accordance with standards of the American Society of Testing Materials and the American Welding Society. All visible welds shall be ground smooth. Where metal is welded, the contact surface shall be free of scale, spatter, and grease and shall be treated to preclude rusting.

A.81. SPECIFICATIONS FOR OPTIONAL ITEMS

A.81.1. CNG CONVERSION FORD CHASSIS

- A.81.1.1.** OEM engine shall be converted to operate on dedicated CNG. A WESTPORT/BAF Cal Comp System or approved equal shall be provided. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional control module will be accepted. Dual fuel systems will not be accepted. System must comply with the following:
- A.81.1.2.** Closed-loop fuel control
- A.81.1.3.** Sequential fuel injection (SFI)
- A.81.1.4.** Optimized ignition timing
- A.81.1.5.** Must maintain original fault codes (DTCs)
- A.81.1.6.** Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner
- A.81.1.7.** CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.
- A.81.1.8.** The minimum CNG tank capacity on the mini-buses should be 39 Gasoline Gallon Equivalent
- A.81.1.9.** CNG interlock – Engine will not run when filling CNG tanks.
- A.81.1.10.** Must provide a detailed floor plan of the placement of the CNG tanks.
- A.81.1.11.** System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

A.82. CNG BIFUEL CONVERSION FORD CHASSIS

A.82.1. OEM engine shall be converted to operate on CNG and Gasoline. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional module will be accepted. System shall be capable of switching between CNG and Gasoline. The Gasoline fuel tank will be installed as per OEM specifications. The system must comply with the following:

A.82.2. Closed-loop fuel control

- A.82.3.** Sequential fuel injection (SFI)
- A.82.4.** Optimized ignition timing
- A.82.5.** Must maintain original fault codes (DTCs)
- A.82.6.** Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner
- A.82.7.** CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.
- A.82.8.** The minimum CNG tank capacity on the mini-buses should be 29 Gasoline Gallon Equivalent
- A.82.9.** Must provide a detailed floor plan of the placement of the CNG tanks.
- A.82.10.** System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

A.83. DEDICATED PROPANE AUTOGAS INJECTION

- A.83.1.** The system shall be a Roush CleanTech System or approved equal. The system must be CARB, EPA certified, and OBDII Compliant. The system shall have the following system components:
- A.83.2.** PCM Calibration
- A.83.3.** Billet aluminum high-pressure fuel rail.
- A.83.4.** Appropriate fuel injectors
- A.83.5.** Appropriate fuel lines
- A.83.6.** Appropriate OEM engine prep package
- A.83.7.** Coverage of Five (5) year/ 60,000 mile warranty.
- A.83.8.** System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

A.84. DUAL FUEL VEHICLE PROPANE AUTOGAS INJECTION

- A.84.1.** System shall be a Roush CleanTech System or approved equal.
- A.84.2.** The system shall be a Roush CleanTech System or approved equal. The system must be CARB, EPA certified, and OBDII Compliant. The system shall have the following system components:
- A.84.3.** PCM Calibration
- A.84.4.** Billet aluminum high-pressure fuel rail.
- A.84.5.** Appropriate fuel injectors
- A.84.6.** Appropriate fuel lines
- A.84.7.** Appropriate OEM engine prep package
- A.84.8.** Coverage of Five (5) year/ 60,000 mile warranty.
- A.84.9.** System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

A.85. BACK-UP MONITOR SYSTEM

- A.85.1.** ASA Voyager AOM562A or approved equal with a 5.6" color LCD screen mounted on rear view mirror OEM Bracket. With a rear mounted outside backup camera and a second inside front mounted camera to view passengers.

A.86. TWO-WAY RADIO SYSTEM UHF

- A.86.1.** ICOM F6021 UHF two-way Radio System with a PCTEL MUF4505 UHF antenna and coax or approved equal.
- A.86.2.** Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.
- A.86.3.** Radio must be mounted in an easy accessible location for the driver.
- A.86.4.** Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

A.87. TWO-WAY RADIO SYSTEM VHF

- A.87.1.** ICOM F5021 VHF two-way Radio System with a PCTEL MHB5800 VHF antenna and coax or approved equal.
- A.87.2.** Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

A.87.3. Radio must be mounted in an easy accessible location for the driver.

A.87.4. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

A.88. TWO-WAY RADIO SYSTEM 800 MHZ

A.88.1. Kenwood NX-900K 800 mhz two-way Radio System with a PCTEL MUF8003 antenna and coax or approved equal.

A.88.2. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

A.88.3. Radio must be mounted in an easy accessible location for the driver.

A.88.4. Radio must be programmed with the correct Frequencies and the antenna tuned for agency issuing this purchase.

A.89. DRIVER'S SHIELD

A.89.1. A clear Plexiglas barrier shall be erected behind the driver and extend from the stanchion crossbar behind the driver up to the ceiling.

A.89.2. This shield start at the wall on the driver's left side (close enough to prevent a passenger from reaching through to the driver) and should extend 3 inches past the right side of the driver's seat, but shall not obstruct the view from the rear view mirror.

A.89.3. This barrier shall consist of clear Plexiglas and shall be at least ¼ inch thick.

A.89.4. A 1 ½ inch clearance between the stanchion and barrier should be provided to allow a hand hold on the right side.

A.90. PAINTED LOWER SKIRTS

A.90.1. Paint to purchaser's color specs. NOTE: See Figure 2.

A.91. OUTSIDE PASSENGER DOOR SWITCH

A.91.1. Outside keyed electric passenger door switch outside. Switch must be water proof.

A.92. BUS CAMERA SYSTEM

A.92.1. REI Bus-Watch R4001 with 500GB Hard drive and four cameras or approved equal. Successful vendor shall coordinate with the agency issuing this purchase for location of Camera's. NOTE: See Figure 3 for camera type and location of cameras.

A.93. FABRIC INSERT ON CEILING

A.93.1. Must match seat fabric and pattern.

A.94. STREET SIDE EXHAUST

A.94.1. Exhaust to be turned out opposite side of Wheel Chair lift

A.95. INTEGRATED CHILD SEAT

A.95.1. Integrated Child Restraint Seat must be a Freedman Seating ICS-10 or equivalent

A.95.2. Must have an integrated 4-point safety harness. for children 22-78 Lbs with under seat retractor seat belts for adults

A.96. VINYL SEATS

A.96.1. This will be a price deduction from the durable transit style level 5 cloth fabrics.

A.96.2. Vinyl deduction is for passenger seats only

A.96.3. Pilot and co-pilot seats shall be durable transit quality level 5-cloth fabric

A.97. PUBLIC ADDRESS SYSTEM

A.97.1. A public address system shall be installed with a hand held microphone.

A.97.2. The system shall include a solid-state amplifier of sufficient power and quality that the operator's voice can be clearly heard without distortion.

A.97.3. The amplifier shall be firmly secured in a protective area.

A.97.4. The PA system shall use the vehicles 6 speakers for sound.

A.97.5. A power switch for the PA system shall be mounted on the dash to provide operation for the inside and amplifier off.

A.97.6. Any noise suppression due to alternator, lighting, engine or other source is required of the contractor.

A.98. PASSENGER SIGNAL SYSTEM PULL CORD

A.98.1. The Stop Request system shall have the following features:

A.98.2. Separate provisions for W/C passengers and ambulatory passengers to signal a Stop request.

A.98.3. Must use a yellow pull cord run below the windows for the ambulatory request and a large yellow push pad mounted at least 15" above the floor, but not more than 48". There must be a touch pad per W/C space for the passengers to signal a stop request.

A.98.4. The driver should have a means of telling if a W/C passenger has signaled. There must be a Blue dash light to signal a W/C passenger request and a RED light to signal an ambulatory passenger request.

A.98.5. The "Stop Request" lighted sign should show if a W/C passenger has signaled; the sign shall be a universal W/C symbol which lights in blue.

A.98.6. There shall be an audible signal when a stop is requested and must be able to be heard by the driver.

A.98.7. Once the pull cord is pulled, the sign will light, the driver's red light goes on, and a chime sounds. The sign will stay lit until the bus is stopped and the entry door is opened. The system automatically re sets itself

A.98.8. When the W/C passenger signals a stop request, the W/C portion of the sign lights, the chime sounds, and the blue light on the dash goes on. The sign will stay lit until the W/C lift is deployed and then stowed and the W/C door is closed again.

A.99. PASSENGER STOP REQUEST SIGNS

A.99.1. Passenger stop request sign must be Transign, or equivalent.

A.99.2. The signs must be back-lighted stop requests and shall be mounted overhead on the front ceiling end closure.

A.99.3. The sign shall be so designated as to remain illuminated when activated (by the passenger signal system) until it is extinguished by opening the door.

A.100. FARE COLLECTION BOX

A.100.1. Fare collection box must be GFI Genfare "Cents a bill" farebox or compatible.

A.100.2. With this option, the mounted fare box will eliminate the front passenger seat and make the bus a 14 passenger.

A.100.3. Also must have the OEM Co-Driver seat covered with same fabric as the other passenger seats shipped loose with the bus. Co-Driver door shall have the same type of running board as driver's door.

A.101. DESTINATION SIGNS

A.101.1. Destination signs must be Twinvision, or equivalent. The automatic electronic destination sign system shall be furnished on the front and on the right side near the front door of the vehicle. Display areas of destination signs shall be clearly visible in direct sunlight and/or at night. The sign system shall provide optimum visibility of the message display units for passengers and shall meet applicable ADA requirements defined in 49 CFR, Part 38.39. Destination signs shall be installed in such a manner as to facilitate easy access for replacement of the entire sign assembly, or components such as fluorescent lamps/LED's and electronic control modules, from inside the bus within 30 minutes by a mechanic. Lamps and associated parts shall be commercially available.

A.101.2. Destination messages, route designations, and public relations messages shall be independently selectable via a single Operator's Control Panel (OCP) which shall include a display monitor. The OCP display monitor readout shall show the exact information displayed on the destination signs. The OCP shall be conveniently located for the bus operator and mounted in such a manner that will not pose any safety hazard. The OCP shall utilize a durable weatherproof keypad with tactile feel for destination message control functions.

A.101.3. The destination sign system shall be capable of programming 10,000 message lines. The number of public relations messages shall be limited only by the remaining number of message lines not used for destination purposes. Sign displays shall have alternating message capability with programmable blanking time between message lines as may be required. Variable blanking times shall be programmable between 0.5 to 25 seconds in duration. Each line message or blanking time for each message shall be individually programmable. The message display units shall incorporate an automatic blanking feature that will cause the display area to blank within 30 seconds of the bus master power switch being turned off.

A.101.4. An emergency message shall be initiated by the closure, or opening, of a dry contact switch or relay. The emergency message shall be displayed on the exterior of the bus only. The OCP shall not display the emergency message. The destination sign shall automatically resume normal operation when the remote emergency switch is returned to its normal position.

A.101.5. Destination Sign Programming: The electronic sign system shall be programmable via an integral connector located in the front destination sign area. Software shall be furnished for programming the sign system via an IBM-

compatible, laptop computer. Software shall be capable of providing a high degree of flexibility to create, or select preprogrammed, fonts and graphic displays. The sign shall have the capability of being programmed in the field using a PC or field programmer. Message program information shall be transferable to and/or from the field programmer device as specified by the transit system in attachments to Part 5: Technical Specifications.

A.101.6. The destination sign compartments shall be designed to prevent condensation and entry of moisture and dirt. Additional provisions shall be included, if necessary, to prevent fogging of both destination sign compartment window and glazing on unit itself. Access shall be provided to allow cleaning of inside of destination sign compartment window and unit glazing.

A.101.7. A complete listing of destination sign readings for initial sign programming by the manufacturer are provided in attachments to Part 5: Technical Specifications.

A.101.8. Front Signs:

A.101.8.1. Sign Size:

A.101.8.1.1. A 16 Row by 148 Column Spectrum Route Multi-Color Sign that shall have no less than 3,264 LEDs with a message display area of not less than 8.0 inches high by not less than 64.6 inches wide. The LEDs displays shall consist of red-blue-green LEDs and amber colored LEDs. The color LEDs shall be rated by their manufacturers for a life expectancy of 50,000 hours to 100,000 hours and shall support up to 27 colors.

A.101.8.2. Sign Readability:

A.101.8.2.1. The destination message shall be readable by a person with 20/20 vision from a distance of 250 feet. The sign shall have an equal readability at 65 degrees on either side of the line perpendicular to the center of the mean plane of the display. The entire display area of all signs shall be clearly visible and readable both in direct sunlight and at night.

A.101.9. Side Signs

A.101.9.1. Sign Size:

A.101.9.1.1. An 8 Row by 96 Column Spectrum Route Multi-Color Sign that shall have no less than 768 LEDs with a message display area of not less than 2.8 inches high by not less than 36.3 inches wide. The LEDs shall be rated by their manufacturers for a 100,000-hour life expectancy.

A.101.9.2. Sign Readability:

A.101.9.2.1. The destination message shall be easily read from the sidewalk level. The entire display area of all signs shall be clearly visible and readable both in direct sunlight and at night.

A.102. SYSTEM CONTROL CONSOLE – OPERATOR DISPLAY AND KEYBOARD

A.102.1. The system control console shall be used to view and update display messages. The system control console shall utilize a 28-key conductive rubber pad keyboard with tactile feel, designed especially for the harsh transit environment or approved equal. The system control console shall contain a 16 x 128 pixel vacuum fluorescent display. The system control console shall contain an audio annunciator that beeps to alert the operator to view the display for a message, or beeps indicating that a key is depressed. The system control console shall continuously display the complete message associated with the selected destination code.

A.103. MEMORY TRANSFER

A.103.1. The sign system shall be reprogrammable through the system control console by either a PCMCIA flash card or a Memory Transfer Unit.

A.104. EMERGENCY MESSAGE DISPLAY

A.104.1. If required, a special emergency message can be activated by a switch. This message shall be displayed on signs, facing outside the vehicle, while the signs inside the vehicle, including the system control console, remain unchanged. The emergency message shall be canceled by entering a new destination code or by removing the emergency signal.

A.105. PROGRAMMING

A.105.1. A programming software package shall be furnished to generate message lists for the destination sign system. A PCMCIA flash memory card having a minimum of 8 megabytes of memory shall be provided to facilitate bus system programming. The software must be compatible with Windows NT, Windows 2000, Windows XP, Windows Vista and Windows 7

The programming software shall use techniques that require minimal operator training and that are intended for use by operators that are not trained in complex computer operations. All operator screens shall utilize pull down and pop-up menus.

A.106. BICYCLE RACKS

A.106.1. Manufacturer/model should be Sportworks DL- 2 or equivalent.

A.106.2. Racks must have a 2 (two) bike capacity, and follow the specs noted below.

A.106.3. The bike rack must meet OSHA requirements for lifting by a single individual and be capable of being raised or lowered with one hand

A.106.4. The bike rack must accommodate all bicycles with wheels 16" (for example, the Dahon folding bicycle series) or larger diameter, excluding tandems and recumbent type bicycles. The rack must accommodate all bicycles 80" and longer.

A.106.5. The bike rack frame must be manufactured with 304 stainless steel tubing with a minimum wall thickness of 0.125 in., outside corners to be rounded, pinch joints minimized and welds smoothed.

A.106.6. All nuts, bolts and washers shall be either AISI Type 304 stainless steel or Grade 8 yellow zinc plated steel

A.106.7. The bike rack must be mounted to the front of the bus and accommodate two (2) bicycles. In the stowed position, folded up against the front of the bus, it shall protrude no more than 8" from the front bumper. The protrusion shall be no more than 36" when deployed.

A.106.8. The latching mechanism must automatically lock the bike rack in the stowed and deployed positions.

A.106.9. The bike rack, when stowed, shall not interfere with any access panels/doors, windshield wipers or driver vents.

A.106.10. The bike rack shall be designed for loading and unloading from the front, curbside, of the bus. The securement can only contact the bicycle's tires as to not do any damage to the bicycle's frame. The bike rack shall have a positive securement with a four (4) point locking system, contacting the wheel in such a way that greater than half the circumference of the wheel is captured. Straps, cords, and/or springs shall not be required to secure a bicycle.

A.106.11. The carrier shall not interfere with the ability of the driver to safely operate the vehicle. This includes, but is not limited to, the obstruction of the windshield view and the operation of the windshield wipers, turn signals, and headlights.

A.106.12. The carrier shall be compatible with automated bus washing systems and shall be capable of repeated use with automated washing equipment without sustaining damage to the carrier, vehicle, or the washing equipment. The carrier shall be designed as not to accumulate water internally.

A.106.13. The use of this rack shall not affect route scheduling. The bike rack shall have a design capability of being loaded or unloaded in 20 seconds or less.

A.106.14. The mounting bracket/ pivot plate assembly must be designed to fit all urban transit buses, both standard floor and low floor.

A.106.15. The bicycle rack shall be warranted against defects in materials and workmanship for a period of one (1) year from date of installation.

A.106.16. The bicycle rack manufacture is required to furnish all the complete parts and service (maintenance) books.

A.106.17. The bicycle rack should have a latching system in both positions, stowed and deployed; this will need to be explained in detail

A.106.18. The racks should be in a friendly design and a tire only mount.

A.106.19. The mounting brackets should be detailed at to what bus needs with brackets.

A.107. PRODUCT STANDARDS

A.107.1. Only first quality materials, workmanship and finish shall be acceptable.

All general materials and workmanship shall be guaranteed to be free of defects for a minimum of at least one (1) year from date of installation except as noted below. Any defects shall be rectified or replaced to meet specifications at the expense of the manufacturer, including freight, parts and labor.

Any exposed fasteners shall be colored to match the finish of the framework components.

A.108. SPARE PARTS

A.108.1. The contractor will provide pricing and the delivery time on the available spare parts for each bicycle rack and maintain adequate stock levels.

A.109. DELETE COPILOT DOOR, SEAT AND B PILLAR

A.109.1. This Moves the Passenger door from the coach Body to the chassis cab section. This delete's the Copilot door; seat and B pillar section of the cab. This will add 2 seats positions in Coach Body.

A.110. DELETE ALTRO CHROMA FLOORING

A.110.1. This delete's the Altro Chroma Floor covering to install the Gray RCA Rubber Transit-Flor. The step well, entrance area, and center aisle floor area shall be overlaid with ribbed, slip resistant, oil resistant commercial 3/16" step tread thickness. The 1/8" thickness flooring under the seats and in the wheelchair area shall be smooth, slip resistant, and oil resistant. The flooring shall extend up the sidewall and rear wall to the seat rail line and shall be coved at the floor/wall joint to form a smooth water-tight transition. Flooring adhesive shall be oil resistant.

A.111. DELETE YELLOW POWDER COAT ON HANDRAILS

A.111.1. This delete's the yellow powder coating on the stainless steel handrails, grab handles and stanchions. They will be the natural brushed Stainless steel Color.

A.112. 100% NIDA-CORE[®] STRUCTURE OR APPROVED EQUAL

A.112.1. Resin Hardened Nida-Core[®] or approved equal Polypropylene Copolymer honeycomb (1" thickness, minimum) throughout 100% of the entire body structure, walls, roof, front and rear caps must be used instead of Honeycomb Paper Vertical. This is to eliminate any possibility of rotting in any area of the body structure.

A.113. COMPOSITE FLOOR

A.113.1. Composite Space-age Synthetics Thermo-Lite Board-Tough Series or approved equal Floor that will not rot and is lighter than the standard marine grade plywood floor. SIDE DOOR SLIDE OUT BATTERY TRAY

A.113.2. Must have an Extra Heavy Duty Stainless Steel slide out Battery Tray for all auxiliary batteries mounted under Bus. Battery Box must have OEM type battery hold down brackets to securely hold batteries in place. Cloth hold down straps is not ALLOWED. Battery box must be sealed to keep mud from getting on batteries.

A.114. DIESEL ENGINE

A.114.1. Current Power plant for the make and model of chassis

A.115. REAR SPARE TIRE HOLDER

A.115.1. A rear spare tire holder that shall be affixed to the vehicle in a way to allow easy removal of spare tire.

A.116. ADJUSTABLE REAR SUPSENIOR SYSTEM

A.116.1. System shall be a MOR/ryde suspension system or equal shall be used with the following:

A.116.2. Installed as per the manufactures recommendations.

A.116.3. Fully adjusted for each bus installed on.

A.116.4. Warranty to be a 5 year 100,000 mile.

A.117. MEMO/PAMPHLET RACK

A.117.1. The memo/Pamphlet rack will be bolted to inside side wall of bus. (See Figure 6)

A.118. TDSS FOLD AWAY SEAT

A.118.1. Seat will be bolted to structural steel. (See Figure 7)

A.119. METAL BOX

A.119.1. Metal box should be bolted and placed between the passenger and driver's seat. (See Figure 8)

A.120. SEAT BELT EXTENSIONS

A.120.1. Extra Seat belt Extensions

SECTION "A"

24' 12 Passenger Metal Bus

RESPONSE SHEET

BASE VEHICLE COST PER UNIT

BASE VEHICLE	COST PER UNIT
TRANSIT BUS (GAS ENGINE)	\$

CHASSIS SPECIFICATIONS

Specify Overall Vehicle Length (outside of front bumper to outside of Rear bumper): _____

SPECIFICATIONS	MINIMUM/MAXIMUM IN INCHES	SUPPLIER'S RESPONSE
OVERALL VEHICLE LENGTH	282" minimum	
OVERALL VEHICLE LENGTH	307" maximum	
WIDTH EXTERIOR	95" minimum	
WIDTH INTERIOR	91" minimum	
HEIGHT EXTERIOR	105" minimum	
HEIGHT EXTERIOR	124" maximum	
HEIGHT INTERIOR	75" minimum	
WHEELBASE	176" minimum	
WHEELBASE	190" maximum	

AIR CONDITIONING

Make and Model of Rear A/C Unit and Cooling Capacity of rear Unit BTU's/Hr. Include literature on unit being proposed.

MAKE/MODEL	
BTU/HR OF REAR UNIT ONLY	

HEATING

MAKE/MODEL	
BTU/HR OF REAR UNIT ONLY	

OPTIONAL ITEMS

OPTIONAL ITEMS	COST PER ITEM
CNG CONVERSION CHASSIS	
CNG BIFUEL CONVERSION CHASSIS	
PROPANE DEDICATED CONVERSION	
PROPANE DUEL FUEL CONVERSION	
BACK-UP MONITOR SYSTEM	
TWO-WAY RADIO (UHF)	

OMES/PURCHASING

TWO-WAY RADIO (VHF)	
TWO-WAY RADIO (800 MZ)	
DRIVER'S SHIELD	
PAINTED LOWER SKIRTS	
OUTSIDE PASSENGER DOOR SWITCH	
BUS CAMERA SYSTEM	
FABRIC INSERT ON CEILING	
STREET SIDE EXHAUST	
INTEGRATED CHILD SEATS	
VINYL SEATS (PRICE DEDUCTION)	
PUBLIC ADDRESS SYSTEM	
PASSENGER SIGNAL SYSTEM PULL CORD	
PASSENGER STOP REQUEST SIGNS	
FARE COLLECTION BOX	
DESTINATION SIGNS	
BICYCLE RACKS	
DELETE ALTRO CHROMA FLOORING (PRICE DEDUCTION)	
DELETE YELLOW POWDER COATING ON HANDRAILS, GRAB RAILS, AND STANCHIONS (PRICE DEDUCTION)	
100% NIDA-CORE STRUCTURE	
COMPOSITE FLOOR	
SIDE DOOR SLIDE OUT BATTERY BOX	
DIESEL ENGINE	
REAR SPARE TIRE HOLDER	
ADJUSTABLE REAR SUSPENSION SYSTEM	
MEMO/PAMPHLET RACK (See Figure 6)	
FREEDMAN SEATING TDSS (OR EQUIVALENT) FOLD AWAY SEAT (See Figure 7)	
METAL BOX (See Figure 8)	
EXTRA SEAT BELT EXTENSIONS	

A LIST OF OPTIONAL EQUIPMENT AND/OR ACCESSORIES SHALL BE PROVIDED. THE LIST MUST CONTAIN:

- Item
- Description and functionality detail
- Cost of item installed in final delivery of vehicle
- Any changes to listed specifications as outlined above to accommodate options

PROPOSAL EXCEPTIONS

Supplier must list any exceptions here to be used as a part of the Proposal evaluation and analysis. Please list the roman numerical on the standard specs or the number for the options when listing any Proposal exceptions.

FIGURE 1

Figure 1

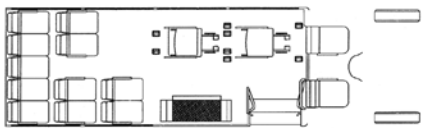


FIGURE 2



FIGURE 3 (Cam reference location only)

Figure 1

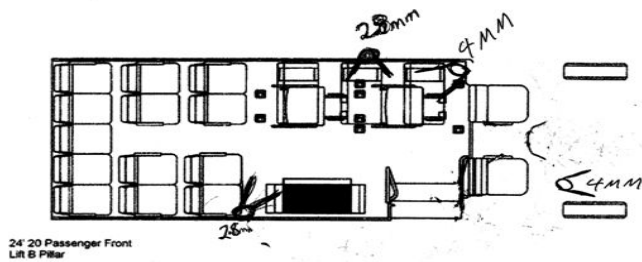


FIGURE 4



FIGURE 5

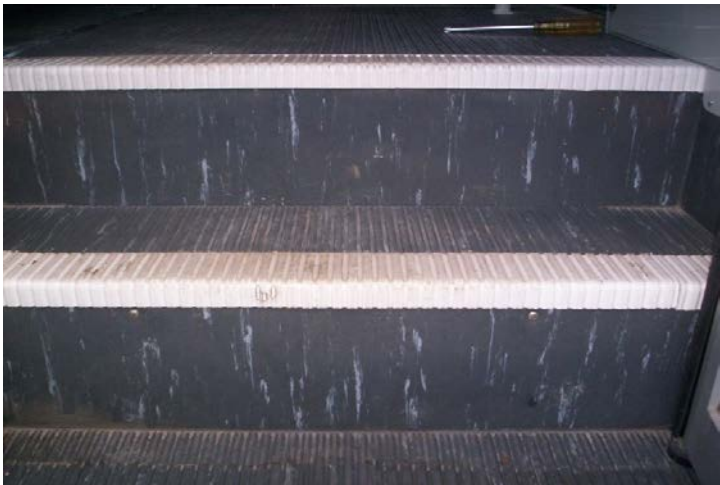


FIGURE 6



FIGURE 7



FIGURE 8



B. SPECIFICATIONS FOR 24' 12 PASSENGER, REAR LIFT MFSAB TRANSIT VEHICLES

B.1. DELIVERY

- B.1.1.** Vehicle must be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following:
- B.1.2.** The vehicle must have a full tank of fuel when delivered.
- B.1.3.** Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
- B.1.4.** All parts added, as part of the modification process shall be new.
- B.1.5.** Headlights properly aligned
- B.1.6.** Engine Tuned
- B.1.7.** All accessories properly adjusted
- B.1.8.** Electrical, braking and suspension systems inspected
- B.1.9.** Both batteries Charged
- B.1.10.** Front-end alignment must be done after body is put on chassis. Chamber, caster and toe must be adjusted to the center of OEM specs. Ford chassis buses must have adjustable caster, camber bushings installed. Standard OEM bushings will not be accepted. Each bus must come with documentation stating before and after actual alignment readings of bus.
- B.1.11.** All wheels balanced, including spare
- B.1.12.** All lubricants checked, and greased if needed
- B.1.13.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
- B.1.14.** Warranty papers and owner's guide
- B.1.15.** Exterior and interior cleaned and washed.
- B.1.16.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.
- B.1.17.** Under no circumstances are tow vehicles to be attached to any buses.
- B.1.18.** Each vehicle must be delivered to the agency submitting the P.O.

B.2. CERTIFICATE OF ORIGINS

- B.2.1.** Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order five business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery is not acceptable.

B.3. NOTIFICATIONS

- B.3.1.** Vendor shall notify buyer of vehicle delivery ten business days prior. NOTE: If these specifications contradict any listed in the Federal Regulations, they are superseded by those of the Federal Regulations.

B.4. NO PROTOTYPES

- B.4.1.** Must be a Current production bus that has been in Production for a minimum of one year.

B.5. BODY STRUCTURE

- B.5.1.** The vehicle shall have a purpose-built body, which will provide for a minimum floor to ceiling distance of 76" at the center aisle.
- B.5.2.** The floor frame must be welded or bolted to the sidewall frame, and the sidewall frame must be welded or bolted to the roof frame.
- B.5.3.** Steel roll cage must form a complete Unitized body and a steel support cage behind front and rear cap to prevent flexing. All steel joints must have gussets for additional strength. All steel parts shall either be galvanized, powder coated or primed to prevent rusting.
- B.5.4.** Composite construction is not acceptable.
- B.5.5.** Construction methods utilizing double-sided tape to secure sidewall skin will not be accepted.

- B.5.6.** If utilizing aluminum for the roof or sidewall skin it must be a minimum of .060" thick with AZDEL SuperLite backing or equivalent.
- B.5.7.** All surfaces and hardware having sharp edges, corners, or angles that could cause injury shall be covered and padded with heavy-duty vinyl-foam type material.
- B.5.8.** The roof will be constructed of the same reinforced materials as the body of the vehicle and of sufficient strength to prevent vibration, drumming and flexing.
- B.5.9.** If exterior roof or sidewall skin is made of Fiberglass it must be a Minimum of 3/16" thick this is not including any FRP, Luan, plywood or foam backings.
- B.5.10.** Fiberglass Roof must be a one piece molded unit that has molded sides to connect to side walls. Bending a flat sheet of fiberglass to connect to walls is NOT ALLOWED.
- B.5.11.** If exterior roof or sidewall skin is made of Galvanized steel it must be a minimum of .024" thick with AZDEL SuperLight backing or equivalent.
- B.5.12.** Roof design shall prevent pooling of water on the roof.
- B.5.13.** The completed body shall meet the requirements of FMVSS-220 School bus rollover protection. Sidewalls shall meet the specification of FMVSS 221, joint strength testing.

B.6. OEM CHASIS FRAME

- B.6.1.** The rear overhang, measured from the center of the rear axle to the outer edge of the rear bumper, cannot exceed 1/3 of the overall vehicle length.
- B.6.2.** Further, ODOT will not allow re-certification of the chassis OEM GVWR and GAWR.
- B.6.3.** Any vehicle that exceeds the OEM GVWR and/or GAWR will not be accepted. **NOTE:** Supplier must provide detailed documentation if chassis modification must be made to accommodate length of wheelbase from OEM.
- B.6.4.** This documentation shall include, but not limited to type of modification, frame supports, out sourcing of frame work, drive shafts, or quality control.

B.7. DOORS

- B.7.1.** Passenger Entry Door: Passenger entry door must have a Two (2)-panel door design providing a minimum 32" X 80" clear opening. A&M door actuator, or equivalent.
 - B.7.1.1.** Door is located directly opposite driver and electrically power operated controlled by the driver.
 - B.7.1.2.** Each door panel shall be actuated together by a single electric powered overhead actuator.
 - B.7.1.3.** Actuator is equipped with an emergency manual release lever.
 - B.7.1.4.** Vertical door shafts shall be an integral part of the door panels.
 - B.7.1.5.** The top portion of the shaft shall be designed to prevent door panels from rotating out of alignment.
 - B.7.1.6.** Shafts shall pivot on a top-mounted, bronze thrust bushing and a lower stud-mounted alignment pivot, accommodated with a glass-filled molded bearing equal to A&M door actuator, or equivalent.
 - B.7.1.7.** Perimeter door edges shall be sealed with neoprene 2" leading edge seals.
 - B.7.1.8.** Seals shall overlap front and rear to provide an air and watershed.
 - B.7.1.9.** Upper and lower edges of doors shall be tightly sealed against entrance of air drafts and water, including spray from vehicle washing.
 - B.7.1.10.** Operating controls should be located within easy reach of the driver.

B.8. PASSENGERS DOOR INTERLOCK

- B.8.1.** Electric Passenger door in coach body will only work when transmission in Park.

B.9. WHEELCHAIR LIFT DOORS

- B.9.1.** A double door entrance shall be provided on the right (curb) side of the vehicle behind the vehicle's rear wheels.
- B.9.2.** The door opening shall be at minimum width of 48" and height of 70" to accommodate the wheelchair lift specified within this document.
- B.9.3.** Clearance between the top of the door opening and the raised lift platform shall be a minimum of 68".

B.9.4. Each door shall be equipped with an A.L. Hansen Type 23 Door Check or equivalent which is a Top Mounted Spring Loaded Device that will securely hold the door in the open position while the wheelchair lift is in operation. (Sliding door is not acceptable).

B.9.5. Each door must have a window which shall be the same height as the passenger windows.

B.10. COACH BODY DOOR LOCKS

B.10.1. All doors shall be equipped with a lock.

B.11. DRIVER'S DOOR

B.11.1. Must have Power windows and Power door locks

B.12. RUNNING BOARDS

B.12.1. Extra Heavy-duty Running Boards that are bolted to Coach Body for added step strength

B.12.2. Steps must be able to hold over 400lbs.

B.13. HANDRAIL

B.13.1. Handrails (left and right) of the front passenger door shall be provided. Cross-sectional diameter of handrail shall be between 1 ¼" and 1½".

B.13.2. Entrance handrails shall not be padded.

B.13.3. Must have at minimum a wall thickness of 18 gauge steel.

B.13.4. Two overhead ceiling-mounted handrails with mounting brackets at 24" on centers placed over the aisle shall be provided for the full length of the vehicle's passenger aisle way, except in wheelchair lift area and over passenger entry door.

B.13.5. All handrails must be Powder coated Steel that will not rattle or Flex and mounting bolts shall be bolted into Structural steel.

B.13.6. Color of Handrails shall be bright yellow (to assist the visually impaired),

B.13.7. **Wood mounting** is not allowed.

B.14. GRAB RAILS

B.14.1. Must have grab rails with the following:

B.14.1.1. Shall be installed in the entrance to the vehicle running parallel to the steps in a configuration which allows persons with disabilities to grasp while entering or exiting the vehicle.

B.14.1.2. Cross-sectional diameter of grab rail shall be between 1 ¼" and 1½"

B.14.1.3. Must be at minimum a wall thickness of 18 gauge steel.

B.14.1.4. All Grab rails must be Powder Coated Steel that will not Rattle or Flex and mounting bolts shall be bolted into Structural steel.

B.14.1.5. Color of grab rails shall be bright yellow (to assist the visually impaired),

B.14.1.6. **Wood mounting** is not allowed.

B.15. STANCHIONS

B.15.1. Must be at minimum a wall thickness of 18 gauge steel.

B.15.2. All stanchions must be Powder Coated Steel that will not Rattle or Flex and mounting bolts shall be bolted into Structural steel.

B.15.3. **Wood mounting** is not allowed.

B.15.4. Color of stanchions shall be bright yellow (to assist the visually impaired),

B.15.5. A stanchion and vinyl padded modestly panel shall be provided at entrance door in front of first passenger seat.

B.15.6. A stanchion from the floor to roof shall be installed on the interior left side of the front passenger door approximately 14 inches inside the vehicle.

B.15.7. A horizontal handrail shall be installed between the stanchion and the right wall approximately 30 inches above the floor.

B.15.8. A stanchion shall be located in the rear of the driver's seat at the edge of the aisle and a handrail shall extend from the stanchion to the side wall of the vehicle behind the driver's seat.

B.15.9. The stanchion shall not interfere with a rearward travel of the driver's power seat adjustment.

B.16. MODESTY PANEL

- B.16.1.** A modesty panel shall be positioned at the rear edge of the step well.
- B.16.2.** This will be made up of a stanchion at the inner rear corner of the step well with a rail running from that stanchion to the wall at windowsill height and the modesty panel installed therein.
- B.16.3.** Panel shall have no less than 1 ½" between the bottom of the panel and the floor to facilitate cleaning of the floor.
- B.16.4.** Fastening of the panel shall be by bolts or rivets.
- B.16.5.** **Screws** will not be acceptable.

B.17. STEPWELL

- B.17.1.** Must be made of Galvanized, Primed or Powder Coated steel,
- B.17.2.** Must have two steps covered with the same slip resistant floor covering as specified within this document.
- B.17.3.** maximum 12" minimum 10" from ground to first step,
- B.17.4.** 9" riser, Tread depth minimum 8½".
- B.17.5.** All steps to get up to floor level must be in step well area.

B.18. INTERIOR

- B.18.1.** All interior panels shall be vinyl coated with AZDEL SuperLite backing, vinyl coated metal, FRP or equivalent with same durability and cleaning ease.
- B.18.2.** Vendor shall provide a list of available colors at their quoted price and may also include a list of colors available at additional cost.
- B.18.3.** Interior shall be trimmed with an attractive molding, covering all seams.
- B.18.4.** All surfaces and items or hardware in passenger compartment having sharp edges, corners, or angles that could cause injury shall be passed with heavy-duty vinyl covered foam-type material.
- B.18.5.** Door and instrument panel is to be painted or otherwise finished to match overall tones of interior panels

B.19. DRIVERS AREA

- B.19.1.** The drivers area shall consist of an ergonomically designed molded dash console, located conveniently to the driver's seated position and in full view of the driver.
- B.19.2.** Supplemental control panels mounted above the driver's head or above windshield are not accepted.
- B.19.3.** All switches are to be properly labeled and illuminated.
- B.19.4.** The instrument control panel shall be painted or otherwise finished with non-reflective, anti-glare black finish.

B.20. STORAGE COMPARTMENT

- B.20.1.** Vehicle must have a large overhead driver storage compartment.
- B.20.2.** This compartment must have a lip on the inside to protect objects from opening compartment door. Also shall provide easy access to clearance lights connectors through top of Storage Compartment. And provide a door latch to hold door open.

B.21. FLOOR ASSEMBLY

- B.21.1.** The floor shall consist of 3/4 inch Advantech Engineered flooring or equivalent with Undercoating.
- B.21.2.** Construction of sufficient strength and support to not allow flexing of the finished or surface floor. The chassis, body and flooring shall be attached in such a manner as to act as one unit without any movement or flexing at the joints.
- B.21.3.** Shall have Floor Coving material at wall.

B.22. SLIP-RESISTANT FLOOR COVERING

- B.22.1.** Floor covering shall be slip resistant vinyl flooring, constructed with aluminum oxide, silicon carbide and optional PVC chip blended throughout a high quality vinyl wear surface.
- B.22.2.** Top coating is not acceptable.
- B.22.3.** Backing to be polyester/cellulose material with fiberglass fiber reinforced center scrim for additional durability.
- B.22.4.** Bacteriostats will be incorporated providing all exposed surfaces with excellent anti-bacterial properties.
- B.22.5.** Must be Altro Chrome with a minimum thickness of 2.2 millimeters or equivalent
- B.22.6.** Color to be selected from current Altro color range by each agency.
- B.22.7.** The whole floor will be a uniform thickness throughout the vehicle, eliminating the need for ribbed surfaces, while exceeding the ADA minimum slip resistance standard rating of .06 static coefficient of friction under dry or wet conditions.
- B.22.8.** Coving material is to be installed to support floor when rolling floor covering up the sidewall of vehicle to the seat track.
- B.22.9.** Seams must be heat welded to provide a permanent waterproof seal against water penetration leading to premature sub-floor failure or curling leading to possible tripping hazards.
- B.22.10.** Landing area and step edgings are to be Altro yellow safety vinyl edging.
- B.22.11.** Edging is to heat welded to the main floor and step tread to provide for a long lasting seam.
- B.22.12.** The floor must be installed according to manufacturer's directions using proper tools, accessories and adhesives.
NOTE: If the flooring is not installed according to the flooring manufacture (heat welded and adhesives) specifications the bus will not be accepted.

B.23. GAUGES

- B.23.1.** Vehicles shall be equipped with the following needle-type gauges (lights in lieu of gauges are not acceptable): and all shall be in easy view of driver.
- B.23.2.** If OEM gauges are not available then Stewart Warner gauges or equivalent shall be used.
 - B.23.2.1.** OEM chassis Voltmeter Plus a Auxiliary Voltmeter Gauge
 - B.23.2.2.** Oil pressure
 - B.23.2.3.** Temperature
 - B.23.2.4.** Fuel level
 - B.23.2.5.** Speedometer
 - B.23.2.6.** Odometer
 - B.23.2.7.** Tachometer
 - B.23.2.8.** Engine hour meter

B.24. BUMPERS

- B.24.1.** Front and rear bumpers shall be securely fastened to the chassis frame to adequately absorb shock from impact. In no case are the bumpers to be fastened directly to the vehicle body.
- B.24.2.** Rear bumper must be an energy absorbing Romeo Rim with Heavy Duty bumper mounting brackets that use four 7/16 grade 8 bolts per bracket or equivalent.
- B.24.3.** Front bumper and grille shall be chrome plated.

B.25. INSULATION

- B.25.1.** Insulation shall be provided in both walls, roof, front cap, rear wall and roof side radius area where roof meets walls.
- B.25.2.** Adequate insulating properties shall be provided to ensure minimum heat, cold and noise penetration into the vehicle interior.
- B.25.3.** Insulation may be accomplished through the use of fiberglass, vacuum design or equivalent.
- B.25.4.** Must have a minimum R-value of 6, and fire resistant.

B.26. AIR CONDITIONING

- B.26.1.** Air conditioning efficiency is of paramount concern to the purchaser. Air conditioning shall be adequate to cool both the passengers and driver areas. Only vehicles offering top of the line commercial transit type air conditioning systems will be considered.
- B.26.2.** The vehicle's electrical system shall be designed and integrated such that ample electrical supply is provided to maintain optimum air conditioning performance without battery discharge.
- B.26.3.** The air conditioning system offered shall have a proven transit performance record and shall be provided by a nationally recognized manufacturer of bus air conditioning.
- B.26.4.** The OEM Dash unit and Rear Air Conditioning unit shall be two separate stand alone systems. Tying into the front OEM dash system is not allowed.
- B.26.5.** Rear evaporator shall have an easy accessible return air filter; having to remove evaporator cover housing to gain access to filter will not be accepted.
 - B.26.5.1.** The rear air conditioning system shall provide a minimum cooling capacity of 65,000 BTU/Hr.
 - B.26.5.2.** A Carrier model AC-833MAX System or equivalent. The Combined Total cooling Capacity of the OEM dash unit and Rear Unit shall be a minimum of 78,000 BTU/hr.
 - B.26.5.3.** Rear Evaporator shall have an easy accessible return air filter; having to remove the evaporator cover housing to gain access to filter will not be accepted.
- B.26.6.** The Rear A/C System must have the following specified components.
 - B.26.6.1.** Carrier EM-3 Evaporator or equivalent
 - B.26.6.2.** Carrier CM-3 Condenser or equivalent
 - B.26.6.3.** Carrier TM-21 Compressor or equivalent
 - B.26.6.4.** Carrier Flex CLICK SAE J-2064 Type E Color coded hoses or equivalent.
 - B.26.6.5.** Service Ports for rear Air conditioning System must be easily accessible and located under the bus near the rear A/C Condenser.
- B.26.7.** A conventional dash mounted unit for the front of the driver's area of the vehicle. Both units shall be equipped with multi-speed fans (minimum 2 speeds).
 - B.26.7.1.** Evaporator fans shall produce a minimum of 1600 CFM.
- B.26.8.** The Rear system shall include a skirt mounted commercial condenser. Condenser fan(s) shall produce a minimum of 2400 CFM of airflow over the coils. All components of the condenser unit shall be coated or constructed with a corrosion resistant material to protect the unit from road salts other foreign substances that might be sprayed on the unit.
 - B.26.8.1.** Condenser unit shall be positioned so as not to draw air from under vehicle. **NOTE:** Air conditioning refrigerant lines, to include their foam covering, will not be exposed to road hazards or elements of the weather. All air conditioning refrigerant lines, which extend from the engine area to the rear evaporator, shall be protected from damage. And all drain lines, hoses and wiring from evaporator shall be covered from view.
- B.26.9. VENTILATION**
 - B.26.9.1.** Vents provided in driver area.
- B.26.10. HEATING**
 - B.26.10.1.** Front & rear heater core factory installed hot water type, of sufficient capacity to warm cabin area and clear windows of snow, ice and fog.
 - B.26.10.2.** An easily accessible clearly marked shut-off ¼ turn ball valves shall be installed in heater supply and return lines which will allow the water to be cut off to the rear heater core.
 - B.26.10.3.** The water lines for the rear heater core shall be protected from damage.
 - B.26.10.4.** Rear heating unit shall provide a minimum of 65,000 BTU's/Hr. this is in addition to front dash unit. State BTU/HR of rear heating unit you are proposing.

B.27. SAFETY EQUIPMENT

- B.27.1.** All miscellaneous equipment must be secured to the vehicle and easily accessible.
- B.27.2.** First aid kit: (24M – National Standard School Bus Metal)
 - B.27.2.1.** Must be Certified Safety Mfg. Model S203-045 or equivalent.

- B.27.3.** Fire extinguisher – Multi-purpose Stored Pressure Dry Chemical Extinguisher.
- B.27.3.1.** **Must be a** 5 lb. type 3A:40B: C Pro Line, Kiddie Model # FXBND9 or equivalent.
- B.27.3.2.** Must have a gauge to indicate state of charge and mounted to vehicle using a bracket and having a heavy duty vinyl cover.
- B.27.4.** Triangle warning devices (3), with storage container.
- B.27.4.1.** must meet FMVSSP # 125
- B.27.5.** Bloodborne Pathogens infection control kit.
- B.27.5.1.** Must be Certified Safety Mfg. Model #FK200-931, or equivalent.
- B.27.6.** Seat belt cutter

B.28. MIRRORS

- B.28.1.** Exterior:
- B.28.1.1.** Heavy Duty Heated Power Mirrors by Velvac Model 2020 Deluxe Head with Turn Signals or equivalent.
- B.28.1.2.** Mirrors are to be mounted to the driver and copilot doors in the same position as the OEM mirrors.
- B.28.2.** Interior:
- B.28.2.1.** Vehicle must have the two (2) following mirrors.
- B.28.2.2.** Must be OEM Day/night, 10" rear view mirror, conforming to FMVSS No. 111. (This mirror will be deleted if purchaser chooses backup camera as an option).
- B.28.2.3.** Passenger viewing and backup mirror shall be made of safety glass, having rounded corners and protective edges, and a 6" x 16". This mirror is in addition to the mirror mounted on windshield.
- B.28.3.** Fresnel Lens: 11" x 14" Lens on rear window.

B.29. SEATS

- B.29.1.** Driver's Seat
- B.29.1.1.** The driver seat must be a deluxe bucket, OEM high back 6-way power seat.
- B.29.1.2.** Seat must be padded with allergy-free material and upholstered with a durable transit quality level 5-cloth fabric.
- B.29.1.3.** Seat must have adjustable lumbar
- B.29.1.4.** Seat must have a certified seat belt and shoulder harness with retractor shall be attached to frame.
- B.29.1.5.** Seat must have reclining backs and padded armrests. **NOTE:** Supplier must supply seating diagram reflecting all listed dimensions for approval.
- B.29.2.** Passenger Seats
- B.29.2.1.** Seating shall be provided for a minimum of Twelve (12) ambulatory passengers.
- B.29.2.2.** Wheelchair spaces will each be equipped with a wheelchair securement tie down and occupant restraint system, which meets the Americans with Disabilities Act requirements.
- B.29.2.3.** All seats shall be IMMI Safeguard Vinyl Contoured Seats or approved equivalent, With Integrated Child Restraint Seats and Integrated Retractable three-point Lap and Shoulder Belts.
- B.29.2.4.** All passenger seats shall be covered with a durable transit quality Vinyl and must meet all MFSAB requirements. NOTE: If the seating configuration being proposed is different than that shown in Figure 1, a diagram must be furnished.
- B.29.2.5.** Must include Two (2) Seat Belt Extensions that will fit Passenger Seat Belts.
- B.29.2.6.** A commercial quality seat belt knife fastened to bus in driver's reach.
- B.29.2.7.** All seats including any foldaway seats must be bolted to structural steel.
- B.29.3.** Bolting seats to plywood floor without bolting into structural steel under floor is NOT ALLOWED.
- B.29.4.** **All seat tracks must be welded to steel sidewalls and steel floor sections. Riveting or bolting seat tracks to sidewalls is NOT ALLOWED**
- B.29.5.** **All seats shall meet, as minimum, FMVSSP 302 207 requirements. Any additional requirements would be optional.**

B.30. PRIORITY SEATING SIGNS

- B.30.1.** Each vehicle shall contain sign(s), which indicate that, the row of forward –facing seats located in the front of the vehicle are priority seats for persons with disabilities, and that other passengers should make such seats available to those who wish to use them.
- B.30.2.** The signs shall be located on the interior walls directly above the front row of forward-facing seats.
- B.30.3.** Signs must follow FTA 49CFR38 Section 38.27 for the required lettering characters of the signs.

B.31. LIGHTING

- B.31.1.** All manufacturers' lighting added to the vehicle (both interior and exterior) shall be provided with light-emitting diode (LED) lights.
- B.31.2.** Door activated 4 way flashers that are activated when passenger door is opened. This includes 2 additional amber LED flashing lights mounted high on each side of the rear wall.
- B.31.3.** The location, type and hookup of all exterior lights and reflectors to conform to Federal Motor Vehicle Safety Standards and Procedures.
- B.31.4.** The number of interior lights and their light output shall be determined by providing a minimum average of 7 foot-candles of illumination on a 1 square foot plane, at an angle of 45 degrees from horizontal, centered 33 inches above the floor and 24 inches in front of the seat back at each seat position.
- B.31.5.** Floor surface in the aisles shall be a minimum of 10 foot-candles.
- B.31.6.** Each vehicle shall be equipped with OEM daytime running lights.
- B.31.7.** Must have Red LED lights over all emergency exits
- B.31.8.** All interior lighting in the passenger area shall be mounted in the ceiling cove at the sidewall with a minimum of three (3) fixtures on each side of the vehicle. Lighting fixtures shall be installed on the interior walls and ceiling in a manner that does not present a head strike to the passengers.

B.32. NOTE

- B.32.1.** All clearance lights front, rear and side shall have metal armored shields. This shall protect lights from tree limb damage.
- B.32.2.** Tail lights are to be recessed and shall not protrude more than 2 inches from the body; they shall include a pair of amber combinational hazard and signal lights. Rear tail-lamps shall also include a pair of red tail lights and red stop lights, which may be combinational. (Ref: Dialight 46121RB-Red, 46121AB-Amber or equivalent)
- B.32.3.** Side signal lamps, with marker, shall be provided independently or be incorporated into the center of the vehicle. Location must be above and in front of the rear wheel opening and provide visibility from behind the rear wheel opening. (Ref.: Dialight 18001AB811 or equivalent)
- B.32.4.** Clearance marker lights shall be installed surface-mounted, facing the front, rear, and each side at rear. (Ref.: Dialight 15001RB, 15001AB or equivalent)
- B.32.5.** The third brake light shall be center-mounted above the rear window, minimum 18" in length. (Ref.: Dialight 87121RB or equivalent)
- B.32.6.** Two back-up lights, one mounted on each side of the body rear cap. (Ref.: Dialight 46001CB or equivalent)
- B.32.7.** Step lighting shall be mounted to provide light for the entire step-well and an area a minimum of three (3) feet beyond the first step on the ground area outside the bus (Ref.: Dialight 170-81CB or equal). **NOTE:** The step lights shall be extinguished when the front door has closed.
- B.32.8.** Raised floor step lighting shall be provided by one strip light mounted in the step riser. Light strip shall be a minimum of 18 inches and recess-mounted to protect from accidental damage by passengers contacting light while using the step. (Ref.: Dialight 87121CB or equivalent).
- B.32.9.** Exterior step light shall be mounted away from wheel splash. (Ref.: Dialight #VSW-CC-19B-35-801 or equivalent)
- B.32.10.** Wheelchair lift area light shall be positioned in the manufacturer's standard location in order to illuminate the area in the immediate vicinity of the wheelchair lift platform for night operation. The light shall be automatically activated only when the wheelchair lift doors are open. (Ref.: Dialight Light #46121CB or equivalent)

B.33. ELECTRICAL WIRING

- B.33.1.** All wiring shall meet the requirements of SAE recommended practice J878a, Type SXL.
- B.33.2.** Connections with 3 to 12 circuits shall be environmentally sealed high impact plastic connectors with pull apart locking tabs.
- B.33.3.** All non-OEM connections containing one or two circuits shall be made with Posi-lick connectors.

- B.33.4.** No butt connectors will be allowed.
- B.33.5.** All added wiring shall be in a loom and securely clipped for maximum protection and routed in separate hangers from the heater hoses or air conditioning hoses.
- B.33.6.** Clips shall be rubber or plastic coated to prevent them from cutting the wiring insulation.
- B.33.7.** All electrical wiring shall be automotive stranded and sufficient size to carry the required current without excessive voltage drop and shall be color, number and function coded at a minimum of eighteen (18) inch intervals.
- B.33.8.** No electrical, stationary or mechanical device may block the removal of the engine cover inside the bus.
- B.33.9.** All wiring passing through the body metal shall have anti-chaffing grommets.
- B.33.10.** Each vehicle shall contain a set of detailed system by system "as built" wiring schematics covering all electrical equipment and electrical circuits installed, complete with wiring codes for each vehicle ordered.
- B.33.11.** Identification on the wiring diagram must tie the diagram to the bus.

B.34. WINDOWS

- B.34.1.** All windows to be of tempered safety glass and water and airtight.
- B.34.2.** Window in driver's door, windshield and entrance door glass are all to be tinted.
- B.34.3.** All the windows in the passenger area are to be factory-installed smoked glass with at minimum 30 percent tint. No Add on Film
- B.34.4.** Windows must be a MFSAB approved windows.
- B.34.5.** Must be constructed of corrosion resistant aluminum frames.
- B.34.6.** All window and emergency exists must meet the performance and operational requirements as outlined in the Federal Motor Vehicle Safety Standards and Procedures.

B.35. EMERGENCY EXITS

- B.35.1.** At least one (1) window on each side at or near the rear of the vehicle shall be equipped with emergency release latches to provide emergency exits.
- B.35.2.** Release instructions shall be provided at or near the release handles and an audible alarm shall be installed near the driver, which will be activated when the window is released.

B.36. BACK-UP ALARM

- B.36.1.** Alarm shall be waterproof ECCO #530 or equivalent.
- B.36.2.** Must be mounted in the rear of the vehicle
- B.36.3.** Must be readily audible outside the vehicle when the transmission is in reverse.

B.37. WHEELCHAIR LIFT

- B.37.1.** An electric powered hydraulic wheelchair lift shall be installed inside the vehicle at the side door.
- B.37.2.** Bus must meet FMVSS 403-404 lift installation requirements.
- B.37.3.** Wheelchair lift shall meet the following MINIMUM requirements.
 - B.37.3.1.** A Braun wheel chair Lift NL919FIB-2 (Millennium-2 Series) or equivalent. Ground cable from lift must be connected to vehicle frame.
 - B.37.3.2.** Connecting ground cable to lifts mounting bolts is NOT ALLOWED.
 - B.37.3.3.** 800 pound load capacity lifts assembly.
 - B.37.3.4.** An electric hydraulic pump, powered by vehicle's electrical system.
 - B.37.3.5.** Platform dimensions 34" wide by 51" long.
 - B.37.3.6.** Platform to be constructed of 11 gauge expanded metal.
 - B.37.3.7.** Platform shall be stored in an upright position within the vehicle.
 - B.37.3.8.** Powered operation for (1) unfolding and folding the platforms and (2) raising and lowering the platform.
 - B.37.3.9.** Emergency platforms release to permit the platform to be unfolded manually and lowered by gravity.
 - B.37.3.10.** To prevent the wheelchair from rolling off, a barrier 1 ½" at minimum shall be provided on the outer edges of the platform and have an outboard roll stop that engages and locks before the platform leaves the ground to form a safety barrier when platform is raised or lowered

- B.37.3.11.** A free floating bridge plate will be replaced between the lift platform and the vehicle. This bridge plate will be hinged in a manner to permit upward movement should a person's foot become entangled.
- B.37.3.12.** Lift shall be securely bolted to the floor and floor reinforced as necessary to support the load.
- B.37.3.13.** To permit the lift platform to be raised without electrical power, a hand pump that allows the operator to raise the platform shall be installed.
- B.37.3.14.** An interior light shall be provided to illuminate the lift area;
- B.37.3.15.** All moving parts likely to cause personal injury shall be shielded.
- B.37.3.16.** Working parts, such as cables, pulleys, and shafts, which can be expected to wear, and upon which the lift depends for support of the load, shall have a safety factor of at least six, based on the ultimate strength of the material. Nonworking parts, such as platform, frame, and attachment hardware, which would not be expected to wear, shall have a safety factor of at least three, based on the ultimate strength of the material.
- B.37.3.17.** Lift shall be installed as specified by the manufacturer and shall be thoroughly tested prior to delivery.
- B.37.3.18.** Repair manual, parts list and instructions for adjusting hydraulic valves and electrical equipment shall be provided.
- B.37.3.19.** Lift controls shall be interlocked with the vehicle brakes, transmission, or door, or shall provide other appropriate mechanisms or systems to ensure that the vehicle cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks or systems are engaged.
- B.37.3.20.** The left control cord must be secured in a manner not to interfere with the door being closed.

B.38. USE BY STANDEES

- B.38.1.** Lift shall accommodate persons using walkers, crutches, canes or braces or who otherwise have difficulty using steps. The platform may be marked to indicate a preferred standing position.

B.39. HANDRAILS

- B.39.1.** Platform on lift shall be equipped with handrails on two sides, which move in tandem with the lift, and which shall be graspable and provide support to standees throughout the entire lift operation.
- B.39.2.** Handrails shall have a usable component at least 8" long with the lowest portion a minimum 30" above the platform and the highest portion a maximum 38" above the platform.
- B.39.3.** Capability of withstanding a force of 100 pounds concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure required.
- B.39.4.** Cross-sectional diameter of handrail shall be between 1 ¼" and 1½", and shall have eased edges with corner radii of not less than 1/8".
- B.39.5.** Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

B.40. WHEELCHAIR SECUREMENT

- B.40.1.** Wheelchair parking space shall have clear floor area of 30" wide by 52" long and be equipped with a four-point wheelchair securement tie-down.
- B.40.2.** Occupant restraint system must be Q'Straint Q-8306-SC or equivalent. Shall have a Retractable lap/shoulder belt combo with a Retractable height adjuster that are anchored to floor and wall with L Tracks that meet SAE J2249 and ADA requirements.
- B.40.3.** Tracks shall be recessed into the floor and not shift position under anticipated loads. Any tracks overlapping the access path must be flush with the floor to prevent passengers from tripping.
- B.40.4.** The L tracks and Slide N Click anchors must be bolted to structural steel.
- B.40.5.** Bolting to plywood floor without bolting into structural steel under floor IS NOT ALLOWED.
- B.40.6.** **Wheel Chair Securement system must be** Q'Straint QRT MAX Automatic Retractor System Q-8306-SC with Slide N Click anchorage system and J-Hooks, or equivalent.
- B.40.7.** There must be 52" at minimum and 54" maximum measured from center to center between front and rear Slide N Click anchor points. And be fully assembled and ready to use.
- B.40.8.** Must have securement pouches attached to wall to store wheelchair securement tie-downs.
- B.40.9.** Must include eight (8) Q'Straint Q5-7580 Webbing Loops or equivalent for Securing Scooters. Wheelchair location must be in the rear of bus, one beside the other.
- B.40.10.** Each wheelchair securement location shall have sign designating it as such. Lettering size and type on these signs shall comply with the Americans with disabilities Act Regulations,

B.41. WHEELCHAIR ACCESSIBILITY SYMBOL

B.41.1. The vehicle will display the international wheelchair accessibility symbol of a person in a wheelchair that is outlined in white on blue background.

B.41.2. This symbol will be placed on all four sides of the bus.

B.42. VEHICLE COLORS

B.42.1. Body: Vendor to supply list of colors and prices available.

B.43. WINDOW BLACKOUT PAINT

B.43.1. Bus must have window blackout paint. NOTE: See Figure 2

B.44. COLOR OF SEATS

B.44.1. Proposal must include all colors available

B.44.2. Successful vendor shall coordinate with the agency issuing this purchase order in the selection of material and color of the seats.

B.44.3. Seats shall be fully padded.

B.45. VEHICLE FLOOR PLAN

B.45.1. A proposed floor plan including all pertinent interior dimensions such as overall length, width, distance between seats, etc.,

B.45.2. Shall be submitted with the proposal.

B.46. CHASSIS SPECIFICATIONS

B.46.1. Supplier must list chassis specs on the Section "B" Response Sheet.

B.46.2. GVWR, axle, spring and tire:

B.46.2.1. 14,500 lb. GVWR minimum

B.46.2.2. Front axle- 5,000 lb. GAWR minimum

B.46.2.3. Rear axle – 9,500 lb. GAWR minimum

B.46.2.4. (Dual wheel are required on rear axle.)

B.46.2.5. Front springs – heavy duty, 5,000 lb minimum

B.46.2.6. Rating combined at ground.

B.46.2.7. Rear springs – heavy duty, 9,500 lb minimum

B.46.2.8. Ratings each, at ground.

B.46.3. It is the Supplier's responsibility to calculate the actual loaded weight, spring and axle ratings so that the vehicle is engineered for safety.

B.47. TIRES

B.47.1. Tire size must meet 14,500 GVWR minimum and must be steel radial with "E" load rating.

B.47.2. Steel or brass valve stems 1.5" in length shall be used on all wheels with elbow extensions on the inside rear dual for access.

B.47.3. Stainless steel or brass valve caps with an inner air seal shall be used.

B.47.4. One mounted spare tire and wheel to match existing tires/wheels to be shipped loose.

B.48. ENGINE: GASOLINE

B.48.1. Minimum – (6.8 liter) displacement.

B.48.2. Must Have a CNG Capable Engine with hardened intake and exhaust valves with hardened intake and exhaust valve seats Ford Option # 91G.

B.49. RADIATOR

B.49.1. Heavy Duty, with factory installed recovery system.

B.49.2. The cooling system must be winterized with ethylene glycol for temperatures to –20 degrees F (-28.8889 C).

B.50. TRANSMISSION

B.50.1. At minimum, heavy-duty 5-speed automatic with overdrive, lock-up converter, lock in park and a heavy-duty auxiliary transmission cooler.

B.51. WHEEL WELLS

B.51.1. The wheel housing shall be of sturdy heavy-duty construction of a minimum 14 gauge galvanized steel or stainless steel and provide ample tire clearance during all operating conditions.

B.51.2. Fender and splash aprons (underskirt) of durable construction shall be provided so as to provide maximum deflection of the wheel splash.

B.51.3. There shall be sufficient clearance to enable easy removal of wheels mounted with inflated tires.

B.52. REAR FENDER FLARES

B.52.1. Must have Rubber or Fiberglass Fender Flares.

B.53. DRIVE SHAFT

B.53.1. Drive shaft must be properly supported, balanced and guaranteed not to vibrate. Each drive shaft shall be equipped with a protective metal guard or guards to prevent whipping through the floor or dropping to the ground in the event of a tube or universal joint failure, or if the drive shaft breaks.

B.54. WHEEL COVERS

B.54.1. Bright Metal Stainless Steel Wheel inserts.

B.55. BRAKES

B.55.1. Two (2) braking systems are required. Service brakes shall be dual hydraulic, disc front and disc rear.

B.55.2. The parking brake system shall be operated by a cable to the rear wheels, or Drive Shaft Drum Brake.

B.55.3. The braking system shall be adequate for the GVWR of the vehicle.

B.56. GEAR RATIO

B.56.1. Must be a 4:56 gear ratio

B.57. FUEL CAPACITY

B.57.1. Must be at minimum of 55 gallons

B.58. FUEL PUMP ACCESS DOOR

B.58.1. An aluminum diamond plate access door shall be provided in the floor of the vehicle above the fuel tank to allow the fuel pump to be serviced without removal of the tank. NOTE: Door must be Large enough and centered over fuel pump to allow easy removal of pump.

B.59. SHOCK ABSORBERS

B.59.1. Must have heavy duty, front and rear shock absorbers.

B.59.2. Rear Shock Absorbers upper mounting brackets shall not be covered by any Body Braces that would prevent easy access to Upper Shock Mounting Bolts and Nuts.

B.60. SUSPENSION

B.60.1. Rear shall have Leaf Springs.

B.60.2. Right rear shall have an extra leaf to compensate for weight of wheelchair lift.

B.61. STEERING

B.61.1. Must have power-assisted steering

B.61.2. Must have tilt wheel,

B.61.3. Must have factory installed cruise control.

B.62. AIR CLEANER

B.62.1. Must have a heavy duty, dry type air cleaner

B.63. OIL FILTER

B.63.1. Must have a heavy duty, throw away type oil filter.

B.64. ALTERNATOR

B.64.1. Vehicle shall have Ford OEM 225-amp Alternator or equivalent.

B.65. BATTERIES

- B.65.1.** Two (2) heavy duty, maintenance free, minimum 650 CCA at 0 degrees F (-17.778 C) Batteries must be wired together in a parallel circuit to increase total battery capacity.
- B.65.2.** Front OEM battery must have OEM type battery hold down brackets to securely hold battery in place.
- B.65.3.** Instep Battery Box that is bolted down securely and must be sealed to keep mud and debris from getting on Rear Coach Battery.
- B.65.4.** Battery must be bolted within this instep box. Cloth holds down straps are not ALLOWED.
- B.65.5.** Battery box must be sealed to keep mud from getting on batteries. SEE FIGURE 4 & 5

B.66. GROUNDS

- B.66.1.** A ground of the battery cable size, shall be installed between the engine and chassis frame.
- B.66.2.** The vehicle body shall be properly grounded to the chassis frame at least 2 (two) places.
- B.66.3.** Engine and body grounds shall be installed to handle subsystem electrical capacity.
- B.66.4.** Grounding wires fastened to the frame shall use a bolt with a nut installed in a proper sized hole with dielectric compound applied to the cleaned surfaces, bolt, and cable end.
- B.66.5.** Lift pump motor shall be grounded directly to chassis frame using a cable of the same size as the pump motor feed wire.
- B.66.6.** All exterior lights and accessories added by the body manufacture shall be grounded by an in harness ground attached at a fuse panel common grounding point.
- B.66.7.** For all ground wire connections paint shall be removed at the grounding point to provide a surface, cable end, bolt, and nut where each positive or grounding cable is attached.

B.67. STABILIZER BAR

- B.67.1.** Heavy Duty Front and rear

B.68. HORN

- B.68.1.** Must have a dual, electric horn.

B.69. SIGNAL

- B.69.1.** Directional and self-canceling with hazard warning flashers.

B.70. TOW HOOKS

- B.70.1.** Shall have 2 tow hooks on Rear.

B.71. WINDSHIELD WIPERS

- B.71.1.** Minimum two speeds with intermittent feature and washer.

B.72. KEYS

- B.72.1.** Vehicle must include three (3) sets of keys for the entire bus.

B.73. RADIO

- B.73.1.** Must have an AM & FM CD radio
- B.73.2.** Radio must be of same manufacture as chassis. Radio must be mounted in the Chassis OEM Location in dash.
- B.73.3.** Must have a minimum of six speakers two (2) OEM speakers in front chassis doors. The coach body's four (4) speakers shall be a 3-way standard speakers.

B.74. PAINTING, DECALS AND MONOGRAMS

- B.74.1.** All signs required by State and federal law shall be affixed to each vehicle exterior and interior.
- B.74.2.** It is up to the bus dealer/manufacture to add such signs and decals upon delivery of vehicle.
- B.74.3.** No decals, name plates, or painted identification of the bus dealer/manufacture are to be added to the vehicle.

B.75. UNDERCOATING

- B.75.1.** Floor and wheel housing, anti-rust factory installed.

B.76. WARRANTY REQUIREMENTS

- B.76.1.** The contractor warrants and guarantees to the original Procuring Agency each complete bus and specific subsystem and components for 100% parts and labor as follows:
- B.76.1.1.** OEM standard factory warranties for chassis and engine.
 - B.76.1.2.** Complete bus body and body structure, exterior, wiring, flooring installation, and paint are warranted to be free from defects, related defects and to maintain structural integrity for a period of Five (5) year or 100,000 miles.
 - B.76.1.3.** Add-on components shall have component manufacture's standard warranty.
 - B.76.1.4.** Warranty shall begin on the date that the vehicle delivery is accepted by the agency issuing the purchase order.
 - B.76.1.5.** The wheelchair lift shall have a five (5) year unlimited mileage and unlimited cycles.
 - B.76.1.6.** The air-conditioning system shall have a minimum 2 years unlimited mileage.
 - B.76.1.7.** The Chassis powertrain should be warrantied for a five (5) years or 100,000 miles.
 - B.76.1.8.** Any parts under warranty must be available and delivered to the purchasing transportation provider or their repair shop within 5 days of the time they requested/ordered them. The bus vendor/manufacture shall bear all reasonable financial costs of shipment of parts.
 - B.76.1.9.** The warranty, as well as any recall notifications, shall cover each vehicle of the ultimate purchaser or recipient agency. The vendor shall provide a copy of any recall notice to the purchasing agency.

B.77. BUS TESTING

- B.77.1.** Certification shall be provided that in accordance with 49 CFR Part 665,
- B.77.2.** Bus Testing, the vehicle either does not need to be tested (with justification specified for exemption) or has been tested at the bus testing facility and a test report is included.

B.78. BUS WATER TESTING

- B.78.1.** The roofs, windows, windshield and all doors of all coaches shall be water tested, as follows:
- B.78.2.** The waster test shall consist of a series of nozzles that are strategically located around the perimeter of the vehicle so as to the nozzles spray water over the entire surface of the vehicle.
- B.78.3.** The nozzles shall eject a volume of water no less than 2.6 gallons per minute under a pressure of no less than twenty-two (22) pounds per square inch measured at the nozzle tip.
- B.78.4.** There shall be no less than twenty (20) nozzles installed in the water test area, each capable of directing a force of water as indicated above.
- B.78.5.** The Vendor/Manufacture shall be required to water test each vehicle, under the conditions set forth above, for no less than five (5) minutes, in order to determine whether or not there are any body leaks at the window areas, door areas, roof panels, etc.
- B.78.6.** The Vendor/Manufacture shall take the necessary corrective action when body leaks are found to exist as a result of the above test, and conduct a second water test to recheck for body leaks following corrective action.

B.79. ALTOONA TESTING

- B.79.1.** Vehicle must be tested in the 7-year/200,000 mile category at the Altoona Bus Testing Facility in Duncansville, PA. And a copy of the full report must be submitted with the Proposal.

B.80. GENERAL

- B.80.1.** All equipment cataloged as standard for the basic vehicle, unless superseded by these specifications, must be furnished and included in the purchase price of each vehicle. Complete printed specifications, published literature, and photos, or illustrations of the basic units that the Supplier proposes to furnish with this Proposal must accompany each Proposal.

B.81. QUALITY OF MATERIALS

- B.81.1.** Welding procedures and materials shall be in accordance with standards of the American Society of Testing Materials and the American Welding Society. All visible welds shall be grounded smooth. Where metal is welded, the contact surface shall be free of scale, spatter, and grease and shall be treated to preclude rusting.

B.82. PUBLICATIONS AND PRINTED MATERIALS

- B.82.1.** Each vehicle shall have a complete set of operation, quality assurance, and warranty publications.
- B.82.2.** The information shall be organized in a three ring binder format with each sections clearly identified.
- B.82.3.** As built wiring diagram and as built parts manuals for body and all auxiliary equipment.

- B.82.4.** Maintenance and inspection schedule incorporating the required maintenance and inspection of the basic vehicle and its sub-systems.
- B.82.5.** Operator's manual: A complete operations manual and troubleshooting guide with a detailed manufacturer's parts list that covers the conversion features on the vehicle as listed in this specification. The manual will provide complete, comprehensive instructions for the wheelchair accessories, wheelchair list deployment, air conditioning system, tie downs, heater, deployment of seats, wiring diagram and related equipment.
- B.82.6.** Warranty papers for chassis, body, and additional equipment.
- B.82.7.** Warranty Information: Each vehicle must have a published listing of contractor warranty repair locations, including address, telephone number, and contact names for the State of Oklahoma.

B.83. PRE-AWARD AUDIT

- B.83.1.** The vehicles are not considered delivered to the purchasing agency until the required FTA documents are completed by a Government Official.
- B.83.2.** A Pre-Award Audit shall be conducted to determine if the proposal meets specifications. The Supplier shall submit documents, which include certification of the manufacturer's compliance with the Federal Transit Administration (FTA) Pre-Award Buy America Audit Requirements. The document submitted shall include the following information for each major component used on vehicle:
 - B.83.2.1.** Name and address of each supplier.
 - B.83.2.2.** Cost of each major component and subcomponent. In order to protect proprietary information, the document may reflect the percentage of total cost each item represents instead of the actual cost.
 - B.83.2.3.** Country of origin of each major component and subcomponent.
 - B.83.2.4.** Name and address of company where final assembly occurs.
 - B.83.2.5.** Cost of final assembly
 - B.83.2.6.** Signature of authorized representative of vehicle manufacturer.

B.84. POST- DELIVERY AUDIT

- B.84.1.** A Post Delivery Audit of the vehicle(s) shall be conducted at the purchaser's facility, to determine that the completed vehicle(s) meets specifications. Once this process has been satisfactorily completed, the vehicle(s) shall be considered acceptable.

B.85. ACCESSIBILITY REQUIREMENTS

- B.85.1.** When submitting a Proposal for an accessible vehicle for the disabled, the vendor shall provide a list of the vehicle related equipment illustrating the component cost and related installation charges. The purpose of this list is to reflect an accurate cost for those vehicle related items, which are required to make the vehicle accessible to the disabled.

B.86. ACCEPTANCE OF VEHICLES

- B.86.1.** Upon delivery at the designed location specified within this document the final acceptance will occur after the vehicles have been inspected, road tested and all FTA required post audit delivery requirements have been met.
- B.86.2.** All vehicles shall be insured by the Supplier until the post audit delivery has been conducted at minimum

B.87. CNG CONVERSION CHASSIS

- B.87.1.** OEM engine shall be converted to operate on dedicated CNG. A WESTPORT/BAF Cal Comp System or approved equal shall be provided. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional control module will be accepted. Dual fuel systems will not be accepted. System must comply with the following
 - B.87.1.1.** Closed-loop fuel control
 - B.87.1.2.** Sequential fuel injection (SFI)
 - B.87.1.3.** Optimized ignition timing
 - B.87.1.4.** Must maintain original fault codes (DTCs)
 - B.87.1.5.** Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner
 - B.87.1.6.** CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.
 - B.87.1.7.** The minimum CNG tank capacity on the mini-buses should be 39 Gasoline Gallon Equivalent
 - B.87.1.8.** CNG interlock – Engine will not run when filling CNG tanks.

B.87.1.9. Must provide a detailed floor plan of the placement of the CNG tanks.

B.87.1.10. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

B.88. CNG BIFUEL CONVERSION CHASSIS

B.88.1. OEM engine shall be converted to operate on CNG and Gasoline. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional module will be accepted. System shall be capable of switching between CNG and Gasoline. The Gasoline fuel tank will be installed as per OEM specifications. The system must comply with the following:

B.88.2. Closed-loop fuel control

B.88.3. Sequential fuel injection (SFI)

B.88.4. Optimized ignition timing

B.88.5. Must maintain original fault codes (DTCs)

B.88.6. Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner

B.88.7. CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.

B.88.8. The minimum CNG tank capacity on the mini-buses should be 29 Gasoline Gallon Equivalent

B.88.9. Must provide a detailed floor plan of the placement of the CNG tanks.

B.88.10. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

B.89. DEDICATED PROPANE AUTOGAS INJECTION

B.89.1. The system shall be a Roush CleanTech System or approved equal. The system must be CARB, EPA certified, and OBDII Compliant. The system shall have the following system components:

B.89.1.1. PCM Calibration

B.89.1.2. Billet aluminum high-pressure fuel rail.

B.89.1.3. Appropriate fuel injectors

B.89.1.4. Appropriate fuel lines

B.89.1.5. Appropriate OEM engine prep package

B.89.1.6. Coverage of Five (5) year/ 60,000 mile warranty.

B.89.1.7. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

B.90. DUAL FUEL VEHICLE PROPANE AUTOGAS INJECTION

B.90.1. System shall be a Roush CleanTech System or approved equal.

B.90.2. The system shall be a Roush CleanTech System or approved equal. The system must be CARB, EPA certified, and OBDII Compliant. The system shall have the following system components:

B.90.2.1. PCM Calibration

B.90.2.2. Billet aluminum high-pressure fuel rail.

B.90.2.3. Appropriate fuel injectors

B.90.2.4. Appropriate fuel lines

B.90.2.5. Appropriate OEM engine prep package

B.90.2.6. Coverage of Five (5) year/ 60,000 mile warranty.

B.90.2.7. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

B.91. BACK-UP MONITOR SYSTEM:

B.91.1. ASA Voyager AOM562A or approved equal with a 5.6" color LCD screen mounted on rear view mirror OEM Bracket. With a rear mounted outside backup camera and a second inside front mounted camera to view passengers.

B.92. TWO-WAY RADIO SYSTEM UHF

B.92.1. ICOM F6021 UHF two-way Radio System with a PCTEL MUF4505 UHF antenna and coax or approved equal.

B.92.1.1. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

B.92.1.2. Radio must be mounted in an easy accessible location for the driver.

B.92.1.3. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

B.93. TWO-WAY RADIO SYSTEM

B.93.1. ICOM F5021 VHF two-way Radio System with a PCTEL MHB5800 VHF antenna and coax or approved equal.

B.93.1.1. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

B.93.1.2. Radio must be mounted in an easy accessible location for the driver.

B.93.1.3. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

B.94. TWO-WAY RADIO SYSTEM 800 MHZ

B.94.1. Kenwood NX-900K 800 MHz two-way Radio System with a PCTEL MUF8003 antenna and coax or approved equal.

B.94.1.1. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

B.94.1.2. Radio must be mounted in an easy accessible location for the driver.

B.94.1.3. Radio must be programmed with the correct Frequencies and the antenna tuned for agency issuing this purchase.

B.95. DRIVER'S SHIELD

B.95.1. A clear Plexiglas barrier shall be erected behind the driver and extend from the stanchion crossbar behind the driver up to the ceiling.

B.95.2. This shield start at the wall on the driver's left side (close enough to prevent a passenger from reaching through to the driver) and should extend 3 inches past the right side of the driver's seat, but shall not obstruct the view from the rear view mirror.

B.95.3. This barrier shall consist of clear Plexiglas and shall be at least ¼ inch thick.

B.95.4. A 1 ½ inch clearance between the stanchion and barrier should be provided to allow a hand hold on the right side.

B.96. PAINTED LOWER SKIRTS

B.96.1. Paint to purchaser's color specs.

B.97. NOTE: See Figure 2.

B.98. OUTSIDE PASSENGER DOOR SWITCH

B.98.1. Outside keyed electric passenger door switch outside. Switch must be water proof.

B.99. BUS CAMERA SYSTEM

B.99.1. REI Bus-Watch R4001 with 500GB Hard drive and four cameras or approved equal. Successful vendor shall coordinate with the agency issuing this purchase for location of Camera's.

B.99.2. See Figure 3 for camera type and location of cameras.

B.100. FABRIC INSERT ON CEILING

B.100.1. Must match seat fabric and pattern.

B.101. STREET SIDE EXHAUST

B.101.1. Exhaust to be turned out opposite side of Wheel Chair lift

B.102. INTEGRATED CHILD SEAT

B.102.1. Integrated Child Restraint Seat must be a Freedman Seating ICS-10 or equivalent

B.102.2. Must have an integrated 4-point safety harness. for children 22-78 Lbs with under seat retractor seat belts for adults

VINYL SEATS

B.102.3. This will be a price deduction from the durable transit style level 5 cloth fabrics.

B.102.4. Vinyl deduction is for passenger seats only

B.102.5. Pilot and co-pilot seats shall be durable transit quality level 5-cloth fabric

B.103. PUBLIC ADDRESS SYSTEM

B.103.1. A public address system shall be installed with a hand held microphone.

B.103.2. The system shall include a solid-state amplifier of sufficient power and quality that the operator's voice can be clearly heard without distortion.

B.103.3. The amplifier shall be firmly secured in a protective area.

B.103.4. The PA system shall use the vehicles 6 speakers for sound.

B.103.5. A power switch for the PA system shall be mounted on the dash to provide operation for the inside and amplifier off.

B.103.6. Any noise suppression due to alternator, lighting, engine or other source is required of the contractor.

B.104. PASSENGER SIGNAL SYSTEM PULL CORD

B.104.1. The Stop Request system shall have the following features:

B.104.1.1. Separate provisions for W/C passengers and ambulatory passengers to signal a Stop request.

B.104.1.2. Must uses a yellow pull cord run below the windows for the ambulatory request and a large yellow push pad mounted at least 15" above the floor, but not more than 48". There must be a touch pad per W/C space for the passengers to signal a stop request.

B.104.1.3. The driver should have a means of telling if a W/C passenger has signaled. There must be a Blue dash light to signal a W/C passenger request and a RED light to signal an ambulatory passenger request.

B.104.1.4. The "Stop Request" lighted sign should show if a W/C passenger has signaled; the sign shall be a universal W/C symbol which lights in blue.

B.104.1.5. There shall be an audible signal when a stop is requested and must be able to be heard by the driver.

B.104.1.6. Once the pull cord is pulled, the sign will light, the driver's red light goes on, and a chime sounds. The sign will stay lit until the bus is stopped and the entry door is opened. The system automatically re sets itself

B.104.1.7. When the W/C passenger signals a stop request, the W/C portion of the sign lights, the chime sounds, and the blue light on the dash goes on. The sign will stay lit until the W/C lift is deployed and then stowed and the W/C door is closed again.

B.105. PASSENGER STOP REQUEST SIGNS

B.105.1. Passenger stop request sign must be Transign, or equivalent.

B.105.2. The signs must be back-lighted stop requests and shall be mounted overhead on the front ceiling end closure.

B.105.3. The sign shall be so designated as to remain illuminated when activated (by the passenger signal system) until it is extinguished by opening the door.

B.106. FARE COLLECTION BOX

B.106.1. Fare collection box must be GFI Genfare "Cents a bill" farebox or compatible.

B.106.2. With this option, the mounted fare box will eliminate the front passenger seat and make the bus a 14 passenger.

B.106.3. Also must have the OEM Co-Driver seat covered with same fabric as the other passenger seats shipped loose with the bus. Co-Driver door shall have the same type of running board as driver's door.

B.107. DESTINATION SIGNS

B.107.1. Destination signs must be Twinvision, or equivalent. The automatic electronic destination sign system shall be furnished on the front and on the right side near the front door of the vehicle. Display areas of destination signs shall be clearly visible in direct sunlight and/or at night. The sign system shall provide optimum visibility of the message display units for passengers and shall meet applicable ADA requirements defined in 49 CFR, Part 38.39. Destination signs shall be installed in such a manner as to facilitate easy access for replacement of the entire sign assembly, or components such as fluorescent lamps/LED's and electronic control modules, from inside the bus within 30 minutes by a mechanic. Lamps and associated parts shall be commercially available.

Destination messages, route designations, and public relations messages shall be independently selectable via a single Operator's Control Panel (OCP) which shall include a display monitor. The OCP display monitor readout shall show the exact information displayed on the destination signs. The OCP shall be conveniently located for the

bus operator and mounted in such a manner that will not pose any safety hazard. The OCP shall utilize a durable weatherproof keypad with tactile feel for destination message control functions.

The destination sign system shall be capable of programming 10,000 message lines. The number of public relations messages shall be limited only by the remaining number of message lines not used for destination purposes. Sign displays shall have alternating message capability with programmable blanking time between message lines as may be required. Variable blanking times shall be programmable between 0.5 to 25 seconds in duration. Each line message or blanking time for each message shall be individually programmable. The message display units shall incorporate an automatic blanking feature that will cause the display area to blank within 30 seconds of the bus master power switch being turned off.

An emergency message shall be initiated by the closure, or opening, of a dry contact switch or relay. The emergency message shall be displayed on the exterior of the bus only. The OCP shall not display the emergency message. The destination sign shall automatically resume normal operation when the remote emergency switch is returned to its normal position.

Destination Sign Programming: The electronic sign system shall be programmable via an integral connector located in the front destination sign area. Software shall be furnished for programming the sign system via an IBM-compatible, laptop computer. Software shall be capable of providing a high degree of flexibility to create, or select preprogrammed, fonts and graphic displays. The sign shall have the capability of being programmed in the field using a PC or field programmer. Message program information shall be transferable to and/or from the field programmer device as specified by the transit system in attachments to Part 5: Technical Specifications.

The destination sign compartments shall be designed to prevent condensation and entry of moisture and dirt. Additional provisions shall be included, if necessary, to prevent fogging of both destination sign compartment window and glazing on unit itself. Access shall be provided to allow cleaning of inside of destination sign compartment window and unit glazing.

A complete listing of destination sign readings for initial sign programming by the manufacturer are provided in attachments to Part 5: Technical Specifications.

B.108. FRONT SIGNS

B.108.1. Sign Size

B.108.1.1. A 16 Row by 148 Column Spectrum Route Multi-Color Sign that shall have no less than 3,264 LEDs with a message display area of not less than 8.0 inches high by not less than 64.6 inches wide. The LEDs displays shall consist of red-blue-green LEDs and amber colored LEDs. The color LEDs shall be rated by their manufacturers for a life expectancy of 50,000 hours to 100,000 hours and shall support up to 27 colors.

B.108.2. Sign Readability

B.108.2.1. The destination message shall be readable by a person with 20/20 vision from a distance of 250 feet. The sign shall have an equal readability at 65 degrees on either side of the line perpendicular to the center of the mean plane of the display. The entire display area of all signs shall be clearly visible and readable both in direct sunlight and at night.

B.109. SIDE SIGNS

B.109.1. Sign Size

B.109.1.1. An 8 Row by 96 Column Spectrum Route Multi-Color Sign that shall have no less than 768 LEDs with a message display area of not less than 2.8 inches high by not less than 36.3 inches wide. The LEDs shall be rated by their manufacturers for a 100,000-hour life expectancy.

B.109.2. Sign Readability

B.109.2.1. The destination message shall be easily read from the sidewalk level. The entire display area of all signs shall be clearly visible and readable both in direct sunlight and at night.

B.109.3. System Control Console – Operator Display and Keyboard:

B.109.3.1. The system control console shall be used to view and update display messages. The system control console shall utilize a 28-key conductive rubber pad keyboard with tactile feel, designed especially for the harsh transit environment or approved equal.

The system control console shall contain a 16 x 128 pixel vacuum fluorescent display. The system control console shall contain an audio annunciator that beeps to alert the operator to view the display for a message, or beeps indicating that a key is depressed. The system control console shall continuously display the complete message associated with the selected destination code.

B.109.4. Memory Transfer

B.109.4.1. The sign system shall be reprogrammable through the system control console by either a PCMCIA flash card or a Memory Transfer Unit.

B.109.5. Emergency Message Display

B.109.5.1. If required, a special emergency message can be activated by a switch. This message shall be displayed on signs, facing outside the vehicle, while the signs inside the vehicle, including the system control console, remain unchanged. The emergency message shall be canceled by entering a new destination code or by removing the emergency signal.

B.110. PROGRAMMING

B.110.1. A programming software package shall be furnished to generate message lists for the destination sign system. A PCMCIA flash memory card having a minimum of 8 megabytes of memory shall be provided to facilitate bus system programming. The software must be compatible with Windows NT, Windows 2000, Windows XP, Windows Vista and Windows 7. The programming software shall use techniques that require minimal operator training and that are intended for use by operators that are not trained in complex computer operations. All operator screens shall utilize pull down and pop-up menus.

B.111. BICYCLE RACKS

B.111.1. Manufacturer/model should be Sportworks DL- 2 or equivalent.

B.111.2. Racks must have a 2 (two) bike capacity, and follow the specs noted below.

B.111.2.1. The bike rack must meet OSHA requirements for lifting by a single individual and be capable of being raised or lowered with one hand

B.111.2.2. The bike rack must accommodate all bicycles with wheels 16" (for example, the Dahon folding bicycle series) or larger diameter, excluding tandems and recumbent type bicycles. The rack must accommodate all bicycles 80" and longer.

B.111.2.3. The bike rack frame must be manufactured with 304 stainless steel tubing with a minimum wall thickness of 0.125 in., outside corners to be rounded, pinch joints minimized and welds smoothed.

B.111.2.4. All nuts, bolts and washers shall be either AISI Type 304 stainless steel or Grade 8 yellow zinc plated steel

B.111.2.5. The bike rack must be mounted to the front of the bus and accommodate two (2) bicycles. In the stowed position, folded up against the front of the bus, it shall protrude no more than 8" from the front bumper. The protrusion shall be no more than 36" when deployed.

B.111.2.6. The latching mechanism must automatically lock the bike rack in the stowed and deployed positions.

B.111.2.7. The bike rack, when stowed, shall not interfere with any access panels/doors, windshield wipers or driver vents.

B.111.2.8. The bike rack shall be designed for loading and unloading from the front, curbside, of the bus. The securement can only contact the bicycle's tires as to not do any damage to the bicycle's frame. The bike rack shall have a positive securement with a four (4) point locking system, contacting the wheel in such a way that greater than half the circumference of the wheel is captured. Straps, cords, and/or springs shall not be required to secure a bicycle.

B.111.2.9. The carrier shall not interfere with the ability of the driver to safely operate the vehicle. This includes, but is not limited to, the obstruction of the windshield view and the operation of the windshield wipers, turn signals, and headlights.

B.111.2.10. The carrier shall be compatible with automated bus washing systems and shall be capable of repeated use with automated washing equipment without sustaining damage to the carrier, vehicle, or the washing equipment. The carrier shall be designed as not to accumulate water internally.

B.111.2.11. The use of this rack shall not affect route scheduling. The bike rack shall have a design capability of being loaded or unloaded in 20 seconds or less.

The mounting bracket/ pivot plate assembly must be designed to fit all urban transit buses, both standard floor and low floor.

B.111.2.12. The bicycle rack shall be warranted against defects in materials and workmanship for a period of one (1) year from date of installation.

- B.111.2.13.** The bicycle rack manufacture is required to furnish all the complete parts and service (maintenance) books.
- B.111.2.14.** The bicycle rack should have a latching system in both positions, stowed and deployed; this will need to be explained in detail
- B.111.2.15.** The racks should be in a friendly design and a tire only mount.
- B.111.2.16.** The mounting brackets should be detailed at to what bus needs with brackets.

B.112. PRODUCT STANDARDS

- B.112.1.** Only first quality materials, workmanship and finish shall be acceptable.
- B.112.2.** All general materials and workmanship shall be guaranteed to be free of defects for a minimum of at least one (1) year from date of installation except as noted below. Any defects shall be rectified or replaced to meet specifications at the expense of the manufacturer, including freight, parts and labor.
- B.112.3.** Any exposed fasteners shall be colored to match the finish of the framework components.

B.113. SPARE PARTS

- B.113.1.** The contractor will provide pricing and the delivery time on the available spare parts for each bicycle rack and maintain adequate stock levels.

B.114. DELETE ALTRO CHROMA FLOORING

- B.114.1.** This delete's the Altro Chroma Floor covering to install the Gray RCA Rubber Transit-Flor. The step well, entrance area, and center aisle floor area shall be overlaid with ribbed, slip resistant, oil resistant commercial 3/16" step tread thickness. The 1/8" thickness flooring under the seats and in the wheelchair area shall be smooth, slip resistant, and oil resistant. The flooring shall extend up the sidewall and rear wall to the seat rail line and shall be coved at the floor/wall joint to form a smooth water-tight transition. Flooring adhesive shall be oil resistant.

B.115. DELETE YELLOW POWDER COAT ON HANDRAILS

- B.115.1.** This delete's the yellow powder coating on the stainless steel handrails, grab handles and stanchions. They will be the natural brushed Stainless steel Color.

B.116. 100% NIDA-CORE[®] STRUCTURE OR APPROVED EQUAL

- B.116.1.** Resin Hardened Nida-Core[®] or approved equal Polypropylene Copolymer honeycomb (1" thickness, minimum) Throughout 100% of the entire body structure, walls, roof, front and rear caps must be used instead of Honeycomb Paper Vertical. This is to eliminate any possibility of rotting in any area of the body structure.

B.117. COMPOSITE FLOOR:

- B.117.1.** Composite Space-age Synthetics Thermo-Lite Board-Tough Series or approved equal Floor that will not rot and is lighter than the standard marine grade plywood floor.

B.118. SIDE DOOR SLIDE OUT BATTERY TRAY:

- B.118.1.** Must have an Extra Heavy Duty Stainless Steel slide out Battery Tray for all auxiliary batteries mounted under Bus. Battery Box must have OEM type battery hold down brackets to securely hold batteries in place. Cloth hold down straps is not ALLOWED. Battery box must be sealed to keep mud from getting on batteries.

B.119. DIESEL ENGINE

- B.119.1.** Current Power plant for the make and model of chassis

B.120. REAR SPARE TIRE HOLDER

B.120.1. A rear spare tire holder that shall be affixed to the vehicle in a way to allow easy removal of spare tire.

B.121. ADJUSTABLE REAR SUPSENIOR SYSTEM

B.121.1. System shall be a MOR/ryde suspension system or equal shall be used with the following:

B.121.1.1. Installed as per the manufactures recommendations.

B.121.1.2. Fully adjusted for each bus installed on.

B.121.1.3. Warranty to be a 5 year 100,000 miles

B.122. MEMO/PAMPHLET RACK

B.122.1. The memo/Pamphlet rack will be bolted to inside side wall of bus. (See Figure 6)

B.123. TDSS FOLD AWAY SEAT

B.123.1. Seat will be bolted to structural steel. (See Figure 7)

B.124. METAL BOX

B.124.1. Metal box should be bolted and placed between the passenger and driver's seat. (See Figure 8)

B.125. SEAT BELT EXTENSIONS

B.125.1. Extra Seat belt Extensions

SECTION "B"
24' 12 Passenger MFSAB Bus
RESPONSE SHEET

BASE VEHICLE COST PER UNIT

BASE VEHICLE	COST PER UNIT
TRANSIT BUS (GAS ENGINE)	\$

CHASSIS SPECIFICATIONS

Specify Overall Vehicle Length (outside of front bumper to outside of Rear bumper): _____

SPECIFICATIONS	MINIMUM/MAXIMUM IN INCHES	SUPPLIER'S RESPONSE
OVERALL VEHICLE LENGTH	276" minimum	
OVERALL VEHICLE LENGTH	307" maximum	
WIDTH EXTERIOR	95" minimum	
WIDTH INTERIOR	91" minimum	
HEIGHT EXTERIOR	105" minimum	
HEIGHT EXTERIOR	124" maximum	
HEIGHT INTERIOR	74" minimum	
WHEELBASE	158" minimum	
WHEELBASE	176" maximum	

AIR CONDITIONING

Make and Model of Rear A/C Unit and Cooling Capacity of rear Unit BTU's/Hr. Include literature on unit being proposed.

MAKE/MODEL	
BTU/HR OF REAR UNIT ONLY	

HEATING

Make and Model of Rear Heating Unit and Heating Capacity of rear Unit BTU's/Hr. Include literature on unit being proposed.

MAKE/MODEL	
BTU/HR OF REAR UNIT ONLY	

OPTIONAL ITEMS

OPTIONAL ITEMS	COST PER ITEM
CNG CONVERSION CHASSIS	
CNG BIFUEL CONVERSION CHASSIS	

PROPANE DEDICATED CONVERSION	
PROPANE DUEL FUEL CONVERSION	
BACK-UP MONITOR SYSTEM	
TWO-WAY RADIO (UHF)	
TWO-WAY RADIO (VHF)	
TWO-WAY RADIO (800 MZ)	
DRIVER'S SHIELD	
PAINTED LOWER SKIRTS	
OUTSIDE PASSENGER DOOR SWITCH	
BUS CAMERA SYSTEM	
FABRIC INSERT ON CEILING	
STREET SIDE EXHAUST	
INTEGRATED CHILD SEATS	
VINYL SEATS (PRICE DEDUCTION)	
PUBLIC ADDRESS SYSTEM	
PASSENGER SIGNAL SYSTEM PULL CORD	
PASSENGER STOP REQUEST SIGNS	
FARE COLLECTION BOX	
DESTINATION SIGNS	
BICYCLE RACKS	
DELETE ALTRO CHROMA FLOORING (PRICE DEDUCTION)	
DELETE YELLOW POWDER COATING ON HANDRAILS, GRAB RAILS, AND STANCHIONS (PRICE DEDUCTION)	
100% NIDA-CORE STRUCTURE	
COMPOSITE FLOOR	
SIDE DOOR SLIDE OUT BATTERY BOX	
DIESEL ENGINE	
REAR SPARE TIRE HOLDER	
ADJUSTABLE REAR SUSPENSION SYSTEM	
MEMO/PAMPHLET RACK (See Figure 6)	
FREEDMAN SEATING TDSS (OR EQUIVALENT) FOLD AWAY SEAT (See Figure 7)	
METAL BOX (See Figure 8)	
EXTRA SEAT BELT EXTENSIONS	

A LIST OF OPTIONAL EQUIPMENT AND/OR ACCESSORIES SHALL BE PROVIDED. THE LIST MUST CONTAIN:

- Item
- Description and functionality detail
- Cost of item installed in final delivery of vehicle
- Any changes to listed specifications as outlined above to accommodate options

RFP EXECPTIONS

Supplier must list any exceptions here to be used as a part of the RFP evaluation and analysis. Please list the roman numerical on the standard specs or the number for the options when listing any exceptions.

FIGURE 1

Figure 1

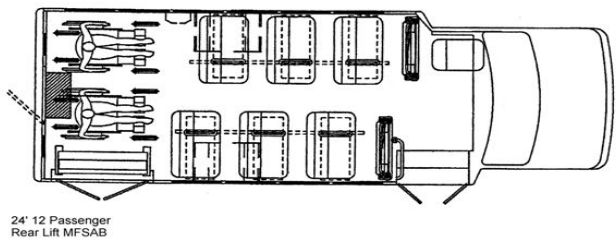


FIGURE 2



FIGURE 3

Figure 1

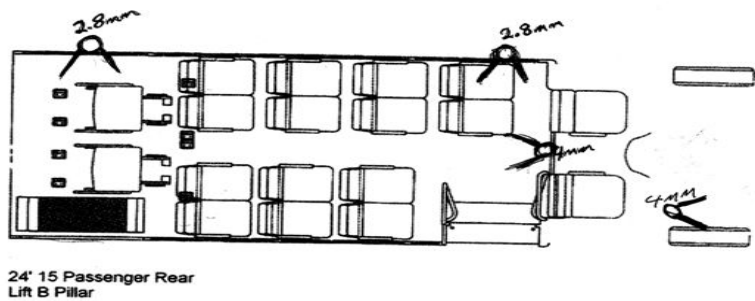


FIGURE 4



FIGURE 5



FIGURE 6



FIGURE 7



FIGURE 8



D. SOLICITATION SPECIFICATIONS FOR 24' 15 PASSENGER, REAR LIFT COMPOSITE TRANSIT BUS

D.1. DELIVERY:

- D.1.1.** Vehicle must be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following:
 - D.1.1.1.** The vehicle must have a full tank of fuel when delivered.
 - D.1.1.2.** Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
 - D.1.1.3.** All parts added, as part of the modification process shall be new.
 - D.1.1.4.** Headlights properly aligned
 - D.1.1.5.** Engine Tuned
 - D.1.1.6.** All accessories properly adjusted
 - D.1.1.7.** Electrical, braking and suspension systems inspected
 - D.1.1.8.** Both batteries Charged
 - D.1.1.9.** Front-end alignment must be done after body is put on chassis. Chamber, caster and toe must be adjusted to the center of OEM specs. Ford chassis buses must have adjustable caster, camber bushings installed. Standard OEM bushings will not be accepted. Each bus must come with documentation stating before and after actual alignment readings of bus.
 - D.1.1.10.** All wheels balanced, including spare
 - D.1.1.11.** All lubricants checked, and greased if needed
 - D.1.1.12.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
 - D.1.1.13.** Warranty papers and owner's guide
 - D.1.1.14.** Exterior and interior cleaned and washed.
 - D.1.1.15.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.
 - D.1.1.16.** Under no circumstances are tow vehicles to be attached to any buses.
 - D.1.1.17.** Each vehicle must be delivered to the agency submitting the P.O.

D.2. CERTIFICATE OF ORIGINS

- D.2.1.** Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order five business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery is not acceptable.

D.3. NOTIFICATION

- D.3.1.** Vendor shall notify buyer of vehicle delivery ten business days prior. NOTE: If these specifications contradict any listed in the Federal Regulations, they are superseded by those of the Federal Regulations.

D.4. NO PROTOTYPES

- D.4.1.** Must be a Current production Model, B Pillar type bus that has been in Production for a minimum of one year.

D.5. BODY STRUCTURE

- D.5.1.** Fiberglass Reinforced Plastic (FRP) Composite Unitized-type Body
- D.5.2.** The bus body shall have a heavy-duty unitized structure and shall be of durable fiberglass reinforced plastic (FRP) composite construction. All the body panels shall consist of an exterior high gloss gel coat (.020" thickness, minimum) on a resin-hardened FRP (.125" thickness, minimum) attached to a center layer of Resin Hardened Nida-Core[®] or approved equal Polypropylene Copolymer honeycomb (1" thickness, minimum) must be used in all high moisture areas around the fuel fill cutout, fender flare cutout, front to back of the bus at floor level to keep any road splash from degrading the structure on both driver and pass sides, roof hatch cutout, rear window cutout and

lift door area. Resin Hardened Paper Vertical Honeycomb (1" thickness, minimum) can be used in all other non high moisture locations.

- D.5.3. Steel perimeter and transverse supports, completely fiber glassed to adjoining body parts. It shall use proper adhesive materials to adequately bond and mechanically fasten all joints and points of stress with sufficient strength to comply with the FMVSS 220 rollover protection test. Each supplier shall provide certification with the Proposal that the bus as proposed meets or exceeds FMVSS 220 and FMVSS 221 requirements.
- D.5.4. All exterior side and roof panels when completed shall be at a minimum 1 1/8" thick. Bond lines at the side walls, rear end cap, roof, and front cap shall be interlocked by adhesives, resin saturated fiberglass matting, and mechanical fasteners, forming a unibody design without exposed fasteners or protruding moldings. Imbedded reinforcements equal to the structural members of the body shall be installed at all door openings in order to support door mounting hardware and door operating mechanisms. All door openings shall have full structural framing to maintain integrity of the body structure. **All door frame structure's including wheel chair door frame shall be made of 304 Grade stainless steel powder coated OEM white.**
- D.5.5. Interior panels may be an integral part of the FRP composite panel or may be made of scuff-resistant laminate/FRP finished material. Molded ABS may be used as trim but not for interior panels. Where threaded fasteners are in the trim/interior panel only, an imbedded reinforcing nut or a reinforcing steel panel shall be integrated into the FRP composite for added strength and fastener retention.
- D.5.6. Where self-tapping fasteners are used in body panels, the body panels shall have an imbedded reinforcing nut or a steel reinforcing panel shall be integrated into the FRP composite for added strength and fastener retention.
- D.5.7. Window openings cut into body panels shall have a maximum frame clearance of 1/8" on each side, to minimize the need for caulking. All openings cut into body exterior panels must have the exposed edges of the cutout properly coated to prevent moisture intrusion before further assembly or painting occurs. Steel window frames in the body shall be Zinc Dipped to prevent corrosion and windows shall be properly caulked/sealed to prevent intrusion of moisture and dust.
- D.5.8. Fiberglass Roof must be a one piece molded unit that has molded sides to connect to side walls. Bending a flat sheet of fiberglass to connect to walls is NOT ALLOWED.

D.6. OEM CHASIS FRAME

- D.6.1. The rear overhang, measured from the center of the rear axle to the outer edge of the rear bumper, cannot exceed 1/3 of the overall vehicle length.
- D.6.2. Further, ODOT will not allow re-certification of the chassis OEM GVWR and GAWR.
- D.6.3. Any vehicle that exceeds the OEM GVWR and/or GAWR will not be accepted. NOTE: Supplier must provide detailed documentation if chassis modification must be made to accommodate length of wheelbase from OEM. This documentation shall include, but not limited to type of modification, frame supports, out sourcing of frame work, drive shafts, or quality control.

D.7. DOORS

- D.7.1. Passenger Entry Door: Passenger entry door must have a Two (2)-panel door design providing a minimum 32" X 80" clear opening. A&M door actuator, or equivalent.
 - D.7.1.1. Door is located in coach body and electrically power operated controlled by the driver.
 - D.7.1.2. Each door panel shall be actuated together by a single electric powered overhead actuator.
 - D.7.1.3. Actuator is equipped with an emergency manual release lever.
 - D.7.1.4. Vertical door shafts shall be an integral part of the door panels.
 - D.7.1.5. The top portion of the shaft shall be designed to prevent door panels from rotating out of alignment.
 - D.7.1.6. Shafts shall pivot on a top-mounted, bronze thrust bushing and a lower stud-mounted alignment pivot, accommodated with a glass-filled molded bearing equal to A&M door actuator, or equivalent.
 - D.7.1.7. Perimeter door edges shall be sealed with neoprene 2" leading edge seals.
 - D.7.1.8. Seals shall overlap front and rear to provide an air and watershed.
 - D.7.1.9. Upper and lower edges of doors shall be tightly sealed against entrance of air drafts and water, including spray from vehicle washing.
 - D.7.1.10. Operating controls should be located within easy reach of the driver.

D.8. PASSENGERS DOOR INTERLOCK

- D.8.1. Electric Passenger door in coach body will only work when transmission in Park.

D.9. WHEELCHAIR LIFT DOORS

- D.9.1.** A double door entrance shall be provided on the right (curb) side of the vehicle behind the vehicle's rear wheels.
- D.9.2.** The door opening shall be at minimum width of 48" and height of 70" to accommodate the wheelchair lift specified within this document.
- D.9.3.** Clearance between the top of the door opening and the raised lift platform shall be a minimum of 68".
- D.9.4.** Each door shall be equipped with an A.L. Hansen Type 23 Door Check or equivalent which is a Top Mounted Spring Loaded Device that will securely hold the door in the open position while the wheelchair lift is in operation. (Sliding door is not acceptable).
- D.9.5.** Each door must have a window which shall be the same height as the passenger windows.

D.10. COACH BODY DOOR LOCKS

- D.10.1.** All doors shall be equipped with a lock.

D.11. DRIVER'S DOOR AND CO-DRIVER'S DOOR

- D.11.1.** Must have Power windows, Power door locks

D.12. RUNNING BOARDS

- D.12.1.** Extra Heavy-duty Running Boards that are bolted to Coach Body for added step strength
- D.12.2.** Steps must be able to hold over 400lbs.

D.13. HANDRAIL

- D.13.1.** Handrails (left and right) of the front passenger door shall be provided. Cross-sectional diameter of handrail shall be between 1 ¼" and 1½".
- D.13.2.** Entrance handrails shall not be padded.
- D.13.3.** Must have at minimum a wall thickness of 18 gauge Stainless steel.
- D.13.4.** Two overhead ceiling-mounted handrails with mounting brackets at 24" on centers placed over the aisle shall be provided for the full length of the vehicle's passenger aisle way, except in wheelchair lift area and over passenger entry door.
- D.13.5.** All handrails must be Powder coated Stainless Steel that will not rattle or Flex and mounting bolts shall be bolted into Structural steel.
- D.13.6.** Color of Handrails shall be bright yellow (to assist the visually impaired),
- D.13.7.** **Wood mounting** is not allowed.

D.14. GRAB RAILS

- D.14.1.** Must have grab rails with the following:
 - D.14.1.1.** Shall be installed in the entrance to the vehicle running parallel to the steps in a configuration which allows persons with disabilities to grasp while entering or exiting the vehicle.
 - D.14.1.2.** Cross-sectional diameter of grab rail shall be between 1 ¼" and 1½"
 - D.14.1.3.** Must be at minimum a wall thickness of 18 gauge Stainless steel.
 - D.14.1.4.** All Grab rails must be Powder Coated Stainless Steel that will not Rattle or Flex and mounting bolts shall be bolted into Structural steel.
 - D.14.1.5.** Color of grab rails shall be bright yellow (to assist the visually impaired).
 - D.14.1.6.** **Wood mounting** is not allowed.

D.15. STANCHIONS

- D.15.1.** Must be at minimum a wall thickness of 18 gauge Stainless steel.
- D.15.2.** All stanchions must be Powder Coated Stainless Steel that will not Rattle or Flex and mounting bolts shall be bolted into Structural steel.
- D.15.3.** **Wood mounting** is not allowed.
- D.15.4.** Color of stanchions shall be bright yellow. (to assist the visually impaired),
- D.15.5.** A stanchion and vinyl padded modestly panel shall be provided at entrance door in front of first passenger seat.

- D.15.6. A stanchion from the floor to roof shall be installed on the interior left side of the front passenger door approximately 14 inches inside the vehicle.
- D.15.7. A horizontal handrail shall be installed between the stanchion and the right wall approximately 30 inches above the floor.
- D.15.8. A stanchion shall be located in the rear of the driver's seat at the edge of the aisle and a handrail shall extend from the stanchion to the side wall of the vehicle behind the driver's seat.
- D.15.9. The stanchion shall not interfere with a rearward travel of the driver's power seat adjustment.

D.16. MODESTY PANEL

- D.16.1. A modesty panel shall be positioned at the rear edge of the step well.
- D.16.2. This will be made up of a stanchion at the inner rear corner of the step well with a rail running from that stanchion to the wall at windowsill height and the modesty panel installed therein.
- D.16.3. Panel shall have no less than 1 ½" between the bottom of the panel and the floor to facilitate cleaning of the floor.
- D.16.4. Fastening of the panel shall be by bolt and nut type system.
- D.16.5. **Sheet metal Screws** will not be accepted.

D.17. STEPWELL

- D.17.1. Must be made of minimum 14 gauge 304 Stainless steel to prevent rusting and powder coated white.
- D.17.2. Must have two steps covered with the same slip resistant floor covering as specified within this document.
- D.17.3. maximum 12" minimum 10" from ground to first step,
- D.17.4. 9" riser, Tread depth minimum 8½".
- D.17.5. All steps to get up to floor level must be in step well area.

D.18. INTERIOR

- D.18.1. All interior panels shall be vinyl coated with AZDEL SuperLite backing, vinyl coated metal, FRP or equivalent with same durability and cleaning ease.
- D.18.2. Vendor shall provide a list of available colors at their quoted price and may also include a list of colors available at additional cost.
- D.18.3. Interior shall be trimmed with an attractive molding, covering all seams.
- D.18.4. All surfaces and items or hardware in passenger compartment having sharp edges, corners, or angles that could cause injury shall be passed with heavy-duty vinyl covered foam-type material.
- D.18.5. Door and instrument panel is to be painted or otherwise finished to match overall tones of interior panels

D.19. DRIVERS AREA

- D.19.1. The drivers area shall consist of an ergonomically designed molded dash console, located conveniently to the driver's seated position and in full view of the driver.
- D.19.2. Supplemental control panels mounted above the driver's head or above windshield are not accepted.
- D.19.3. All switches are to be properly labeled and illuminated.
- D.19.4. The instrument control panel shall be painted or otherwise finished with non-reflective, anti-glare black finish.

D.20. STORAGE COMPARTMENT

- D.20.1. Vehicle must have a large overhead driver storage compartment.
- D.20.2. This compartment must have a lip on the inside to protect objects from opening compartment door. Also shall provide easy access to clearance lights connectors through top of Storage Compartment. And provide a door latch to hold door open.

D.21. FLOOR ASSEMBLY

- D.21.1. **The floor shall consist of 3/4 inch Marine Grade Plywood with edge undercoating.**
- D.21.2. Construction of sufficient strength and support to not allow flexing of the finished or surface floor. The chassis, body and flooring shall be attached in such a manner as to act as one unit without any movement or flexing at the joints.
- D.21.3. Shall have Floor Coving material at wall.

D.22. SLIP-RESISTANT FLOOR COVERING

- D.22.1.** Floor covering shall be slip resistant vinyl flooring, constructed with aluminum oxide, silicon carbide and optional PVC chip blended throughout a high quality vinyl wear surface.
- D.22.2.** Top coating is not acceptable.
- D.22.3.** Backing to be polyester/cellulose material with fiberglass fiber reinforced center scrim for additional durability.
- D.22.4.** Bacteriostats will be incorporated providing all exposed surfaces with excellent anti-bacterial properties.
- D.22.5.** Must be Altro Chroma with a minimum thickness of 2.2 millimeters or equivalent
- D.22.6.** Color to be selected from current Altro color range by each agency.
- D.22.7.** The whole floor will be a uniform thickness throughout the vehicle, eliminating the need for ribbed surfaces, while exceeding the ADA minimum slip resistance standard rating of .06 static coefficient of friction under dry or wet conditions.
- D.22.8.** Coving material is to be installed to support floor when rolling floor covering up the sidewall of vehicle to the seat track.
- D.22.9.** Seams must be heat welded to provide a permanent waterproof seal against water penetration leading to premature sub-floor failure or curling leading to possible tripping hazards.
- D.22.10.** Landing area and step edgings are to be Altro yellow safety vinyl edging.
- D.22.11.** Edging is to heat welded to the main floor and step tread to provide for a long lasting seam.
- D.22.12.** The floor must be installed according to manufacturer's directions using proper tools, accessories and adhesives.
NOTE: If the flooring is not installed according to the flooring manufacture (heat welded and adhesives) specifications the bus will not be accepted.

D.23. GAUGES

- D.23.1.** Vehicles shall be equipped with the following needle-type gauges (lights in lieu of gauges are not acceptable): and all shall be in easy view of driver.
- D.23.2.** If OEM gauges are not available then Stewart Warner gauges or equivalent shall be used.
 - D.23.2.1.** OEM chassis Voltmeter Plus a Auxiliary Voltmeter Gauge
 - D.23.2.2.** Oil pressure
 - D.23.2.3.** Temperature
 - D.23.2.4.** Fuel level
 - D.23.2.5.** Speedometer
 - D.23.2.6.** Odometer
 - D.23.2.7.** Tachometer
 - D.23.2.8.** Engine hour meter

D.24. BUMPERS

- D.24.1.** Front and rear bumpers shall be securely fastened to the chassis frame to adequately absorb shock from impact. In no case are the bumpers to be fastened directly to the vehicle body.
- D.24.2.** Rear bumper must be an energy absorbing Romeo Rim with Heavy Duty bumper mounting brackets that use four 7/16 grade 8 bolts per bracket or equivalent.
- D.24.3.** Front bumper and grille shall be chrome plated.

D.25. INSULATION

- D.25.1.** Insulation shall be provided in both walls, roof, front cap, rear wall and roof side radius area where roof meets walls.
- D.25.2.** Adequate insulating properties shall be provided to ensure minimum heat, cold and noise penetration into the vehicle interior.
- D.25.3.** Insulation may be accomplished through the use of fiberglass, vacuum design or equivalent.
- D.25.4.** Must have a minimum R-value of 6, and fire resistant.

D.26. AIR CONDITIONING

- D.26.1.** Air conditioning efficiency is of paramount concern to the purchaser. Air conditioning shall be adequate to cool both the passengers and driver areas. Only vehicles offering top of the line commercial transit type air conditioning systems will be considered.
- D.26.2.** The vehicle's electrical system shall be designed and integrated such that ample electrical supply is provided to maintain optimum air conditioning performance without battery discharge.
- D.26.3.** The air conditioning system offered shall have a proven transit performance record and shall be provided by a nationally recognized manufacturer of bus air conditioning.
- D.26.4.** The OEM Dash unit and Rear Air Conditioning unit shall be two separate stand alone systems. Tying into the front OEM dash system is not allowed.
- D.26.5.** Rear evaporator shall have an easy accessible return air filter; having to remove evaporator cover housing to gain access to filter will not be accepted.
- D.26.5.1.** The rear air conditioning system shall provide a minimum cooling capacity of 65,000 BTU/Hr.
- D.26.5.2.** A Carrier model AC-833MAX System or equivalent. The Combined Total cooling Capacity of the OEM dash unit and Rear Unit shall be a minimum of 78,000 BTU/hr.
- D.26.5.3.** Rear Evaporator shall have an easy accessible return air filter; having to remove the evaporator cover housing to gain access to filter will not be accepted.
- D.26.6.** THE REAR A/C SYSTEM MUST HAVE THE FOLLOWING SPECIFIED COMPONENTS
- D.26.6.1.** Carrier EM-3 Evaporator or equivalent
- D.26.6.2.** Carrier CM-3 Condenser or equivalent
- D.26.6.3.** Carrier TM-21 Compressor or equivalent
- D.26.6.4.** Carrier Flex CLICK SAE J-2064 Type E Color coded hoses or equivalent to.
- D.26.6.5.** Service Ports for rear Air conditioning System must be easily accessible and located under the bus near the rear A/C Condenser.
- D.26.6.6.** A conventional dash mounted unit for the front of the driver's area of the vehicle. Both units shall be equipped with multi-speed fans (minimum 2 speeds).
- D.26.6.7.** Evaporator fans shall produce a minimum of 1600 CFM.
- D.26.6.8.** The Rear system shall include a skirt mounted commercial condenser. Condenser fan(s) shall produce a minimum of 2400 CFM of airflow over the coils. All components of the condenser unit shall be coated or constructed with a corrosion resistant material to protect the unit from road salts other foreign substances that might be sprayed on the unit.
- D.26.6.9.** Condenser unit shall be positioned so as not to draw air from under vehicle.
- D.26.6.10.** Air conditioning refrigerant lines, to include their foam covering, will not be exposed to road hazards or elements of the weather. All air conditioning refrigerant lines, which extend from the engine area to the rear evaporator, shall be protected from damage. And all drain lines, hoses and wiring from evaporator shall be covered from view.
- D.26.7.** VENTILATION:
- D.26.7.1.** Vents provided in driver area.
- D.26.8.** HEATING:
- D.26.8.1.** Front & rear heater core factory installed hot water type, of sufficient capacity to warm cabin area and clear windows of snow, ice and fog.
- D.26.8.2.** An easily accessible clearly marked shut-off ¼ turn ball valves shall be installed in heater supply and return lines which will allow the water to be cut off to the rear heater core.
- D.26.8.3.** The water lines for the rear heater core shall be protected from damage.
- D.26.8.4.** Rear heating unit shall provide a minimum of 65,000 BTU's/Hr. this is in addition to front dash unit.

D.27. SAFETY EQUIPMENT

- D.27.1.** All miscellaneous equipment must be secured to the vehicle and easily accessible.
- D.27.2.** First aid kit: (24M – National Standard School Bus Metal
- D.27.2.1.** Must be Certified Safety Mfg. Model S203-045 or equivalent.
- D.27.3.** Fire extinguisher – Multi-purpose Stored Pressure Dry Chemical Extinguisher.

D.27.3.1. Must be a 5 lb. type 3A:40B: C Pro Line, Kiddie Model # FXBND9 or equivalent.

D.27.3.2. Must have a gauge to indicate state of charge and mounted to vehicle using a bracket and having a heavy duty vinyl cover.

D.27.4. Triangle warning devices (3), with storage container.

D.27.4.1. must meet FMVSSP # 125

D.27.5. Bloodborne Pathogens infection control kit.

D.27.5.1. Must be Certified Safety Mfg. Model #FK200-931, or equivalent.

D.27.6. Seat belt cutter

D.28. MIRRORS

D.28.1. Exterior:

D.28.1.1. Heavy Duty Heated Power Mirrors by Velvac Model 2020 Deluxe Head with Turn Signals or equivalent.

D.28.1.2. Mirrors are to be mounted to the driver and copilot doors in the same position as the OEM mirrors.

D.28.2. Interior:

D.28.2.1. Vehicle must have the two (2) following mirrors.

D.28.2.2. Must be OEM Day/night, 10" rear view mirror, confirming to FMVSS No. 111. (This mirror will be deleted if purchaser chooses backup camera as an option).

D.28.2.3. Passenger viewing and backup mirror shall be made of safety glass, having rounded corners and protective edges, and a 6" x 16". This mirror is in addition to the mirror mounted on windshield.

D.28.3. Fresnel Lens: 11" x 14" Lens on rear window.

D.29. SEATS

D.29.1. Driver's Seat and Co-Driver's Seat:

D.29.1.1. The driver seat must be a deluxe bucket, OEM high back 6-way power seat.

D.29.1.2. The Co-Driver's Seat must be adjustable fore and aft.

D.29.1.3. Seats must be padded with allergy-free material and upholstered with a durable transit quality level 5-cloth fabric.

D.29.1.4. Both seats must have adjustable lumbar

D.29.1.5. Both seats must have a certified seat belt and shoulder harness with retractor shall be attached to frame.

D.29.1.6. Both seats must have reclining backs and padded armrests. NOTE: Supplier must supply seating diagram reflecting all listed dimensions for approval.

D.30. PASSENGER SEATS

D.30.1. Seating shall be provided for fifteen (15) ambulatory passengers and 2 non-ambulatory passengers.

D.30.2. Wheelchair spaces will each be equipped with a wheelchair securement tie down and occupant restraint system, which meets the Americans with Disabilities Act requirements.

D.30.3. All seats shall be "bucket" semi-contoured transit type.

D.30.4. Seats are to be consistent with what is accepted as transit quality construction. School bus type seats are not acceptable.

D.30.5. Seat frames are to be welded.

D.30.6. Seats must be padded with allergy-free material and upholstered with a durable transit quality level 5-cloth fabric.

D.30.7. Aisle seats must have padded fold up armrests and Anti-Vandal grab handles on the seat backs.

D.30.8. Seats must be Freedman Seating Mid Back type bucket seat or equivalent.

D.30.9. Seat belts to be installed at each seat position, and must be a Retractable under Seat Retractor, type of seat belts.

D.30.10. Must include Two (2) Seat Belt Extensions that will fit Passenger Seat Belts.

D.30.11. A commercial quality seat belt knife fastened to bus in driver's reach.

D.30.12. All seats shall provide a minimum seat width of 17" per passenger, or 34" per two (2) -passenger seats.

- D.30.13.** Minimum depth of seat (front to back contour) 18"
- D.30.14.** All seats including any foldaway seats must be bolted to structural steel.
- D.30.15.** Bolting seats to plywood floor without bolting into structural steel under floor is NOT ALLOWED.
- D.30.16.** All seat tracks must be welded to steel sidewalls and steel floor sections. Riveting or bolting seat tracks to sidewalls is NOT ALLOWED.
- D.30.17.** Seats shall be fully padded and shall be constructed with a no-sag spring bottom suspension. Plywood seat bottoms are unacceptable.
- D.30.18.** Seats shall be covered with a durable transit quality level 5-cloth fabric.
- D.30.19.** Seats shall be spaced on a minimum of 28 1/2" centers, allowing for a minimum of 10" between the front of the bottom cushion and the back of the next forward seat.
- D.30.20.** Minimum aisle width shall be 16".
- D.30.21.** All seats shall meet, as minimum, FMVSSP 302 207 requirements. Any additional requirements would be optional.

D.31. PRIORITY SEATING SIGNS

- D.31.1.** Each vehicle shall contain sign(s), which indicate that, the row of forward –facing seats located in the front of the vehicle are priority seats for persons with disabilities, and that other passengers should make such seats available to those who wish to use them.
- D.31.2.** The signs shall be located on the interior walls directly above the front row of forward-facing seats.
- D.31.3.** Signs must follow FTA 49CFR38 Section 38.27 for the required lettering characters of the signs.

D.32. LIGHTING

- D.32.1.** All manufacturers' lighting added to the vehicle (both interior and exterior) shall be provided with light-emitting diode (LED) lights.
- D.32.2.** Door activated 4 way flashers that are activated when passenger door is opened. This includes 2 additional amber LED flashing lights mounted high on each side of the rear wall.
- D.32.3.** The location, type and hookup of all exterior lights and reflectors to conform to Federal Motor Vehicle Safety Standards and Procedures.
- D.32.4.** The number of interior lights and their light output shall be determined by providing a minimum average of 7 foot-candles of illumination on a 1 square foot plane, at an angle of 45 degrees from horizontal, centered 33 inches above the floor and 24 inches in front of the seat back at each seat position.
- D.32.5.** Floor surface in the aisles shall be a minimum of 10 foot-candles.
- D.32.6.** Each vehicle shall be equipped with OEM daytime running lights.
- D.32.7.** Must have Red LED lights over all emergency exits
- D.32.8.** All interior lighting in the passenger area shall be mounted in the ceiling cove at the sidewall with a minimum of three (3) fixtures on each side of the vehicle. Lighting fixtures shall be installed on the interior walls and ceiling in a manner that does not present a head strike to the passengers. NOTE: All clearance lights front, rear and side shall have metal armored shields. This shall protect lights from tree limb damage.
- D.32.9.** Tail lights are to be recessed and shall not protrude more than 2 inches from the body; they shall include a pair of amber combinational hazard and signal lights. Rear tail-lamps shall also include a pair of red tail lights and red stop lights, which may be combinational. (Ref: Dialight 46121RB-Red, 46121AB-Amber or equivalent)
- D.32.10.** Side signal lamps, with marker, shall be provided independently or be incorporated into the center of the vehicle. Location must be above and in front of the rear wheel opening and provide visibility from behind the rear wheel opening. (Ref.: Dialight 18001AB811 or equivalent)
- D.32.11.** Clearance marker lights shall be installed surface-mounted, facing the front, rear, and each side at rear. (Ref.: Dialight 15001RB, 15001AB or equivalent)
- D.32.12.** The third brake light shall be center-mounted above the rear window, minimum 18" in length. (Ref.: Dialight 87121RB or equivalent)
- D.32.13.** Two back-up lights, one mounted on each side of the body rear cap. (Ref.: Dialight 46001CB or equivalent)
- D.32.14.** Step lighting shall be mounted to provide light for the entire step-well and an area a minimum of three (3) feet beyond the first step on the ground area outside the bus (Ref.: Dialight 170-81CB or equal). Note: The step lights shall be extinguished when the front door has closed.

- D.32.15.** Raised floor step lighting shall be provided by one strip light mounted in the step riser. Light strip shall be a minimum of 18 inches and recess-mounted to protect from accidental damage by passengers contacting light while using the step. (Ref.: Dialight 87121CB or equivalent).
- D.32.16.** Exterior step light shall be mounted away from wheel splash. (Ref.: Dialight #VSW-CC-19B-35-801 or equivalent)
- D.32.17.** Wheelchair lift area light shall be positioned in the manufacturer's standard location in order to illuminate the area in the immediate vicinity of the wheelchair lift platform for night operation. The light shall be automatically activated only when the wheelchair lift doors are open. (Ref.: Dialight Light #46121CB or equivalent)

D.33. ELECTRICAL WIRING

- D.33.1.** All wiring shall meet the requirements of SAE recommended practice J878a, Type SXL.
- D.33.2.** Connections with 3 to 12 circuits shall be environmentally sealed high impact plastic connectors with pull apart locking tabs.
- D.33.3.** All non-OEM connections containing one or two circuits shall be made with Posi-lick connectors.
- D.33.4.** No butt connectors will be allowed.
- D.33.5.** All added wiring shall be in a loom and securely clipped for maximum protection and routed in separate hangers from the heater hoses or air conditioning hoses.
- D.33.6.** Clips shall be rubber or plastic coated to prevent them from cutting the wiring insulation.
- D.33.7.** All electrical wiring shall be automotive stranded and sufficient size to carry the required current without excessive voltage drop and shall be color, number and function coded at a minimum of eighteen (18) inch intervals.
- D.33.8.** No electrical, stationary or mechanical device may block the removal of the engine cover inside the bus.
- D.33.9.** All wiring passing through the body metal shall have anti-chaffing grommets.
- D.33.10.** Each vehicle shall contain a set of detailed system by system "as built" wiring schematics covering all electrical equipment and electrical circuits installed, complete with wiring codes for each vehicle ordered.
- D.33.11.** Identification on the wiring diagram must tie the diagram to the bus.

D.34. WINDOWS

- D.34.1.** All windows to be of tempered safety glass and water and airtight.
- D.34.2.** Window in driver's door, windshield and entrance door glass are all to be tinted.
- D.34.3.** All the windows in the passenger area are to be factory-installed smoked glass with at minimum 30 percent tint. No Add on Film
- D.34.4.** Windows must be a top horizontal sliding T- transit type that the ventilation openings are located at the top of the window.
- D.34.5.** Must be constructed of corrosion resistant aluminum frames. NOTE: All windows and emergency exits must meet the performance and operational requirements as outlined in the Federal Motor Vehicle Safety Standards and Procedures.

D.35. EMERGENCY EXITS

- D.35.1.** At least one (1) window on each side at or near the rear of the vehicle shall be equipped with emergency release latches to provide emergency exits.
- D.35.2.** Release instructions shall be provided at or near the release handles and an audible alarm shall be installed near the driver, which will be activated when the window is released.

D.36. BACK-UP ALARM

- D.36.1.** Alarm shall be waterproof ECCO #530 or equivalent.
- D.36.2.** Must be mounted in the rear of the vehicle
- D.36.3.** Must be readily audible outside the vehicle when the transmission is in reverse.

D.37. WHEELCHAIR LIFT

- D.37.1.** An electric powered hydraulic wheelchair lift shall be installed inside the vehicle at the side door.
- D.37.2.** Bus must meet FMVSS 403-404 lift installation requirements.
- D.37.3.** Wheelchair lift shall meet the following MINIMUM requirements.
- D.37.3.1.** A Braun wheel chair Lift NL919FIB-2 (Millennium-2 Series) or equivalent. Ground cable from lift must be connected to vehicle frame. Connecting ground cable to lifts mounting bolts is NOT ALLOWED.

- D.37.3.2.** 800 pound load capacity lifts assembly.
- D.37.3.3.** An electric hydraulic pump, powered by vehicle's electrical system.
- D.37.3.4.** Platform dimensions 34" wide by 51" long.
- D.37.3.5.** Platform to be constructed of 11 gauge expanded metal.
- D.37.3.6.** Platform shall be stored in an upright position within the vehicle.
- D.37.3.7.** Powered operation for (1) unfolding and folding the platforms and (2) raising and lowering the platform.
- D.37.3.8.** Emergency platforms release to permit the platform to be unfolded manually and lowered by gravity.
- D.37.3.9.** To prevent the wheelchair from rolling off, a barrier 1 ½" at minimum shall be provided on the outer edges of the platform and have an outboard roll stop that engages and locks before the platform leaves the ground to form a safety barrier when platform is raised or lowered
- D.37.3.10.** A free floating bridge plate will be replaced between the lift platform and the vehicle. This bridge plate will be hinged in a manner to permit upward movement should a person's foot become entangled.
- D.37.3.11.** Lift shall be securely bolted to the floor and floor reinforced as necessary to support the load.
- D.37.3.12.** To permit the lift platform to be raised without electrical power, a hand pump that allows the operator to raise the platform shall be installed.
- D.37.3.13.** An interior light shall be provided to illuminate the lift area;
- D.37.3.14.** All moving parts likely to cause personal injury shall be shielded.
- D.37.3.15.** Working parts, such as cables, pulleys, and shafts, which can be expected to wear, and upon which the lift depends for support of the load, shall have a safety factor of at least six, based on the ultimate strength of the material. Nonworking parts, such as platform, frame, and attachment hardware, which would not be expected to wear, shall have a safety factor of a least three, based on the ultimate strength of the material.
- D.37.3.16.** Lift shall be installed as specified by the manufacturer and shall be thoroughly tested prior to delivery.
- D.37.3.17.** Repair manual, parts list and instructions for adjusting hydraulic valves and electrical equipment shall be provided.
- D.37.3.18.** Lift controls shall be interlocked with the vehicle brakes, transmission, or door, or shall provide other appropriate mechanisms or systems to ensure that the vehicle cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks or systems are engaged.
- D.37.3.19.** The left control cord must be secured in a manner not to interfere with the door being closed.

D.38. USE BY STANDEES

- D.38.1.** Lift shall accommodate persons using walkers, crutches, canes or braces or who otherwise have difficulty using steps. The platform may be marked to indicate a preferred standing position.

D.39. HANDRAILS

- D.39.1.** Platform on lift shall be equipped with handrails on two sides, which move in tandem with the lift, and which shall be graspable and provide support to standees throughout the entire lift operation.
- D.39.2.** Handrails shall have a usable component at least 8" long with the lowest portion a minimum 30" above the platform and the highest portion a maximum 38" above the platform.
- D.39.3.** Capability of withstanding a force of 100 pounds concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure required.
- D.39.4.** Cross-sectional diameter of handrail shall be between 1 ¼" and 1½", and shall have eased edges with corner radii of not less than 1/8".
- D.39.5.** Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

D.40. WHEELCHAIR SECUREMENT

- D.40.1.** Wheelchair parking space shall have a (Minimum) clear floor area of 30" wide by 48" long and be equipped with a four-point wheelchair securement tie-down.
- D.40.2.** Occupant restraint system must be Q'Straint Q-8306-SC or equivalent. Shall have a Retractable lap/shoulder belt combo with a Retractable height adjuster that are anchored to floor and wall with L Tracks that meet SAE J2249 and ADA requirements.
- D.40.3.** Tracks shall be recessed into the floor and not shift position under anticipated loads. Any tracks overlapping the access path must be flush with the floor to prevent passengers from tripping.

- D.40.4.** The L tracks and Slide N Click anchors must be bolted to structural steel.
- D.40.5.** Bolting to plywood floor without bolting into structural steel under floor IS NOT ALLOWED.
- D.40.6.** **Wheel Chair Securement system must be** Q'Straint QRT MAX Automatic Retractor System with Slide N Click anchorage system and J-Hooks, or equivalent to.
- D.40.7.** There must be 52" at minimum and 54" maximum measured from center to center between front and rear Slide N Click anchor points. And be fully assembled and ready to use.
- D.40.8.** Must have securement pouches attached to wall to store wheelchair securement tie-downs.
- D.40.9.** Must include eight (8) Q'Straint Q5-7580 Webbing Loops or equivalent to for Securing Scooters. Wheelchair location must be in the rear of bus, one beside the other. NOTE: Each wheelchair securement location shall have sign designating it as such. Lettering size and type on these signs shall comply with the Americans with disabilities Act Regulations,

D.41. WHEELCHAIR ACCESSIBILITY SYMBOL

- D.41.1.** The vehicle will display the international wheelchair accessibility symbol of a person in a wheelchair that is outlined in white on blue background.
- D.41.2.** This symbol will be placed on all four sides of the bus.

D.42. VEHICLE COLORS

- D.42.1.** Body: Vendor to supply list of colors and prices available.

D.43. WINDOW BLACKOUT PAINT

- D.43.1.** Bus must have window blackout paint. NOTE: See Figure 2

D.44. COLOR OF SEATS

- D.44.1.** Proposal must include all colors available
- D.44.2.** Successful vendor shall coordinate with the agency issuing this purchase order in the selection of material and color of the seats.
- D.44.3.** Seats shall be fully padded.

D.45. VEHICLE FLOOR PLAN

- D.45.1.** A proposed floor plan including all pertinent interior dimensions such as overall length, width, distance between seats, etc.,
- D.45.2.** Shall be submitted with the proposal.

D.46. CHASSIS SPECIFICATIONS

- D.46.1.** GVWR, axle, spring and tire:
 - D.46.1.1.** 14,500 lb. GVWR minimum
 - D.46.1.2.** Front axle- 5,000 lb. GAWR minimum
 - D.46.1.3.** Rear axle – 9,500 lb. GAWR minimum
 - D.46.1.4.** (Dual wheel are required on rear axle.)
 - D.46.1.5.** Front springs – heavy duty, 5,000 lb minimum
 - D.46.1.6.** Rating combined at ground.
 - D.46.1.7.** Rear springs – heavy duty, 9,500 lb minimum
 - D.46.1.8.** Ratings each, at ground.
- D.46.2.** It is the supplier's responsibility to calculate the actual loaded weight, spring and axle ratings so that the vehicle is engineered for safety.

D.47. TIRES

- D.47.1.** Tire size must meet 14,500 GVWR minimum and must be steel radial with "E" load rating.
- D.47.2.** Steel or brass valve stems 1.5" in length shall be used on all wheels with elbow extensions on the inside rear dual for access.
- D.47.3.** Stainless steel or brass valve caps with an inner air seal shall be used.
- D.47.4.** One mounted spare tire and wheel to match existing tires/wheels to be shipped loose.

D.48. ENGINE GASOLINE

D.48.1. Minimum – (6.8 liter) displacement.

D.48.2. Must Have a CNG Capable Engine with hardened intake and exhaust valves with hardened intake and exhaust valve seats Ford Option # 91G.

D.49. RADIATOR

D.49.1. Heavy Duty, with factory installed recovery system.

D.49.2. The cooling system must be winterized with ethylene glycol for temperatures to –20 degrees F (-28.8889 C).

D.50. TRANSMISSION

D.50.1. At minimum, heavy-duty 5-speed automatic with overdrive, lock-up converter, lock in park and a heavy-duty auxiliary transmission cooler.

D.51. WHEEL WELLS

D.51.1. The wheel housing shall be of sturdy heavy-duty construction of a minimum 14 gauge galvanized steel or stainless steel and provide ample tire clearance during all operating conditions.

D.51.2. Fender and splash aprons (underskirt) of durable construction shall be provided so as to provide maximum deflection of the wheel splash.

D.51.3. There shall be sufficient clearance to enable easy removal of wheels mounted with inflated tires.

D.52. REAR FENDER FLARES

D.52.1. Vehicle must have Rubber or Fiberglass Fender Flares.

D.53. DRIVE SHAFT

D.53.1. Drive shaft must be properly supported, balanced and guaranteed not to vibrate. Each drive shaft shall be equipped with a protective metal guard or guards to prevent whipping through the floor or dropping to the ground in the event of a tube or universal joint failure, or if the drive shaft breaks.

D.54. WHEEL COVERS

D.54.1. Bright Metal Stainless Steel Wheel inserts.

D.55. BRAKES

D.55.1. Two (2) braking systems are required. Service brakes shall be dual hydraulic, disc front and disc rear.

D.55.2. The parking brake system shall be operated by a cable to the rear wheels, or Drive Shaft Drum Brake.

D.55.3. The braking system shall be adequate for the GVWR of the vehicle.

D.56. GEAR RATIO

D.56.1. Must be a 4:56 gear ratio

D.57. FUEL CAPACITY

D.57.1. Must be at minimum of 55 gallons

D.58. FUEL PUMP ACCESS DOOR

D.58.1. An aluminum diamond plate access door shall be provided in the floor of the vehicle above the fuel tank to allow the fuel pump to be serviced without removal of the tank. NOTE: Door must be Large enough and centered over fuel pump to allow easy removal of pump.

D.59. SHOCK ABSORBERS

D.59.1. Must have heavy duty, front and rear shock absorbers.

D.59.2. Rear Shock Absorbers upper mounting brackets shall Not be Covered by any Body Braces that would prevent easy access to Upper Shock Mounting Bolts and Nuts.

D.60. SUSPENSION

D.60.1. Rear shall have Leaf Springs.

D.60.2. Right rear shall have an extra leaf to compensate for weight of wheelchair lift.

D.61. STEERING

- D.61.1. Must have power-assisted steering
- D.61.2. Must have tilt wheel,
- D.61.3. Must have factory installed cruise control.

D.62. AIR CLEANER

- D.62.1. Must have a heavy duty, dry type air cleaner

D.63. OIL FILTER

- D.63.1. Must have a heavy duty, throw away type oil filter.

D.64. ALTERNATOR

- D.64.1. Vehicle shall have Ford OEM 225-amp Alternator or equivalent.

D.65. BATTERIES

- D.65.1. Two (2) heavy duty, maintenance free, minimum 650 CCA at 0 degrees F (-17.778 C) Batteries must be wired together in a parallel circuit to increase total battery capacity.
- D.65.2. Front OEM battery must have OEM type battery hold down brackets to securely hold battery in place.
- D.65.3. Instep Battery Box that is bolted down securely and must be sealed to keep mud and debris from getting on Rear Coach Battery.
- D.65.4. Battery must be bolted within this instep box. Cloth holds down straps are not ALLOWED.
- D.65.5. Battery box must be sealed to keep mud from getting on batteries. SEE FIGURE 4 & 5

D.66. GROUNDS

- D.66.1. A ground of the battery cable size, shall be installed between the engine and chassis frame.
- D.66.2. The vehicle body shall be properly grounded to the chassis frame at least 2 (two) places.
- D.66.3. Engine and body grounds shall be installed to handle subsystem electrical capacity.
- D.66.4. Grounding wires fastened to the frame shall use a bolt with a nut installed in a proper sized hole with dielectric compound applied to the cleaned surfaces, bolt, and cable end.
- D.66.5. Lift pump motor shall be grounded directly to chassis frame using a cable of the same size as the pump motor feed wire.
- D.66.6. All exterior lights and accessories added by the body manufacture shall be grounded by an in harness ground attached at a fuse panel common grounding point.
- D.66.7. For all ground wire connections paint shall be removed at the grounding point to provide a surface, cable end, bolt, and nut where each positive or grounding cable is attached.

D.67. STABILIZER BAR

- D.67.1. Heavy Duty Front and rear

D.68. HORN

- D.68.1. Vehicle must have a dual, electric horn.

D.69. SIGNAL

- D.69.1. Directional and self-canceling with hazard warning flashers.

D.70. TOW HOOKS

- D.70.1. Shall have 2 tow hooks on Rear.

D.71. WINDSHIELD WIPERS

- D.71.1. Minimum two speeds with intermittent feature and washer.

D.72. KEYS

- D.72.1. Vehicle must include three (3) sets of keys for the entire bus.

D.73. RADIO

- D.73.1. Must have an AM & FM CD radio

- D.73.2.** Radio must be of same manufacture as chassis. Radio must be mounted in the Chassis OEM Location in dash.
- D.73.3.** Must have a minimum of six speaker's two (2) OEM speakers in front chassis doors. The coach body's four (4) speakers shall be a 3-way standard speakers.

D.74. PAINTING, DECALS AND MONOGRAMS

- D.74.1.** All signs required by State and federal law shall be affixed to each vehicle exterior and interior.
- D.74.2.** It is up to the bus dealer/manufacture to add such signs and decals upon delivery of vehicle.
- D.74.3.** No decals, name plates, or painted identification of the bus dealer/manufacture are to be added to the vehicle.

D.75. UNDERCOATING

- D.75.1.** Floor and wheel housing, anti-rust factory installed.

D.76. WARRANTY REQUIREMENTS

- D.76.1.** The contractor warrants and guarantees to the original Procuring Agency each complete bus and specific subsystem and components for 100% parts and labor as follows:
 - D.76.1.1.** OEM standard factory warranties for chassis and engine.
 - D.76.1.2.** Complete bus body and body structure, exterior, wiring, flooring installation, and paint are warranted to be free from defects, related defects and to maintain structural integrity for a period of Five (5) year or 100,000 miles
 - D.76.1.3.** Add-on components shall have component manufacture's standard warranty.
 - D.76.1.4.** Warranty shall begin on the date that the vehicle delivery is accepted by the agency issuing the purchase order.
 - D.76.1.5.** The wheelchair lift shall have a five (5) year unlimited mileage and unlimited cycles.
 - D.76.1.6.** The air-conditioning system shall have a minimum 2 years unlimited mileage.
 - D.76.1.7.** The chassis powertrain shall be warrantied for a period or Five (5) years or 100,000 miles.
 - D.76.1.8.** Any parts under warranty must be available and delivered to the purchasing transportation provider or their repair shop within 5 days of the time they requested/ordered them. The bus vendor/manufacture shall bear all reasonable financial costs of shipment of parts.
 - D.76.1.9.** The warranty, as well as any recall notifications, shall cover each vehicle of the ultimate purchaser or recipient agency. The vendor shall provide a copy of any recall notice to each purchasing agency.

D.77. BUS TESTING

- D.77.1.** Certification shall be provided that in accordance with 49 CFR Part 665,
- D.77.2.** Bus Testing, the vehicle either does not need to be tested (with justification specified for exemption) or has been tested at the bus testing facility and a test report is included.

D.78. BUS WATER TESTING

- D.78.1.** The roofs, windows, windshield and all doors of all coaches shall be water tested, as follows:
- D.78.2.** The waster test shall consist of a series of nozzles that are strategically located around the perimeter of the vehicle so as to the nozzles spray water over the entire surface of the vehicle.
- D.78.3.** The nozzles shall eject a volume of water no less than 2.6 gallons per minute under a pressure of no less than twenty-two (22) pounds per square inch measured at the nozzle tip.
- D.78.4.** There shall be no less than twenty (20) nozzles installed in the water test area, each capable of directing a force of water as indicated above.
- D.78.5.** The Vendor/Manufacture shall be required to water test each vehicle, under the conditions set forth above, for no less than five (5) minutes, in order to determine whether or not there are any body leaks at the window areas, door areas, roof panels, etc.
- D.78.6.** The Vendor/Manufacture shall take the necessary corrective action when body leaks are found to exist as a result of the above test, and conduct a second water test to recheck for body leaks following corrective action.

D.79. ALTOONA TESTING

- D.79.1.** Vehicle must be tested in the 7-year/200,000 mile category at the Altoona Bus Testing Facility in Duncansville, PA. And a copy of the full report must be submitted with the Proposal.

D.80. GENERAL

- D.80.1.** All equipment cataloged as standard for the basic vehicle, unless superseded by these specifications, must be furnished and included in the purchase price of each vehicle. Complete printed specifications, published literature, and photos, or illustrations of the basic units that the supplier proposes to furnish with this Proposal must accompany each Proposal.

D.81. QUALITY OF MATERIALS

- D.81.1.** Welding procedures and materials shall be in accordance with standards of the American Society of Testing Materials and the American Welding Society. All visible welds shall be grounded smooth. Where metal is welded, the contact surface shall be free of scale, spatter, and grease and shall be treated to preclude rusting.

D.82. PUBLICATIONS AND PRINTED MATERIALS

- D.82.1.** Each vehicle shall have a complete set of operation, quality assurance, and warranty publications.
- D.82.2.** The information shall be organized in a three ring binder format with each sections clearly identified.
- D.82.3.** As built wiring diagram and as built parts manuals for body and all auxiliary equipment.
- D.82.4.** Maintenance and inspection schedule incorporating the required maintenance and inspection of the basic vehicle and its sub-systems.
- D.82.5.** Operator's manual: A complete operations manual and troubleshooting guide with a detailed manufacturer's parts list that covers the conversion features on the vehicle as listed in this specification. The manual will provide complete, comprehensive instructions for the wheelchair accessories, wheelchair list deployment, air conditioning system, tie downs, heater, deployment of seats, wiring diagram and related equipment.
- D.82.6.** Warranty papers for chassis, body, and additional equipment.
- D.82.7.** Warranty Information: Each vehicle must have a published listing of contractor warranty repair locations, including address, telephone number, and contact names for the State of Oklahoma.

D.83. PRE-AWARD AUDIT

- D.83.1.** The vehicles are not considered delivered to the purchasing agency until the required FTA documents are completed by a Government Official.
- D.83.2.** A Pre-Award Audit shall be conducted to determine if the proposal meets specifications. The supplier shall submit documents, which include certification of the manufacturer's compliance with the Federal Transit Administration (FTA) Pre-Award Buy America Audit Requirements. The document submitted shall include the following information for each major component used on vehicle proposed:
- D.83.2.1.** Name and address of each supplier.
 - D.83.2.2.** Cost of each major component and subcomponent. In order to protect proprietary information, the document may reflect the percentage of total cost each item represents instead of the actual cost.
 - D.83.2.3.** Country of origin of each major component and subcomponent.
 - D.83.2.4.** Name and address of company where final assembly occurs.
 - D.83.2.5.** Cost of final assembly
 - D.83.2.6.** Signature of authorized representative of vehicle manufacturer.

D.84. POST- DELIVERY AUDIT

- D.84.1.** A Post Delivery Audit of the vehicle(s) shall be conducted at the purchaser's facility, to determine that the completed vehicle(s) meets specifications. Once this process has been satisfactorily completed, the vehicle(s) shall be considered acceptable.

D.85. ACCESSIBILITY REQUIREMENTS

- D.85.1.** When submitting a Proposal for an accessible vehicle for the disabled, the vendor shall provide a list of the vehicle related equipment illustrating the component cost and related installation charges. The purpose of this list is to reflect an accurate cost for those vehicle related items, which are required to make the vehicle accessible to the disabled.

D.86. ACCEPTANCE OF VEHICLES

- D.86.1.** Upon delivery at the designed location specified within this document the final acceptance will occur after the vehicles have been inspected, road tested and all FTA required post audit delivery requirements have been meet.
- D.86.2.** All vehicles shall be insured by the supplier until the post audit delivery has been conducted at minimum.

D.87. SPECIFICATIONS FOR OPTIONAL ITEMS

D.87.1. CNG CONVERSION FORD CHASSIS:

D.87.1.1. OEM engine shall be converted to operate on dedicated CNG. A WESTPORT/BAF Cal Comp System or approved equal shall be provided. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional control module will be accepted. Dual fuel systems will not be accepted. System must comply with the following:

D.87.1.1.1. Closed-loop fuel control

D.87.1.1.2. Sequential fuel injection (SFI)

D.87.1.1.3. Optimized ignition timing

D.87.1.1.4. Must maintain original fault codes (DTCs)

D.87.1.1.5. Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner

D.87.1.1.6. CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.

D.87.1.1.7. The minimum CNG tank capacity on the mini-buses should be 39 Gasoline Gallon Equivalent

D.87.1.1.8. CNG interlock – Engine will not run when filling CNG tanks.

D.87.1.1.9. Must provide a detailed floor plan of the placement of the CNG tanks.

D.87.1.1.10. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

D.88. CNG BIFUEL CONVERSION FORD CHASSIS

D.88.1. OEM engine shall be converted to operate on CNG and Gasoline. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional module will be accepted. System shall be capable of switching between CNG and Gasoline. The Gasoline fuel tank will be installed as per OEM specifications. The system must comply with the following:

D.88.1.1. Closed-loop fuel control

D.88.1.2. Sequential fuel injection (SFI)

D.88.1.3. Optimized ignition timing

D.88.1.4. Must maintain original fault codes (DTCs)

D.88.1.5. Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner

D.88.1.6. CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.

D.88.1.7. The minimum CNG tank capacity on the mini-buses should be 29 Gasoline Gallon Equivalent

D.88.1.8. Must provide a detailed floor plan of the placement of the CNG tanks.

D.88.1.9. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

D.89. DEDICATED PROPANE AUTOGAS INJECTION

D.89.1. The system shall be a Roush CleanTech System or approved equal. The system must be CARB, EPA certified, and OBDII Compliant. The system shall have the following system components:

D.89.1.1. PCM Calibration

D.89.1.2. Billet aluminum high-pressure fuel rail.

D.89.1.3. Appropriate fuel injectors

D.89.1.4. Appropriate fuel lines

D.89.1.5. Appropriate OEM engine prep package

D.89.1.6. Coverage of Five (5) year/ 60,000 mile warranty.

D.89.1.7. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

D.90. DUAL FUEL VEHICLE PROPANE AUTOGAS INJECTION

D.90.1. System shall be a Roush CleanTech System or approved equal.

D.90.2. The system shall be a Roush CleanTech System or approved equal. The system must be CARB, EPA certified, and OBDII Compliant. The system shall have the following system components:

D.90.2.1. PCM Calibration

D.90.2.2. Billet aluminum high-pressure fuel rail.

D.90.2.3. Appropriate fuel injectors

D.90.2.4. Appropriate fuel lines

D.90.2.5. Appropriate OEM engine prep package

D.90.2.6. Coverage of Five (5) year/ 60,000 mile warranty.

D.90.2.7. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

D.91. BACK-UP MONITOR SYSTEM

D.91.1. ASA Voyager AOM562A or approved equal with a 5.6" color LCD screen mounted on rear view mirror OEM Bracket. With a rear mounted outside backup camera and a second inside front mounted camera to view passengers.

D.92. TWO-WAY RADIO SYSTEM UHF

D.92.1. ICOM F6021 UHF two-way Radio System with a PCTEL MUF4505 UHF antenna and coax or approved equal.

D.92.1.1. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

D.92.1.2. Radio must be mounted in an easy accessible location for the driver.

D.92.1.3. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

D.93. TWO-WAY RADIO SYSTEM

D.93.1. ICOM F5021 VHF two-way Radio System with a PCTEL MHB5800 VHF antenna and coax or approved equal.

D.93.1.1. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

D.93.1.2. Radio must be mounted in an easy accessible location for the driver.

D.93.1.3. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

D.94. TWO-WAY RADIO SYSTEM 800 MHZ

D.94.1. Kenwood NX-900K 800 mhz two-way Radio System with a PCTEL MUF8003 antenna and coax or approved equal.

D.94.1.1. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

D.94.1.2. Radio must be mounted in an easy accessible location for the driver.

D.94.1.3. Radio must be programmed with the correct Frequencies and the antenna tuned for agency issuing this purchase.

D.95. DRIVER'S SHIELD

D.95.1. A clear Plexiglas barrier shall be erected behind the driver and extend from the stanchion crossbar behind the driver up to the ceiling.

D.95.2. This shield start at the wall on the driver's left side (close enough to prevent a passenger from reaching through to the driver) and should extend 3 inches past the right side of the driver's seat, but shall not obstruct the view from the rear view mirror.

D.95.3. This barrier shall consist of clear Plexiglas and shall be at least ¼ inch thick.

D.95.4. A 1 ½ inch clearance between the stanchion and barrier should be provided to allow a hand hold on the right side.

D.96. PAINTED LOWER SKIRTS

D.96.1. Paint to purchaser's color specs. NOTE: See Figure 2.

D.97. OUTSIDE PASSENGER DOOR SWITCH

D.97.1. Outside keyed electric passenger door switch outside. Switch must be water proof.

D.98. BUS CAMERA SYSTEM

D.98.1. REI Bus-Watch R4001 with 500GB Hard drive and four cameras or approved equal. Successful vendor shall coordinate with the agency issuing this purchase for location of Camera's. NOTE: See Figure 3 for camera type and location of cameras.

D.99. FABRIC INSERT ON CEILING

D.99.1. Must match seat fabric and pattern.

D.100. STREET SIDE EXHAUST

D.100.1. Exhaust to be turned out opposite side of Wheel Chair lift

D.101. INTEGRATED CHILD SEAT

D.101.1. Integrated Child Restraint Seat must be a Freedman Seating ICS-10 or equivalent

D.101.2. Must have an integrated 4-point safety harness. for children 22-78 Lbs with under seat retractor seat belts for adults

D.102. VINYL SEATS

D.102.1. This will be a price deduction from the durable transit style level 5 cloth fabrics.

D.102.2. Vinyl deduction is for passenger seats only

D.102.3. Pilot and co-pilot seats shall be durable transit quality level 5-cloth fabric

D.103. PUBLIC ADDRESS SYSTEM

D.103.1. A public address system shall be installed with a hand held microphone.

D.103.2. The system shall include a solid-state amplifier of sufficient power and quality that the operator's voice can be clearly heard without distortion.

D.103.3. The amplifier shall be firmly secured in a protective area.

D.103.4. The PA system shall use the vehicles 6 speakers for sound.

D.103.5. A power switch for the PA system shall be mounted on the dash to provide operation for the inside and amplifier off.

D.103.6. Any noise suppression due to alternator, lighting, engine or other source is required of the contractor.

D.104. PASSENGER SIGNAL SYSTEM PULL CORD

D.104.1. The Stop Request system shall have the following features:

D.104.1.1. Separate provisions for W/C passengers and ambulatory passengers to signal a Stop request.

D.104.1.2. Must uses a yellow pull cord run below the windows for the ambulatory request and a large yellow push pad mounted at least 15" above the floor, but not more than 48". There must be a touch pad per W/C space for the passengers to signal a stop request.

D.104.1.3. The driver should have a means of telling if a W/C passenger has signaled. There must be a Blue dash light to signal a W/C passenger request and a RED light to signal an ambulatory passenger request.

D.104.1.4. The "Stop Request" lighted sign should show if a W/C passenger has signaled; the sign shall be a universal W/C symbol which lights in blue.

D.104.1.5. There shall be an audible signal when a stop is requested and must be able to be heard by the driver.

D.104.1.6. Once the pull cord is pulled, the sign will light, the driver's red light goes on, and a chime sounds. The sign will stay lit until the bus is stopped and the entry door is opened. The system automatically re sets itself

D.104.1.7. When the W/C passenger signals a stop request, the W/C portion of the sign lights, the chime sounds, and the blue light on the dash goes on. The sign will stay lit until the W/C lift is deployed and then stowed and the W/C door is closed again.

D.105. PASSENGER STOP REQUEST SIGNS

D.105.1. Passenger stop request sign must be Transign, or equivalent.

D.105.2. The signs must be back-lighted stop requests and shall be mounted overhead on the front ceiling end closure.

D.105.3. The sign shall be so designated as to remain illuminated when activated (by the passenger signal system) until it is extinguished by opening the door.

D.106. FARE COLLECTION BOX

D.106.1. Fare collection box must be GFI Genfare "Cents a bill" farebox or compatible.

D.106.2. With this option, the mounted fare box will eliminate the front passenger seat and make the bus a 14 passenger.

D.106.3. Also must have the OEM Co-Driver seat covered with same fabric as the other passenger seats shipped loose with the bus. Co-Driver door shall have the same type of running board as driver's door.

D.107. DESTINATION SIGNS

D.107.1. Destination signs must be Twinvision, or equivalent. The automatic electronic destination sign system shall be furnished on the front and on the right side near the front door of the vehicle. Display areas of destination signs shall be clearly visible in direct sunlight and/or at night. The sign system shall provide optimum visibility of the message display units for passengers and shall meet applicable ADA requirements defined in 49 CFR, Part 38.39. Destination signs shall be installed in such a manner as to facilitate easy access for replacement of the entire sign assembly, or components such as fluorescent lamps/LED's and electronic control modules, from inside the bus within 30 minutes by a mechanic. Lamps and associated parts shall be commercially available.

D.107.2. Destination messages, route designations, and public relations messages shall be independently selectable via a single Operator's Control Panel (OCP) which shall include a display monitor. The OCP display monitor readout shall show the exact information displayed on the destination signs. The OCP shall be conveniently located for the bus operator and mounted in such a manner that will not pose any safety hazard. The OCP shall utilize a durable weatherproof keypad with tactile feel for destination message control functions.

D.107.3. The destination sign system shall be capable of programming 10,000 message lines. The number of public relations messages shall be limited only by the remaining number of message lines not used for destination purposes. Sign displays shall have alternating message capability with programmable blanking time between message lines as may be required. Variable blanking times shall be programmable between 0.5 to 25 seconds in duration. Each line message or blanking time for each message shall be individually programmable. The message display units shall incorporate an automatic blanking feature that will cause the display area to blank within 30 seconds of the bus master power switch being turned off.

D.107.4. An emergency message shall be initiated by the closure, or opening, of a dry contact switch or relay. The emergency message shall be displayed on the exterior of the bus only. The OCP shall not display the emergency message. The destination sign shall automatically resume normal operation when the remote emergency switch is returned to its normal position.

D.107.5. Destination Sign Programming: The electronic sign system shall be programmable via an integral connector located in the front destination sign area. Software shall be furnished for programming the sign system via an IBM-compatible, laptop computer. Software shall be capable of providing a high degree of flexibility to create, or select preprogrammed, fonts and graphic displays. The sign shall have the capability of being programmed in the field using a PC or field programmer. Message program information shall be transferable to and/or from the field programmer device as specified by the transit system in attachments to Part 5: Technical Specifications.

D.107.6. The destination sign compartments shall be designed to prevent condensation and entry of moisture and dirt. Additional provisions shall be included, if necessary, to prevent fogging of both destination sign compartment window and glazing on unit itself. Access shall be provided to allow cleaning of inside of destination sign compartment window and unit glazing.

D.107.7. A complete listing of destination sign readings for initial sign programming by the manufacturer are provided in attachments to Part 5: Technical Specifications.

D.108. FRONT SIGNS

D.108.1. Sign Size:

D.108.1.1. A 16 Row by 148 Column Spectrum Route Multi-Color Sign that shall have no less than 3,264 LEDs with a message display area of not less than 8.0 inches high by not less than 64.6 inches wide. The LEDs displays shall consist of red-blue-green LEDs and amber colored LEDs. The color LEDs shall be rated by their manufacturers for a life expectancy of 50,000 hours to 100,000 hours and shall support up to 27 colors.

D.108.2. Sign Readability:

D.108.2.1. The destination message shall be readable by a person with 20/20 vision from a distance of 250 feet. The sign shall have an equal readability at 65 degrees on either side of the line perpendicular to the center of the mean plane of the display. The entire display area of all signs shall be clearly visible and readable both in direct sunlight and at night.

D.109. SIDE SIGNS

D.109.1. Sign Size:

D.109.1.1. An 8 Row by 96 Column Spectrum Route Multi-Color Sign that shall have no less than 768 LEDs with a message display area of not less than 2.8 inches high by not less than 36.3 inches wide. The LEDs shall be rated by their manufacturers for a 100,000-hour life expectancy.

D.109.2. Sign Readability:

D.109.2.1. The destination message shall be easily read from the sidewalk level. The entire display area of all signs shall be clearly visible and readable both in direct sunlight and at night.

D.110. SYSTEM CONTROL CONSOLE – OPERATOR DISPLAY AND KEYBOARD

D.110.1. The system control console shall be used to view and update display messages. The system control console shall utilize a 28-key conductive rubber pad keyboard with tactile feel, designed especially for the harsh transit environment or approved equal.

D.110.2. The system control console shall contain a 16 x 128 pixel vacuum fluorescent display. The system control console shall contain an audio annunciator that beeps to alert the operator to view the display for a message, or beeps indicating that a key is depressed. The system control console shall continuously display the complete message associated with the selected destination code.

D.111. MEMORY TRANSFER

D.111.1. The sign system shall be reprogrammable through the system control console by either a PCMCIA flash card or a Memory Transfer Unit.

D.112. EMERGENCY MESSAGE DISPLAY

D.112.1. If required, a special emergency message can be activated by a switch. This message shall be displayed on signs, facing outside the vehicle, while the signs inside the vehicle, including the system control console, remain unchanged. The emergency message shall be canceled by entering a new destination code or by removing the emergency signal.

D.113. PROGRAMMING

D.113.1. A programming software package shall be furnished to generate message lists for the destination sign system. A PCMCIA flash memory card having a minimum of 8 megabytes of memory shall be provided to facilitate bus system programming. The software must be compatible with Windows NT, Windows 2000, Windows XP, Windows Vista and Windows 7
The programming software shall use techniques that require minimal operator training and that are intended for use by operators that are not trained in complex computer operations. All operator screens shall utilize pull down and pop-up menus.

D.114. BICYCLE RACKS

D.114.1. Manufacturer/model should be Sportworks DL- 2 or equivalent.

D.114.2. Racks must have a 2 (two) bike capacity, and follow the specs noted below.

D.114.2.1. The bike rack must meet OSHA requirements for lifting by a single individual and be capable of being raised or lowered with one hand

D.114.2.2. The bike rack must accommodate all bicycles with wheels 16" (for example, the Dahon folding bicycle series) or larger diameter, excluding tandems and recumbent type bicycles. The rack must accommodate all bicycles 80" and longer.

D.114.2.3. The bike rack frame must be manufactured with 304 stainless steel tubing with a minimum wall thickness of 0.125 in., outside corners to be rounded, pinch joints minimized and welds smoothed.

D.114.2.4. All nuts, bolts and washers shall be either AISI Type 304 stainless steel or Grade 8 yellow zinc plated steel

D.114.2.5. The bike rack must be mounted to the front of the bus and accommodate two (2) bicycles. In the stowed position, folded up against the front of the bus, it shall protrude no more than 8" from the front bumper. The protrusion shall be no more that 36" when deployed.

D.114.2.6. The latching mechanism must automatically lock the bike rack in the stowed and deployed positions.

D.114.2.7. The bike rack, when stowed, shall not interfere with any access panels/doors, windshield wipers or driver vents.

D.114.2.8. The bike rack shall be designed for loading and unloading from the front, curbside, of the bus. The securement can only contact the bicycle's tires as to not do any damage to the bicycle's frame. The bike

rack shall have a positive securement with a four (4) point locking system, contacting the wheel in such a way that greater than half the circumference of the wheel is captured. Straps, cords, and/or springs shall not be required to secure a bicycle.

D.114.2.9. The carrier shall not interfere with the ability of the driver to safely operate the vehicle. This includes, but is not limited to, the obstruction of the windshield view and the operation of the windshield wipers, turn signals, and headlights.

D.114.2.10. The carrier shall be compatible with automated bus washing systems and shall be capable of repeated use with automated washing equipment without sustaining damage to the carrier, vehicle, of the washing equipment. The carrier shall be designed as not to accumulate water internally.

D.114.2.11. The use of this rack shall not affect route scheduling. The bike rack shall have a design capability of being loaded or unloaded in 20 seconds or less.

D.114.2.12. The mounting bracket/ pivot plate assembly must be designed to fit all urban transit buses, both standard floor and low floor.

D.114.2.13. The bicycle rack shall be warranted against defects in materials and workmanship for a period of one (1) year from date of installation.

D.114.2.14. The bicycle rack manufacture is required to furnish all the complete parts and service (maintenance) books.

D.114.2.15. The bicycle rack should have a latching system in both positions, stowed and deployed; this will need to be explained in detail

D.114.2.16. The racks should be in a friendly design and a tire only mount.

D.114.2.17. The mounting brackets should be detailed at to what bus needs with brackets.

D.115. PRODUCT STANDARDS

D.115.1. Only first quality materials, workmanship and finish shall be acceptable.

All general materials and workmanship shall be guaranteed to be free of defects for a minimum of at least one (1) year from date of installation except as noted below. Any defects shall be rectified or replaced to meet specifications at the expense of the manufacturer, including freight, parts and labor.

Any exposed fasteners shall be colored to match the finish of the framework components.

D.116. SPARE PARTS

D.116.1. The contractor will provide pricing and the delivery time on the available spare parts for each bicycle rack and maintain adequate stock levels.

D.117. DELETE COPILOT DOOR, SEAT AND B PILLAR

D.117.1. This Moves the Passenger door from the coach Body to the chassis cab section. This delete's the Copilot door; seat and B pillar section of the cab. This will add 2 seats positions in Coach Body.

D.118. DELETE ALTRO CHROMA FLOORING

D.118.1. This delete's the Altro Chroma Floor covering to install the Gray RCA Rubber Transit-Flor. The step well, entrance area, and center aisle floor area shall be overlaid with ribbed, slip resistant, oil resistant commercial 3/16" step tread thickness. The 1/8" thickness flooring under the seats and in the wheelchair area shall be smooth, slip resistant, and oil resistant. The flooring shall extend up the sidewall and rear wall to the seat rail line and shall be coved at the floor/wall joint to form a smooth water-tight transition. Flooring adhesive shall be oil resistant.

D.119. DELETE YELLOW POWDER COAT ON HANDRAILS

D.119.1. This delete's the yellow powder coating on the stainless steel handrails, grab handles and stanchions. They will be the natural brushed Stainless steel Color.

D.120. 100% NIDA-CORE[®] STRUCTURE OR APPROVED EQUAL

D.120.1. Resin Hardened Nida-Core[®] or approved equal Polypropylene Copolymer honeycomb (1" thickness, minimum) Throughout 100% of the entire body structure, walls, roof, front and rear caps must be used instead of Honeycomb Paper Vertical. This is to eliminate any possibility of rotting in any area of the body structure.

D.121. COMPOSITE FLOOR

D.121.1. Composite Space-age Synthetics Thermo-Lite Board-Tough Series or approved equal Floor that will not rot and is lighter than the standard marine grade plywood floor.

D.122. SIDE DOOR SLIDE OUT BATTERY TRAY

D.122.1. Must have an Extra Heavy Duty Stainless Steel slide out Battery Tray for all auxiliary batteries mounted under Bus. Battery Box must have OEM type battery hold down brackets to securely hold batteries in place. Cloth hold down straps is not ALLOWED. Battery box must be sealed to keep mud from getting on batteries.

D.123. DIESEL ENGINE

D.123.1. Current Power plant for the make and model of chassis

D.124. REAR SPARE TIRE HOLDER

D.124.1. A rear spare tire holder that shall be affixed to the vehicle in a way to allow easy removal of spare tire.

D.125. ADJUSTABLE REAR SUPENSION SYSTEM

D.125.1. System shall be a MOR/ryde suspension system or equal shall be used with the following:

D.125.1.1. Installed as per the manufactures recommendations.

D.125.1.2. Fully adjusted for each bus installed on.

D.125.1.3. Warranty to be a 5 year 100,000 mile.

D.126. MEMO/PAMPHLET RACK

D.126.1. The memo/Pamphlet rack will be bolted to inside side wall of bus. (See Figure 6)

D.127. TDSS FOLD AWAY SEAT

D.127.1. Seat will be bolted to structural steel. (See Figure 7)

D.128. METAL BOX

D.128.1. Metal box should be bolted and placed between the passenger and driver's seat. (See Figure 8)

D.129. SEAT BELT EXTENSIONS

D.129.1. Extra Seat belt Extensions

SECTION "D"

24' 12 Passenger MFSAB Bus

RESPONSE SHEET

BASE VEHICLE COST PER UNIT

BASE VEHICLE	COST PER UNIT
TRANSIT BUS (GAS ENGINE)	\$

CHASSIS SPECIFICATIONS

Specify Overall Vehicle Length (outside of front bumper to outside of Rear bumper): _____

SPECIFICATIONS	MINIMUM/MAXIMUM IN INCHES	SUPPLIER'S RESPONSE
OVERALL VEHICLE LENGTH	282" minimum	
OVERALL VEHICLE LENGTH	307" maximum	
WIDTH EXTERIOR	96" minimum	
WIDTH INTERIOR	91" minimum	
HEIGHT EXTERIOR	110" minimum	
HEIGHT EXTERIOR	124" maximum	
HEIGHT INTERIOR	75" minimum	
WHEELBASE	176" minimum	
WHEELBASE	186" maximum	

AIR CONDITIONING

Make and Model of Rear A/C Unit and Cooling Capacity of rear Unit BTU's/Hr. Include literature on unit being proposed.

MAKE/MODEL	
BTU/HR OF REAR UNIT ONLY	

HEATING

MAKE/MODEL	
BTU/HR OF REAR UNIT ONLY	

OPTIONAL ITEMS

COST

OPTIONAL ITEMS	COST PER ITEM
CNG CONVERSION CHASSIS	
CNG BIFUEL CONVERSION CHASSIS	
PROPANE DEDICATED CONVERSION	
PROPANE DUEL FUEL CONVERSION	
BACK-UP MONITOR SYSTEM	
TWO-WAY RADIO (UHF)	

TWO-WAY RADIO (VHF)	
TWO-WAY RADIO (800 MZ)	
DRIVER'S SHIELD	
PAINTED LOWER SKIRTS	
OUTSIDE PASSENGER DOOR SWITCH	
BUS CAMERA SYSTEM	
FABRIC INSERT ON CEILING	
STREET SIDE EXHAUST	
INTEGRATED CHILD SEATS	
VINYL SEATS (PRICE DEDUCTION)	
PUBLIC ADDRESS SYSTEM	
PASSENGER SIGNAL SYSTEM PULL CORD	
PASSENGER STOP REQUEST SIGNS	
FARE COLLECTION BOX	
DESTINATION SIGNS	
BICYCLE RACKS	
DELETE ALTRO CHROMA FLOORING (PRICE DEDUCTION)	
DELETE YELLOW POWDER COATING ON HANDRAILS, GRAB RAILS, AND STANCHIONS (PRICE DEDUCTION)	
100% NIDA-CORE STRUCTURE	
COMPOSITE FLOOR	
SIDE DOOR SLIDE OUT BATTERY BOX	
DIESEL ENGINE	
REAR SPARE TIRE HOLDER	
ADJUSTABLE REAR SUSPENSION SYSTEM	
MEMO/PAMPHLET RACK (See Figure 6)	
FREEDMAN SEATING TDSS (OR EQUIVALENT) FOLD AWAY SEAT (See Figure 7)	
METAL BOX (See Figure 8)	
EXTRA SEAT BELT EXTENSIONS	

A LIST OF OPTIONAL EQUIPMENT AND/OR ACCESSORIES SHALL BE PROVIDED. THE LIST MUST CONTAIN

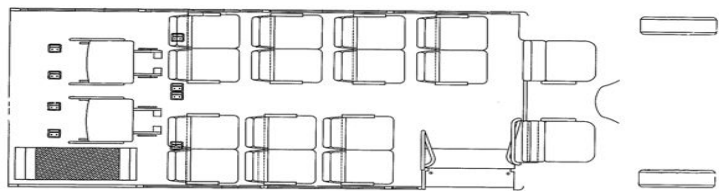
- Item
- Description and functionality detail
- Cost of item installed in final delivery of vehicle
- Any changes to listed specifications as outlined above to accommodate options

PROPOSAL EXCEPTIONS

Supplier must list any exceptions here to be used as a part of the Proposal evaluation and analysis. Please list the roman numerical on the standard specs or the number for the options when listing any Proposal exceptions.

FIGURE 1

Figure 1



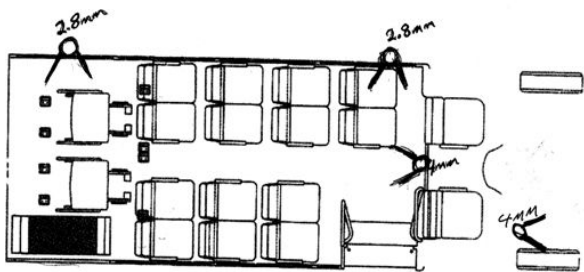
24' 15 Passenger Rear
Lift B Pillar

FIGURE 2



FIGURE 3

Figure 1



24' 15 Passenger Rear
Lift B Pillar

FIGURE 4



FIGURE 5



FIGURE 6



FIGURE 7

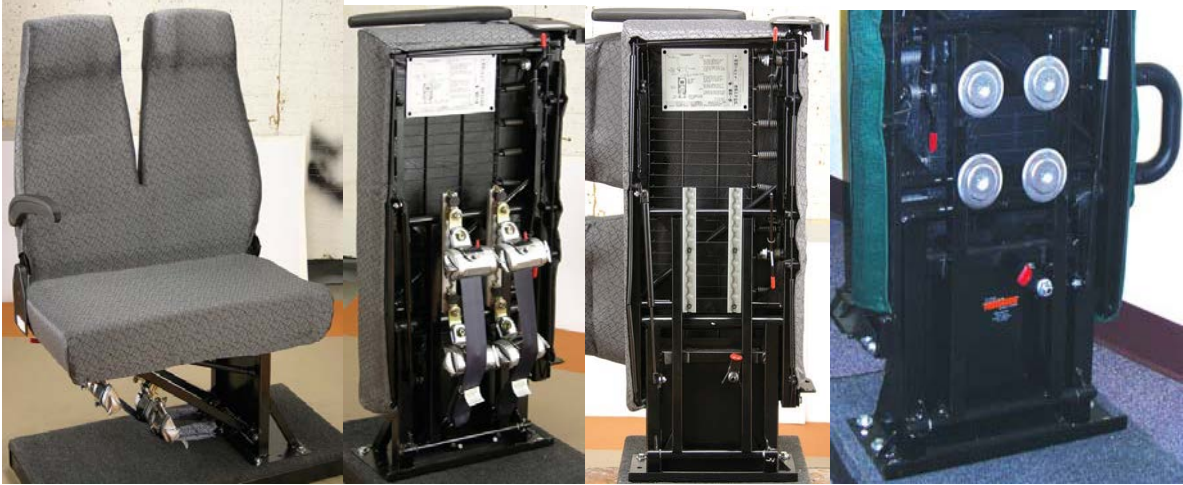


FIGURE 8



E. SOLICITATION SPECIFICATION FOR 24' 15 PASSENGER, REAR LIFT METAL TRANSIT VEHICLE

E.1. DELIVERY

- E.1.1.** Vehicle must be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following:
 - E.1.1.1.** The vehicle must have a full tank of fuel when delivered.
 - E.1.1.2.** Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
 - E.1.1.3.** All parts added, as part of the modification process shall be new.
 - E.1.1.4.** Headlights properly aligned
 - E.1.1.5.** Engine Tuned
 - E.1.1.6.** All accessories properly adjusted
 - E.1.1.7.** Electrical, braking and suspension systems inspected
 - E.1.1.8.** Both batteries Charged
 - E.1.1.9.** Front-end alignment must be done after body is put on chassis. Chamber, caster and toe must be adjusted to the center of OEM specs. Ford chassis buses must have adjustable caster, camber bushings installed. Standard OEM bushings will not be accepted. Each bus must come with documentation stating before and after actual alignment readings of bus.
 - E.1.1.10.** All wheels balanced, including spare
 - E.1.1.11.** All lubricants checked, and greased if needed
 - E.1.1.12.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
 - E.1.1.13.** Warranty papers and owner's guide
 - E.1.1.14.** Exterior and interior cleaned and washed.
 - E.1.1.15.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.
 - E.1.1.16.** Under no circumstances are tow vehicles to be attached to any buses.
 - E.1.1.17.** Each vehicle must be delivered to the agency submitting the P.O.

E.2. CERTIFICATE OF ORIGINS

- E.2.1.** Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order five business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery is not acceptable.

E.3. NOTIFICATION

- E.3.1.** Vendor shall notify buyer of vehicle delivery ten business days prior.
- E.3.2.** If these specifications contradict any listed in the Federal Regulations, they are superseded by those of the Federal Regulations.

E.4. NO PROTOTYPES

- E.4.1.** Must be a Current production Model, B Pillar type bus that has been in Production for a minimum of one year.

E.5. BODY STRUCTURE

- E.5.1.** The vehicle shall have a purpose-built body, which will provide for a minimum floor to ceiling distance of **75"** at the center aisle.
- E.5.2.** The floor frame must be welded or bolted to the sidewall frame, and the sidewall frame must be welded or bolted to the roof frame.

- E.5.3.** Steel roll cage must form a complete Unitized body and a steel support cage behind front and rear cap to prevent flexing. All steel joints must have gussets for additional strength. All steel parts shall either be galvanized, powder coated or primed to prevent rusting.
- E.5.4.** Composite construction is not acceptable.
- E.5.5.** Construction methods utilizing double-sided tape to secure sidewall skin will not be accepted.
- E.5.6.** If utilizing aluminum for the roof or sidewall skin it must be a minimum of .060" thick with AZDEL SuperLite backing or equivalent.
- E.5.7.** All surfaces and hardware having sharp edges, corners, or angles that could cause injury shall be covered and padded with heavy-duty vinyl-foam type material.
- E.5.8.** The roof will be constructed of the same reinforced materials as the body of the vehicle and of sufficient strength to prevent vibration, drumming and flexing.
- E.5.9.** If exterior roof or sidewall skin is made of Fiberglass it must be a Minimum of 3/16" thick this is not including any FRP, Luan, plywood or foam backings.
- E.5.10.** Fiberglass Roof must be a one piece molded unit that has molded sides to connect to side walls. Bending a flat sheet of fiberglass to connect to walls is NOT ALLOWED.
- E.5.11.** If exterior roof or sidewall skin is made of Galvanized steel it must be a minimum of .024" thick with AZDEL SuperLight backing or equivalent.
 - E.5.11.1.** Roof design shall prevent pooling of water on the roof.

E.6. OEM CHASIS FRAME

- E.6.1.** The rear overhang, measured from the center of the rear axle to the outer edge of the rear bumper, cannot exceed 1/3 of the overall vehicle length.
- E.6.2.** Further, ODOT will not allow re-certification of the chassis OEM GVWR and GAWR.
- E.6.3.** Any vehicle that exceeds the OEM GVWR and/or GAWR will not be accepted. NOTE: Supplier must provide detailed documentation if chassis modification must be made to accommodate length of wheelbase from OEM. This documentation shall include, but not limited to type of modification, frame supports, out sourcing of frame work, drive shafts, or quality control.

E.7. DOORS

- E.7.1.** Passenger Entry Door: Passenger entry door must have a Two (2)-panel door design providing a minimum 32" X 80" clear opening. A&M door actuator, or equivalent.
 - E.7.1.1.** Door is located in coach body and electrically power operated controlled by the driver.
 - E.7.1.2.** Each door panel shall be actuated together by a single electric powered overhead actuator.
 - E.7.1.3.** Actuator is equipped with an emergency manual release lever.
 - E.7.1.4.** Vertical door shafts shall be an integral part of the door panels.
 - E.7.1.5.** The top portion of the shaft shall be designed to prevent door panels from rotating out of alignment.
 - E.7.1.6.** Shafts shall pivot on a top-mounted, bronze thrust bushing and a lower stud-mounted alignment pivot, accommodated with a glass-filled molded bearing equal to A&M door actuator, or equivalent.
 - E.7.1.7.** Perimeter door edges shall be sealed with neoprene 2" leading edge seals.
 - E.7.1.8.** Seals shall overlap front and rear to provide an air and watershed.
 - E.7.1.9.** Upper and lower edges of doors shall be tightly sealed against entrance of air drafts and water, including spray from vehicle washing.
 - E.7.1.10.** Operating controls should be located within easy reach of the driver.

E.8. PASSENGERS DOOR INTERLOCK

- E.8.1.** Electric Passenger door in coach body will only work when transmission in Park.

E.9. WHEELCHAIR LIFT DOORS

- E.9.1.** A double door entrance shall be provided on the right (curb) side of the vehicle behind the vehicle's rear wheels.
- E.9.2.** The door opening shall be at minimum width of 48" and height of 70" to accommodate the wheelchair lift specified within this document.
- E.9.3.** Clearance between the top of the door opening and the raised lift platform shall be a minimum of 68".

E.9.4. Each door shall be equipped with an A.L. Hansen Type 23 Door Check or equivalent which is a Top Mounted Spring Loaded Device that will securely hold the door in the open position while the wheelchair lift is in operation. (Sliding door is not acceptable).

E.9.5. Each door must have a window which shall be the same height as the passenger windows.

E.10. COACH BODY DOOR LOCKS

E.10.1. All doors shall be equipped with a lock.

E.11. DRIVER'S DOOR AND CO-DRIVER'S DOOR

E.11.1. Must have Power windows, Power door locks

E.12. RUNNING BOARDS

E.12.1. Extra Heavy-duty Running Boards that are bolted to Coach Body for added step strength

E.12.2. Steps must be able to hold over 400lbs.

E.13. HANDRAIL

E.13.1. Handrails (left and right) of the front passenger door shall be provided. Cross-sectional diameter of handrail shall be between 1 ¼" and 1½".

E.13.2. Entrance handrails shall not be padded.

E.13.3. Must have at minimum a wall thickness of 18 gauge steel.

E.13.4. Two overhead ceiling-mounted handrails with mounting brackets at 24" on centers placed over the aisle shall be provided for the full length of the vehicle's passenger aisle way, except in wheelchair lift area and over passenger entry door.

E.13.5. All handrails must be Powder coated Steel that will not rattle or Flex and mounting bolts shall be bolted into Structural steel.

E.13.6. Color of Handrails shall be bright yellow (to assist the visually impaired),

E.13.7. **Wood mounting** is not allowed.

E.14. GRAB RAILS

E.14.1. Must have grab rails with the following:

E.14.1.1. Shall be installed in the entrance to the vehicle running parallel to the steps in a configuration which allows persons with disabilities to grasp while entering or exiting the vehicle.

E.14.1.2. Cross-sectional diameter of grab rail shall be between 1 ¼" and 1½"

E.14.1.3. Must be at minimum a wall thickness of 18 gauge steel.

E.14.1.4. All Grab rails must be Powder Coated Steel that will not Rattle or Flex and mounting bolts shall be bolted into Structural steel.

E.14.1.5. Color of grab rails shall be bright yellow (to assist the visually impaired),

E.14.1.6. **Wood mounting** is not allowed.

E.15. STANCHIONS

E.15.1. Must be at minimum a wall thickness of 18 gauge steel.

E.15.2. All stanchions must be Powder Coated Steel that will not Rattle or Flex and mounting bolts shall be bolted into Structural steel.

E.15.3. **Wood mounting** is not allowed.

E.15.4. Color of stanchions shall be bright yellow (to assist the visually impaired),

E.15.5. A stanchion and vinyl padded modestly panel shall be provided at entrance door in front of first passenger seat.

E.15.6. A stanchion from the floor to roof shall be installed on the interior left side of the front passenger door approximately 14 inches inside the vehicle.

E.15.7. A horizontal handrail shall be installed between the stanchion and the right wall approximately 30 inches above the floor.

E.15.8. A stanchion shall be located in the rear of the driver's seat at the edge of the aisle and a handrail shall extend from the stanchion to the side wall of the vehicle behind the driver's seat.

E.15.9. The stanchion shall not interfere with a rearward travel of the driver's power seat adjustment.

E.16. MODESTY PANEL

- E.16.1.** A modesty panel shall be positioned at the rear edge of the step well.
- E.16.2.** This will be made up of a stanchion at the inner rear corner of the step well with a rail running from that stanchion to the wall at windowsill height and the modesty panel installed therein.
- E.16.3.** Panel shall have no less than 1 ½" between the bottom of the panel and the floor to facilitate cleaning of the floor.
- E.16.4.** Fastening of the panel shall be by bolts or rivets.
- E.16.5.** **Screws** will not be acceptable.

E.17. STEPWELL

- E.17.1.** Must be made of Galvanized, Primed or Powder Coated steel,
- E.17.2.** Must have two steps covered with the same slip resistant floor covering as specified within this document.
- E.17.3.** maximum 12" minimum 10" from ground to first step,
- E.17.4.** 9" riser, Tread depth minimum 8½".
- E.17.5.** All steps to get up to floor level must be in step well area.

E.18. INTERIOR

- E.18.1.** All interior panels shall be vinyl coated with AZDEL SuperLite backing, vinyl coated metal, FRP or equivalent with same durability and cleaning ease.
- E.18.2.** Vendor shall provide a list of available colors at their quoted price and may also include a list of colors available at additional cost.
- E.18.3.** Interior shall be trimmed with an attractive molding, covering all seams.
- E.18.4.** All surfaces and items or hardware in passenger compartment having sharp edges, corners, or angles that could cause injury shall be passed with heavy-duty vinyl covered foam-type material.
- E.18.5.** Door and instrument panel is to be painted or otherwise finished to match overall tones of interior panels

E.19. DRIVERS AREA

- E.19.1.** The drivers area shall consist of an ergonomically designed molded dash console, located conveniently to the driver's seated position and in full view of the driver.
- E.19.2.** Supplemental control panels mounted above the driver's head or above windshield are not accepted.
- E.19.3.** All switches are to be properly labeled and illuminated.
- E.19.4.** The instrument control panel shall be painted or otherwise finished with non-reflective, anti-glare black finish.

E.20. STORAGE COMPARTMENT

- E.20.1.** Vehicle must have a large overhead driver storage compartment.
- E.20.2.** This compartment must have a lip on the inside to protect objects from opening compartment door. Also shall provide easy access to clearance lights connectors through top of Storage Compartment. And provide a door latch to hold door open.

E.21. FLOOR ASSEMBLY

- E.21.1.** **The floor shall consist of** 3/4 inch Advantech Engineered flooring or equivalent with Undercoating.
- E.21.2.** Construction of sufficient strength and support to not allow flexing of the finished or surface floor. The chassis, body and flooring shall be attached in such a manner as to act as one unit without any movement or flexing at the joints.
- E.21.3.** Shall have Floor Coving material at wall.

E.22. SLIP-RESISTANT FLOOR COVERING

- E.22.1.** Floor covering shall be slip resistant vinyl flooring, constructed with aluminum oxide, silicon carbide and optional PVC chip blended throughout a high quality vinyl wear surface.
- E.22.2.** **Top coating** is not acceptable.
- E.22.3.** Backing to be polyester/cellulose material with fiberglass fiber reinforced center scrim for additional durability.
- E.22.4.** Bacteriostats will be incorporated providing all exposed surfaces with excellent anti-bacterial properties.

- E.22.5. Must be** Altro Chrome with a minimum thickness of 2.2 millimeters or equivalent
- E.22.6.** Color to be selected from current Altro color range by each agency.
- E.22.7.** The whole floor will be a uniform thickness throughout the vehicle, eliminating the need for ribbed surfaces, while exceeding the ADA minimum slip resistance standard rating of .06 static coefficient of friction under dry or wet conditions.
- E.22.8.** Coving material is to be installed to support floor when rolling floor covering up the sidewall of vehicle to the seat track.
- E.22.9.** Seams must be heat welded to provide a permanent waterproof seal against water penetration leading to premature sub-floor failure or curling leading to possible tripping hazards.
- E.22.10.** Landing area and step edgings are to be Altro yellow safety vinyl edging.
- E.22.11.** Edging is to heat welded to the main floor and step tread to provide for a long lasting seam.
- E.22.12.** The floor must be installed according to manufacturer's directions using proper tools, accessories and adhesives.
NOTE: If the flooring is not installed according to the flooring manufacture (heat welded and adhesives) specification the bus will not be accepted.

E.23. GAUGES

- E.23.1.** Vehicles shall be equipped with the following needle-type gauges (lights in lieu of gauges are not acceptable): and all shall be in easy view of driver.
- E.23.2.** If OEM gauges are not available then Stewart Warner gauges or equivalent shall be used.
 - E.23.2.1.** OEM chassis Voltmeter Plus a Auxiliary Voltmeter Gauge
 - E.23.2.2.** Oil pressure
 - E.23.2.3.** Temperature
 - E.23.2.4.** Fuel level
 - E.23.2.5.** Speedometer
 - E.23.2.6.** Odometer
 - E.23.2.7.** Tachometer
 - E.23.2.8.** Engine hour meter

E.24. BUMPERS

- E.24.1.** Front and rear bumpers shall be securely fastened to the chassis frame to adequately absorb shock from impact. In no case are the bumpers to be fastened directly to the vehicle body.
- E.24.2.** Rear bumper must be an energy absorbing Romeo Rim with Heavy Duty bumper mounting brackets that use four 7/16 grade 8 bolts per bracket or equivalent.
- E.24.3.** Front bumper and grille shall be chrome plated.

E.25. INSULATION

- E.25.1.** Insulation shall be provided in both walls, roof, front cap, rear wall and roof side radius area where roof meets walls.
- E.25.2.** Adequate insulating properties shall be provided to ensure minimum heat, cold and noise penetration into the vehicle interior.
- E.25.3.** Insulation may be accomplished through the use of fiberglass, vacuum design or equivalent.
- E.25.4.** Must have a minimum R-value of 6, and fire resistant.

E.26. AIR CONDITIONING

- E.26.1.** Air conditioning efficiency is of paramount concern to the purchaser. Air conditioning shall be adequate to cool both the passengers and driver areas. Only vehicles offering top of the line commercial transit type air conditioning systems will be considered.
- E.26.2.** The vehicle's electrical system shall be designed and integrated such that ample electrical supply is provided to maintain optimum air conditioning performance without battery discharge.
- E.26.3.** The air conditioning system offered shall have a proven transit performance record and shall be provided by a nationally recognized manufacturer of bus air conditioning.

- E.26.4.** The OEM Dash unit and Rear Air Conditioning unit shall be two separate stand alone systems. Tying into the front OEM dash system is not allowed.
- E.26.5.** Rear evaporator shall have an easy accessible return air filter; having to remove evaporator cover housing to gain access to filter will not be accepted.
 - E.26.5.1.** The rear air conditioning system shall provide a minimum cooling capacity of 65,000 BTU/Hr.
 - E.26.5.2.** A Carrier model AC-833MAX System or equivalent. The Combined Total cooling Capacity of the OEM dash unit and Rear Unit shall be a minimum of 78,000 BTU/hr.
- E.26.6.** The Rear A/C System must have the following specified components.
 - E.26.6.1.** Carrier EM-3 Evaporator or equivalent
 - E.26.6.2.** Carrier CM-3 Condenser or equivalent
 - E.26.6.3.** Carrier TM-21 Compressor or equivalent
 - E.26.6.4.** Carrier Flex CLICK SAE J-2064 Type E Color coded hoses or equivalent.
 - E.26.6.5.** Service Ports for rear Air conditioning System must be easily accessible and located under the bus near the rear A/C Condenser.
- E.26.7.** A conventional dash mounted unit for the front of the driver's area of the vehicle. Both units shall be equipped with multi-speed fans (minimum 2 speeds).
 - E.26.7.1.** Evaporator fans shall produce a minimum of 1600 CFM.
- E.26.8.** The Rear system shall include a skirt mounted commercial condenser. Condenser fan(s) shall produce a minimum of 2400 CFM of airflow over the coils. All components of the condenser unit shall be coated or constructed with a corrosion resistant material to protect the unit from road salts other foreign substances that might be sprayed on the unit.
 - E.26.8.1.** Condenser unit shall be positioned so as not to draw air from under vehicle. NOTE: Air conditioning refrigerant lines, to include their foam covering, will not be exposed to road hazards or elements of the weather. All air conditioning refrigerant lines, which extend from the engine area to the rear evaporator, shall be protected from damage. And all drain lines, hoses and wiring from evaporator shall be covered from view.

E.27. VENTILATION

- E.27.1.** Vents provided in driver area.

E.28. HEATING

- E.28.1.** Front & rear heater core factory installed hot water type, of sufficient capacity to warm cabin area and clear windows of snow, ice and fog.
- E.28.2.** An easily accessible clearly marked shut-off ¼ turn ball valves shall be installed in heater supply and return lines which will allow the water to be cut off to the rear heater core.
- E.28.3.** The water lines for the rear heater core shall be protected from damage.
- E.28.4.** Rear heating unit shall provide a minimum of 65,000 BTU's/Hr. this is in addition to front dash unit. State BTU/HR of rear heating unit you are proposing.

E.29. SAFETY EQUIPMENT

- E.29.1.** All miscellaneous equipment must be secured to the vehicle and easily accessible.
- E.29.2.** First aid kit: (24M – National Standard School Bus Metal)
 - E.29.2.1.** Must be Certified Safety Mfg. Model S203-045 or equivalent.
- E.29.3.** Fire extinguisher – Multi-purpose Stored Pressure Dry Chemical Extinguisher.
 - E.29.3.1.** Must be a 5 lb. type 3A:40B: C Pro Line, Kiddie Model # FXBND9 or equivalent.
 - E.29.3.2.** Must have a gauge to indicate state of charge and mounted to vehicle using a bracket and having a heavy duty vinyl cover.
- E.29.4.** Triangle warning devices (3), with storage container.
 - E.29.4.1.** must meet FMVSSP # 125
- E.29.5.** Bloodborne Pathogens infection control kit.
 - E.29.5.1.** Must be Certified Safety Mfg. Model #FK200-931, or equivalent.

E.29.6. Seat belt cutter

E.30. MIRRORS

E.30.1. Exterior:

E.30.1.1. **Heavy Duty Heated Power Mirrors** by Velvac Model 2020 Deluxe Head with Turn Signals or equivalent.

E.30.1.2. Mirrors are to be mounted to the driver and copilot doors in the same position as the OEM mirrors.

E.30.2. Interior:

E.30.2.1. Vehicle must have the two (2) following mirrors.

E.30.2.2. Must be OEM Day/night, 10" rear view mirror, confirming to FMVSS No. 111. (This mirror will be deleted if purchaser chooses backup camera as an option).

E.30.2.3. Passenger viewing and backup mirror shall be made of safety glass, having rounded corners and protective edges, and a 6" x 16". This mirror is in addition to the mirror mounted on windshield.

E.30.3. Fresnel Lens: 11" x 14" Lens on rear window.

E.31. SEATS

E.31.1. Driver's Seat and Co-Driver's Seat:

E.31.1.1. The driver seat must be a deluxe bucket, OEM high back 6-way power seat.

E.31.1.2. The Co-Driver's Seat must be adjustable fore and aft.

E.31.1.3. Seats must be padded with allergy-free material and upholstered with a durable transit quality level 5-cloth fabric.

E.31.1.4. Both seats must have adjustable lumbar

E.31.1.5. Both seats must have a certified seat belt and shoulder harness with retractor shall be attached to frame.

E.31.1.6. Both seats must have reclining backs and padded armrests. NOTE: Supplier must supply seating diagram reflecting all listed dimensions for approval.

E.32. Passenger Seats

E.32.1. Seating shall be provided for fifteen (15) ambulatory passengers.

E.32.2. Wheelchair spaces will each be equipped with a wheelchair securement tie down and occupant restraint system, which meets the Americans with Disabilities Act requirements.

E.32.3. All seats shall be "bucket" semi-contoured transit type.

E.32.4. Seats are to be consistent with what is accepted as transit quality construction. School bus type seats are not acceptable.

E.32.5. Seat frames are to be welded.

E.32.6. Seats must be padded with allergy-free material and upholstered with a durable transit quality level 5-cloth fabric. NOTE: If the seating configuration being proposed is different than that shown in Figure 1, a diagram must be furnished.

E.32.7. Aisle seats must have padded fold up armrests and Anti-Vandal grab handles on the seat backs.

E.32.8. **Seats must be** Freedman Seating Mid Back type bucket seat or equivalent.

E.32.9. Seat belts to be installed at each seat position, and must be a Retractable under Seat Retractor, type of seat belts.

E.32.10. Must include Two (2) Seat Belt Extensions that will fit Passenger Seat Belts.

E.32.11. A commercial quality seat belt knife fastened to bus in driver's reach.

E.32.12. All seats shall provide a minimum seat width of 17" per passenger, or 34" per two (2) -passenger seats.

E.32.13. Minimum depth of seat (front to back contour) 18"

E.32.14. All seats including any foldaway seats must be bolted to structural steel.

E.32.15. Bolting seats to plywood floor without bolting into structural steel under floor is NOT ALLOWED.

E.32.16. All seat tracks must be welded to steel sidewalls and steel floor sections. Riveting or bolting seat tracks to sidewalls is NOT ALLOWED.

- E.32.17. Seats shall be fully padded and shall be constructed with a no-sag spring bottom suspension. Plywood seat bottoms are unacceptable.
- E.32.18. Seats shall be covered with a durable transit quality level 5-cloth fabric.
- E.32.19. Seats shall be spaced on a minimum of 28 1/2" centers, allowing for a minimum of 10" between the front of the bottom cushion and the back of the next forward seat.
- E.32.20. Minimum aisle width shall be 16".
- E.32.21. All seats shall meet, as minimum, FMVSSP 302 207 requirements. Any additional requirements would be optional.

E.33. PRIORITY SEATING SIGNS

- E.33.1. Each vehicle shall contain sign(s), which indicate that, the row of forward –facing seats located in the front of the vehicle are priority seats for persons with disabilities, and that other passengers should make such seats available to those who wish to use them.
- E.33.2. The signs shall be located on the interior walls directly above the front row of forward-facing seats.
- E.33.3. Signs must follow FTA 49CFR38 Section 38.27 for the required lettering characters of the signs.

E.34. LIGHTING

- E.34.1. All manufacturers' lighting added to the vehicle (both interior and exterior) shall be provided with light-emitting diode (LED) lights.
- E.34.2. Door activated 4 way flashers that are activated when passenger door is opened. This includes 2 additional amber LED flashing lights mounted high on each side of the rear wall.
- E.34.3. The location, type and hookup of all exterior lights and reflectors to conform to Federal Motor Vehicle Safety Standards and Procedures.
- E.34.4. The number of interior lights and their light output shall be determined by providing a minimum average of 7 foot-candles of illumination on a 1 square foot plane, at an angle of 45 degrees from horizontal, centered 33 inches above the floor and 24 inches in front of the seat back at each seat position.
- E.34.5. Floor surface in the aisles shall be a minimum of 10 foot-candles.
- E.34.6. Each vehicle shall be equipped with OEM daytime running lights.
- E.34.7. Must have Red LED lights over all emergency exits
- E.34.8. All interior lighting in the passenger area shall be mounted in the ceiling cove at the sidewall with a minimum of three (3) fixtures on each side of the vehicle. Lighting fixtures shall be installed on the interior walls and ceiling in a manner that does not present a head strike to the passengers.
- E.34.9. All clearance lights front, rear and side shall have metal armored shields. This shall protect lights from tree limb damage.
- E.34.10. Tail lights are to be recessed and shall not protrude more than 2 inches from the body; they shall include a pair of amber combinational hazard and signal lights. Rear tail-lamps shall also include a pair of red tail lights and red stop lights, which may be combinational. (Ref: Dialight 46121RB-Red, 46121AB-Amber or equivalent)
- E.34.11. Side signal lamps, with marker, shall be provided independently or be incorporated into the center of the vehicle. Location must be above and in front of the rear wheel opening and provide visibility from behind the rear wheel opening. (Ref.: Dialight 18001AB811 or equivalent)
- E.34.12. Clearance marker lights shall be installed surface-mounted, facing the front, rear, and each side at rear. (Ref.: Dialight 15001RB, 15001AB or equivalent)
- E.34.13. The third brake light shall be center-mounted above the rear window, minimum 18" in length. (Ref.: Dialight 87121RB or equivalent)
- E.34.14. Two back-up lights, one mounted on each side of the body rear cap. (Ref.: Dialight 46001CB or equivalent)
- E.34.15. Step lighting shall be mounted to provide light for the entire step-well and an area a minimum of three (3) feet beyond the first step on the ground area outside the bus (Ref.: Dialight 170-81CB or equal). Note: The step lights shall be extinguished when the front door has closed.
- E.34.16. Raised floor step lighting shall be provided by one strip light mounted in the step riser. Light strip shall be a minimum of 18 inches and recess-mounted to protect from accidental damage by passengers contacting light while using the step. (Ref.: Dialight 87121CB or equivalent).
- E.34.17. Exterior step light shall be mounted away from wheel splash. (Ref.: Dialight #VSW-CC-19B-35-801 or equivalent)

E.34.18. Wheelchair lift area light shall be positioned in the manufacturer's standard location in order to illuminate the area in the immediate vicinity of the wheelchair lift platform for night operation. The light shall be automatically activated only when the wheelchair lift doors are open. (Ref.: Dialight Light #46121CB or equivalent)

E.35. ELECTRICAL WIRING

E.35.1. All wiring shall meet the requirements of SAE recommended practice J878a, Type SXL.

E.35.2. Connections with 3 to 12 circuits shall be environmentally sealed high impact plastic connectors with pull apart locking tabs.

E.35.3. All non-OEM connections containing one or two circuits shall be made with Posi-lick connectors.

E.35.4. No butt connectors will be allowed.

E.35.5. All added wiring shall be in a loom and securely clipped for maximum protection and routed in separate hangers from the heater hoses or air conditioning hoses.

E.35.6. Clips shall be rubber or plastic coated to prevent them from cutting the wiring insulation.

E.35.7. All electrical wiring shall be automotive stranded and sufficient size to carry the required current without excessive voltage drop and shall be color, number and function coded at a minimum of eighteen (18) inch intervals.

E.35.8. No electrical, stationary or mechanical device may block the removal of the engine cover inside the bus.

E.35.9. All wiring passing through the body metal shall have anti-chaffing grommets.

E.35.10. Each vehicle shall contain a set of detailed system by system "as built" wiring schematics covering all electrical equipment and electrical circuits installed, complete with wiring codes for each vehicle ordered.

E.35.11. Identification on the wiring diagram must tie the diagram to the bus.

E.36. WINDOWS

E.36.1. All windows to be of tempered safety glass and water and airtight.

E.36.2. Window in driver's door, windshield and entrance door glass are all to be tinted.

E.36.3. All the windows in the passenger area are to be factory-installed smoked glass with at minimum 30 percent tint. No Add on Film

E.36.4. Windows must be a top horizontal sliding T- transit type that the ventilation openings are located at the top of the window.

E.36.5. Must be constructed of corrosion resistant aluminum frames. NOTE: All windows and emergency exits must meet the performance and operational requirements as outlined in the Federal Motor Vehicle Safety Standards and Procedures.

E.37. EMERGENCY EXITS

E.37.1. At least one (1) window on each side at or near the rear of the vehicle shall be equipped with emergency release latches to provide emergency exits.

E.37.2. Release instructions shall be provided at or near the release handles and an audible alarm shall be installed near the driver, which will be activated when the window is released.

E.38. BACK-UP ALARM

E.38.1. Alarm shall be waterproof ECCO #530 or equivalent.

E.38.2. Must be mounted in the rear of the vehicle

E.38.3. Must be readily audible outside the vehicle when the transmission is in reverse.

E.39. WHEELCHAIR LIFT

E.39.1. An electric powered hydraulic wheelchair lift shall be installed inside the vehicle at the side door.

E.39.2. Bus must meet FMVSS 403-404 lift installation requirements.

E.39.3. Wheelchair lift shall meet the following MINIMUM requirements.

E.39.3.1. A Braun wheel chair Lift NL919FIB-2 (Millennium-2 Series) or equivalent. **Ground cable from lift must be connected to vehicle frame.**

E.39.3.2. Connecting ground cable to lifts mounting bolts is NOT ALLOWED.

E.39.3.3. 800 pound load capacity lifts assembly.

E.39.3.4. An electric hydraulic pump, powered by vehicle's electrical system.

- E.39.3.5.** Platform dimensions 34" wide by 51" long.
- E.39.3.6.** Platform to be constructed of 11 gauge expanded metal.
- E.39.3.7.** Platform shall be stored in an upright position within the vehicle.
- E.39.3.8.** Powered operation for (1) unfolding and folding the platforms and (2) raising and lowering the platform.
- E.39.3.9.** Emergency platforms release to permit the platform to be unfolded manually and lowered by gravity.
- E.39.3.10.** To prevent the wheelchair from rolling off, a barrier 1 ½" at minimum shall be provided on the outer edges of the platform and have an outboard roll stop that engages and locks before the platform leaves the ground to form a safety barrier when platform is raised or lowered
- E.39.3.11.** A free floating bridge plate will be replaced between the lift platform and the vehicle. This bridge plate will be hinged in a manner to permit upward movement should a person's foot become entangled.
- E.39.3.12.** Lift shall be securely bolted to the floor and floor reinforced as necessary to support the load.
- E.39.3.13.** To permit the lift platform to be raised without electrical power, a hand pump that allows the operator to raise the platform shall be installed.
- E.39.3.14.** An interior light shall be provided to illuminate the lift area;
- E.39.3.15.** All moving parts likely to cause personal injury shall be shielded.
- E.39.3.16.** Working parts, such as cables, pulleys, and shafts, which can be expected to wear, and upon which the lift depends for support of the load, shall have a safety factor of at least six, based on the ultimate strength of the material. Nonworking parts, such as platform, frame, and attachment hardware, which would not be expected to wear, shall have a safety factor of a least three, based on the ultimate strength of the material.
- E.39.3.17.** Lift shall be installed as specified by the manufacturer and shall be thoroughly tested prior to delivery.
- E.39.3.18.** Repair manual, parts list and instructions for adjusting hydraulic valves and electrical equipment shall be provided.
- E.39.3.19.** Lift controls shall be interlocked with the vehicle brakes, transmission, or door, or shall provide other appropriate mechanisms or systems to ensure that the vehicle cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks or systems are engaged.
- E.39.3.20.** The left control cord must be secured in a manner not to interfere with the door being closed.

E.40. USE BY STANDEES

- E.40.1.** Lift shall accommodate persons using walkers, crutches, canes or braces or who otherwise have difficulty using steps. The platform may be marked to indicate a preferred standing position.

E.41. HANDRAILS

- E.41.1.** Platform on lift shall be equipped with handrails on two sides, which move in tandem with the lift, and which shall be graspable and provide support to standees throughout the entire lift operation.
- E.41.2.** Handrails shall have a usable component at least 8" long with the lowest portion a minimum 30" above the platform and the highest portion a maximum 38" above the platform.
- E.41.3.** Capability of withstanding a force of 100 pounds concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure required.
- E.41.4.** Cross-sectional diameter of handrail shall be between 1 ¼" and 1½", and shall have eased edges with corner radii of not less than 1/8".
- E.41.5.** Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

E.42. WHEELCHAIR SECUREMENT

- E.42.1.** Wheelchair parking space shall have clear floor area of 30" wide by 52" long and be equipped with a four-point wheelchair securement tie-down.
- E.42.2.** Occupant restraint system must be Q'Straint Q-8306-SC or equivalent. Shall have a Retractable lap/shoulder belt combo with a Retractable height adjuster that are anchored to floor and wall with L Tracks that meet SAE J2249 and ADA requirements.
- E.42.3.** Tracks shall be recessed into the floor and not shift position under anticipated loads. Any tracks overlapping the access path must be flush with the floor to prevent passengers from tripping.
- E.42.4.** The L tracks and Slide N Click anchors must be bolted to structural steel.
- E.42.5.** Bolting to plywood floor without bolting into structural steel under floor IS NOT ALLOWED.

- E.42.6. Wheel Chair Securement system must be** Q'Straint QRT MAX Automatic Retractor System Q-8306-SC with Slide N Click anchorage system and J-Hooks, or equivalent.
- E.42.7.** There must be 52" at minimum and 54" maximum measured from center to center between front and rear Slide N Click anchor points. And be fully assembled and ready to use.
- E.42.8.** Must have securement pouches attached to wall to store wheelchair securement tie-downs.
- E.42.9.** Must include eight (8) Q'Straint Q5-7580 Webbing Loops or equivalent for Securing Scooters. Wheelchair location must be in the rear of bus, one beside the other. NOTE: Each wheelchair securement location shall have sign designating it as such. Lettering size and type on these signs shall comply with the Americans with Disabilities Act Regulations.

E.43. WHEELCHAIR ACCESSIBILITY SYMBOL

- E.43.1.** The vehicle will display the international wheelchair accessibility symbol of a person in a wheelchair that is outlined in white on blue background.
- E.43.2.** This symbol will be placed on all four sides of the bus.

E.44. VEHICLE COLORS

- E.44.1.** Body: Vendor to supply list of colors and prices available.

E.45. WINDOW BLACKOUT PAINT

- E.45.1.** Bus must have window blackout paint.
- E.45.2.** NOTE: See Figure 2

E.46. COLOR OF SEATS

- E.46.1.** Proposal must include all colors available
- E.46.2.** Successful vendor shall coordinate with the agency issuing this purchase order in the selection of material and color of the seats.
- E.46.3.** Seats shall be fully padded.

E.47. VEHICLE FLOOR PLAN

- E.47.1.** A proposed floor plan including all pertinent interior dimensions such as overall length, width, distance between seats, etc.,
- E.47.2.** Shall be submitted with the proposal.

E.48. CHASSIS SPECIFICATIONS

- E.48.1.** Supplier must list chassis specs must be listed the spaces provided below.
- E.48.2.** GVWR, axle, spring and tire:
 - E.48.2.1.** 14,500 lb. GVWR minimum
 - E.48.2.2.** Front axle- 5,000 lb. GAWR minimum
 - E.48.2.3.** Rear axle – 9,500 lb. GAWR minimum
 - E.48.2.4.** (Dual wheel are required on rear axle.)
 - E.48.2.5.** Front springs – heavy duty, 5,000 lb minimum
 - E.48.2.6.** Rating combined at ground.
 - E.48.2.7.** Rear springs – heavy duty, 9,500 lb minimum
 - E.48.2.8.** Ratings each, at ground.
- E.48.3.** It is the supplier's responsibility to calculate the actual loaded weight, spring and axle ratings so that the vehicle is engineered for safety.

E.49. TIRES

- E.49.1.** Tire size must meet 14,500 GVWR minimum and must be steel radial with "E" load rating.
- E.49.2.** Steel or brass valve stems 1.5" in length shall be used on all wheels with elbow extensions on the inside rear dual for access.
- E.49.3.** Stainless steel or brass valve caps with an inner air seal shall be used.

E.49.4. One mounted spare tire and wheel to match existing tires/wheels to be shipped loose.

E.50. ENGINE: GASOLINE

E.50.1. Minimum – (6.8 liter) displacement.

E.50.2. Must Have a CNG Capable Engine with hardened intake and exhaust valves with hardened intake and exhaust valve seats Ford Option # 91G.

E.51. RADIATOR

E.51.1. Heavy Duty, with factory installed recovery system.

E.51.2. The cooling system must be winterized with ethylene glycol for temperatures to –20 degrees F (-28.8889 C).

E.52. TRANSMISSION

E.52.1. At minimum, heavy-duty 5-speed automatic with overdrive, lock-up converter, lock in park and a heavy-duty auxiliary transmission cooler.

E.53. WHEEL WELLS

E.53.1. The wheel housing shall be of sturdy heavy-duty construction of a minimum 14 gauge galvanized steel or stainless steel and provide ample tire clearance during all operating conditions.

E.53.2. Fender and splash aprons (underskirt) of durable construction shall be provided so as to provide maximum deflection of the wheel splash.

E.53.3. There shall be sufficient clearance to enable easy removal of wheels mounted with inflated tires.

E.54. REAR FENDER FLARES

E.54.1. Must have Rubber or Fiberglass Fender Flares.

E.55. DRIVE SHAFT

E.55.1. Drive shaft must be properly supported, balanced and guaranteed not to vibrate. Each drive shaft shall be equipped with a protective metal guard or guards to prevent whipping through the floor or dropping to the ground in the event of a tube or universal joint failure, or if the drive shaft breaks.

E.56. WHEEL COVERS

E.56.1. Bright Metal Stainless Steel Wheel inserts.

E.57. BRAKES

E.57.1. Two (2) braking systems are required. Service brakes shall be dual hydraulic, disc front and disc rear.

E.57.2. The parking brake system shall be operated by a cable to the rear wheels, or Drive Shaft Drum Brake.

E.57.3. The braking system shall be adequate for the GVWR of the vehicle.

E.58. GEAR RATIO

E.58.1. Must be a 4:56 gear ratio

E.59. FUEL CAPACITY

E.59.1. Must be at minimum of 55 gallons

E.60. FUEL PUMP ACCESS DOOR

E.60.1. An aluminum diamond plate access door shall be provided in the floor of the vehicle above the fuel tank to allow the fuel pump to be serviced without removal of the tank. NOTE: Door must be Large enough and centered over fuel pump to allow easy removal of pump.

E.61. SHOCK ABSORBERS

E.61.1. Must have heavy duty, front and rear shock absorbers.

E.61.2. Rear Shock Absorbers upper mounting brackets Shall Not be Covered by any Body Braces that would prevent easy access to Upper Shock Mounting Bolts and Nuts.

E.62. SUSPENSION

E.62.1. Rear shall have Leaf Springs.

E.62.2. Right rear shall have an extra leaf to compensate for weight of wheelchair lift.

E.63. STEERING

- E.63.1. Must have power-assisted steering
- E.63.2. Must have tilt wheel,
- E.63.3. Must have factory installed cruise control.

E.64. AIR CLEANER

- E.64.1. Must have a heavy duty, dry type air cleaner

E.65. OIL FILTER

- E.65.1. Must have a heavy duty, throw away type oil filter.

E.66. ALTERNATOR

- E.66.1. Vehicle shall have Ford OEM 225-amp Alternator or equivalent.

E.67. BATTERIES

- E.67.1. Two (2) heavy duty, maintenance free, minimum 650 CCA at 0 degrees F (-17.778 C) Batteries must be wired together in a parallel circuit to increase total battery capacity.
- E.67.2. Front OEM battery must have OEM type battery hold down brackets to securely hold battery in place.
- E.67.3. Instep Battery Box that is bolted down securely and must be sealed to keep mud and debris from getting on Rear Coach Battery.
- E.67.4. Battery must be bolted within this instep box. Cloth holds down straps are not ALLOWED.
- E.67.5. Battery box must be sealed to keep mud from getting on batteries. SEE FIGURE 4 & 5

E.68. GROUNDS

- E.68.1. A ground of the battery cable size, shall be installed between the engine and chassis frame.
- E.68.2. The vehicle body shall be properly grounded to the chassis frame at least 2 (two) places.
- E.68.3. Engine and body grounds shall be installed to handle subsystem electrical capacity.
- E.68.4. Grounding wires fastened to the frame shall use a bolt with a nut installed in a proper sized hole with dielectric compound applied to the cleaned surfaces, bolt, and cable end.
- E.68.5. Lift pump motor shall be grounded directly to chassis frame using a cable of the same size as the pump motor feed wire.
- E.68.6. All exterior lights and accessories added by the body manufacture shall be grounded by an in harness ground attached at a fuse panel common grounding point.
- E.68.7. For all ground wire connections paint shall be removed at the grounding point to provide a surface, cable end, bolt, and nut where each positive or grounding cable is attached.

E.69. STABILIZER BAR

- E.69.1. Heavy Duty Front and rear

E.70. HORN

- E.70.1. Must have a dual, electric horn.

E.71. SIGNAL

- E.71.1. Directional and self-canceling with hazard warning flashers.

E.72. TOW HOOKS

- E.72.1. Shall have 2 tow hooks on Rear.

E.73. WINDSHIELD WIPERS

- E.73.1. Minimum two speeds with intermittent feature and washer.

E.74. KEYS

- E.74.1. Vehicle must include three (3) sets of keys for the entire bus.

E.75. RADIO

- E.75.1. Must have an AM & FM CD radio

- E.75.2.** Radio must be of same manufacture as chassis. Radio must be mounted in the Chassis OEM Location in dash.
- E.75.3.** Must have a minimum of six speakers two (2) OEM speakers in front chassis doors. The coach body's four (4) speakers shall be a 3-way standard speakers.

E.76. PAINTING, DECALS AND MONOGRAMS

- E.76.1.** All signs required by State and federal law shall be affixed to each vehicle exterior and interior.
- E.76.2.** It is up to the bus dealer/manufacture to add such signs and decals upon delivery of vehicle.
- E.76.3.** No decals, name plates, or painted identification of the bus dealer/manufacture are to be added to the vehicle.

E.77. UNDERCOATING

- E.77.1.** Floor and wheel housing, anti-rust factory installed.

E.78. WARRANTY REQUIREMENTS

- E.78.1.** The contractor warrants and guarantees to the original Procuring Agency each complete bus and specific subsystem and components for 100% parts and labor as follows:
 - E.78.1.1.** OEM standard factory warranties for chassis and engine.
 - E.78.1.2.** Complete bus body and body structure, exterior, wiring, flooring installation, and paint are warranted to be free from defects, related defects and to maintain structural integrity for a period of Five (5) year or 100,000 miles.
 - E.78.1.3.** Add-on components shall have component manufacture's standard warranty.
 - E.78.1.4.** Warranty shall begin on the date that the vehicle delivery is accepted by the agency issuing the purchase order.
 - E.78.1.5.** The wheelchair lift shall have a five (5) year unlimited mileage and unlimited cycles.
 - E.78.1.6.** The air-conditioning system shall have a minimum 2 years unlimited mileage.
 - E.78.1.7.** The Chassis powertrain should be warrantied for a five (5) years or 100,000 miles.
 - E.78.1.8.** Any parts under warranty must be available and delivered to the purchasing transportation provider or their repair shop within 5 days of the time they requested/ordered them. The bus vendor/manufacture shall bear all reasonable financial costs of shipment of parts.
 - E.78.1.9.** The warranty, as well as any recall notifications, shall cover each vehicle of the ultimate purchaser or recipient agency. The vendor shall provide a copy of any recall notice to the purchasing agency.

E.79. BUS TESTING

- E.79.1.** Certification shall be provided that in accordance with 49 CFR Part 665,
- E.79.2.** Bus Testing, the vehicle either does not need to be tested (with justification specified for exemption) or has been tested at the bus testing facility and a test report is included.

E.80. BUS WATER TESTING

- E.80.1.** The roofs, windows, windshield and all doors of all coaches shall be water tested, as follows:
 - E.80.1.1.** The waster test shall consist of a series of nozzles that are strategically located around the perimeter of the vehicle so as to the nozzles spray water over the entire surface of the vehicle.
 - E.80.1.2.** The nozzles shall eject a volume of water no less than 2.6 gallons per minute under a pressure of no less than twenty-two (22) pounds per square inch measured at the nozzle tip.
 - E.80.1.3.** There shall be no less than twenty (20) nozzles installed in the water test area, each capable of directing a force of water as indicated above.
 - E.80.1.4.** The Vendor/Manufacture shall be required to water test each vehicle, under the conditions set forth above, for no less than five (5) minutes, in order to determine whether or not there are any body leaks at the window areas, door areas, roof panels, etc.
 - E.80.1.5.** The Vendor/Manufacture shall take the necessary corrective action when body leaks are found to exist as a result of the above test, and conduct a second water test to recheck for body leaks following corrective action.

E.81. ALTOONA TESTING

- E.81.1.** Vehicle must be tested in the 7-year/200,000 mile category at the Altoona Bus Testing Facility in Duncansville, PA. And a copy of the full report must be submitted with the Proposal.

E.82. GENERAL

- E.82.1.** All equipment cataloged as standard for the basic vehicle, unless superseded by these specifications, must be furnished and included in the purchase price of each vehicle. Complete printed specifications, published literature, and photos, or illustrations of the basic units that the supplier proposes to furnish with this Proposal must accompany each Proposal.

E.83. QUALITY OF MATERIALS

- E.83.1.** Welding procedures and materials shall be in accordance with standards of the American Society of Testing Materials and the American Welding Society. All visible welds shall be grounded smooth. Where metal is welded, the contact surface shall be free of scale, spatter, and grease and shall be treated to preclude rusting.

E.84. PUBLICATIONS AND PRINTED MATERIALS

- E.84.1.** Each vehicle shall have a complete set of operation, quality assurance, and warranty publications.
- E.84.2.** The information shall be organized in a three ring binder format with each sections clearly identified.
- E.84.3.** As built wiring diagram and as built parts manuals for body and all auxiliary equipment.
- E.84.4.** Maintenance and inspection schedule incorporating the required maintenance and inspection of the basic vehicle and its sub-systems.
- E.84.5.** Operator's manual: A complete operations manual and troubleshooting guide with a detailed manufacturer's parts list that covers the conversion features on the vehicle as listed in this specification. The manual will provide complete, comprehensive instructions for the wheelchair accessories, wheelchair list deployment, air conditioning system, tie downs, heater, deployment of seats, wiring diagram and related equipment.
- E.84.6.** Warranty papers for chassis, body, and additional equipment.
- E.84.7.** Warranty Information: Each vehicle must have a published listing of contractor warranty repair locations, including address, telephone number, and contact names for the State of Oklahoma.

E.85. PRE-AWARD AUDIT

- E.85.1.** The vehicles are not considered delivered to the purchasing agency until the required FTA documents are completed by an ODOT staff member.
- E.85.2.** A Pre-Award Audit shall be conducted to determine if the proposal meets specifications. The Supplier shall submit documents, which include certification of the manufacturer's compliance with the Federal Transit Administration (FTA) Pre-Award Buy America Audit Requirements. The document submitted shall include the following information for each major component used on vehicle:
- E.85.2.1.** Name and address of each supplier.
- E.85.2.2.** Cost of each major component and subcomponent. In order to protect proprietary information, the document may reflect the percentage of total cost each item represents instead of the actual cost.
- E.85.2.3.** Country of origin of each major component and subcomponent.
- E.85.2.4.** Name and address of company where final assembly occurs.
- E.85.2.5.** Cost of final assembly
- E.85.2.6.** Signature of authorized representative of vehicle manufacturer.

E.86. POST- DELIVERY AUDIT

- E.86.1.** A Post Delivery Audit of the vehicle(s) shall be conducted at the purchaser's facility, to determine that the completed vehicle(s) meets specifications. Once this process has been satisfactorily completed, the vehicle(s) shall be considered acceptable.

E.87. ACCESSIBILITY REQUIREMENTS

- E.87.1.** When submitting a Proposal for an accessible vehicle for the disabled, the vendor shall provide a list of the vehicle related equipment illustrating the component cost and related installation charges. The purpose of this list is to reflect an accurate cost for those vehicle related items, which are required to make the vehicle accessible to the disabled.

E.88. ACCEPTANCE OF VEHICLES

- E.88.1.** Upon delivery at the designed location specified within this document the final acceptance will occur after the vehicles have been inspected, road tested and all FTA required post audit delivery requirements have been meet.
- E.88.2.** All vehicles shall be insured by the supplier until the post audit delivery has been conducted at minimum.

E.89. CNG CONVERSION FORD CHASSIS

E.89.1. OEM engine shall be converted to operate on dedicated CNG. A WESTPORT/BAF Cal Comp System or approved equal shall be provided. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional control module will be accepted. Dual fuel systems will not be accepted. System must comply with the following:

E.89.1.1. Closed-loop fuel control

E.89.1.2. Sequential fuel injection (SFI)

E.89.1.3. Optimized ignition timing

E.89.1.4. Must maintain original fault codes (DTCs)

E.89.1.5. Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner

E.89.1.6. CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.

E.89.1.7. The minimum CNG tank capacity on the mini-buses should be 39 Gasoline Gallon Equivalent

E.89.1.8. CNG interlock – Engine will not run when filling CNG tanks.

E.89.1.9. Must provide a detailed floor plan of the placement of the CNG tanks.

E.89.1.10. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

E.90. CNG BIFUEL CONVERSION FORD CHASSIS

E.90.1. OEM engine shall be converted to operate on CNG and Gasoline. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional module will be accepted. System shall be capable of switching between CNG and Gasoline. The Gasoline fuel tank will be installed as per OEM specifications. The system must comply with the following:

E.90.1.1. Closed-loop fuel control

E.90.1.2. Sequential fuel injection (SFI)

E.90.1.3. Optimized ignition timing

E.90.1.4. Must maintain original fault codes (DTCs)

E.90.1.5. Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner

E.90.1.6. CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.

E.90.1.7. The minimum CNG tank capacity on the mini-buses should be 29 Gasoline Gallon Equivalent

E.90.1.8. Must provide a detailed floor plan of the placement of the CNG tanks.

E.90.1.9. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

E.91. DEDICATED PROPANE AUTOGAS INJECTION

E.91.1. The system shall be a Roush CleanTech System or approved equal. The system must be CARB, EPA certified, and OBDII Compliant. The system shall have the following system components:

E.91.1.1. PCM Calibration

E.91.1.2. Billet aluminum high-pressure fuel rail.

E.91.1.3. Appropriate fuel injectors

E.91.1.4. Appropriate fuel lines

E.91.1.5. Appropriate OEM engine prep package

E.91.1.6. Coverage of Five (5) year/ 60,000 mile warranty.

E.91.1.7. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

E.92. DUAL FUEL VEHICLE PROPANE AUTOGAS INJECTION

E.92.1. System shall be a Roush CleanTech System or approved equal.

E.92.2. The system shall be a Roush CleanTech System or approved equal. The system must be CARB, EPA certified, and OBDII Compliant. The system shall have the following system components:

E.92.2.1. PCM Calibration

E.92.2.2. Billet aluminum high-pressure fuel rail.

E.92.2.3. Appropriate fuel injectors

E.92.2.4. Appropriate fuel lines

E.92.2.5. Appropriate OEM engine prep package

E.92.2.6. Coverage of Five (5) year/ 60,000 mile warranty.

E.92.2.7. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

E.93. BACK-UP MONITOR SYSTEM

E.93.1. ASA Voyager AOM562A or approved equal with a 5.6" color LCD screen mounted on rear view mirror OEM Bracket. With a rear mounted outside backup camera and a second inside front mounted camera to view passengers.

E.94. TWO-WAY RADIO SYSTEM UHF

E.94.1. ICOM F6021 UHF two-way Radio System with a PCTEL MUF4505 UHF antenna and coax or approved equal.

E.94.1.1. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

E.94.1.2. Radio must be mounted in an easy accessible location for the driver.

E.94.1.3. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

E.95. TWO-WAY RADIO SYSTEM

E.95.1. ICOM F5021 VHF two-way Radio System with a PCTEL MHB5800 VHF antenna and coax or approved equal.

E.95.1.1. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

E.95.1.2. Radio must be mounted in an easy accessible location for the driver.

E.95.1.3. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

E.96. TWO-WAY RADIO SYSTEM 800 MHZ

E.96.1. Kenwood NX-900K 800 mhz two-way Radio System with a PCTEL MUF8003 antenna and coax or approved equal.

E.96.1.1. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

E.96.1.2. Radio must be mounted in an easy accessible location for the driver.

E.96.1.3. Radio must be programmed with the correct Frequencies and the antenna tuned for agency issuing this purchase.

E.97. DRIVER'S SHIELD

E.97.1. A clear Plexiglas barrier shall be erected behind the driver and extend from the stanchion crossbar behind the driver up to the ceiling.

E.97.2. This shield start at the wall on the driver's left side (close enough to prevent a passenger from reaching through to the driver) and should extend 3 inches past the right side of the driver's seat, but shall not obstruct the view from the rear view mirror.

E.97.3. This barrier shall consist of clear Plexiglas and shall be at least ¼ inch thick.

E.97.4. A 1 ½ inch clearance between the stanchion and barrier should be provided to allow a hand hold on the right side.

E.98. PAINTED LOWER SKIRTS

E.98.1. Paint to purchaser's color specs.

E.98.2. See Figure 2.

E.99. OUTSIDE PASSENGER DOOR SWITCH

E.99.1. Outside keyed electric passenger door switch outside. Switch must be water proof.

E.100. BUS CAMERA SYSTEM

E.100.1. REI Bus-Watch R4001 with 500GB Hard drive and four cameras or approved equal. Successful vendor shall coordinate with the agency issuing this purchase for location of Camera's.

E.100.2. See Figure 3 for camera type and location of cameras.

E.101. FABRIC INSERT ON CEILING

E.101.1. Must match seat fabric and pattern.

E.102. STREET SIDE EXHAUST

E.102.1. Exhaust to be turned out opposite side of Wheel Chair lift

E.103. INTEGRATED CHILD SEAT

E.103.1. Integrated Child Restraint Seat must be a Freedman Seating ICS-10 or equivalent

E.103.2. Must have an integrated 4-point safety harness. for children 22-78 Lbs with under seat retractor seat belts for adults

E.104. VINYL SEATS

E.104.1. This will be a price deduction from the durable transit style level 5 cloth fabrics.

E.104.2. Vinyl deduction is for passenger seats only

E.104.3. Pilot and co-pilot seats shall be durable transit quality level 5-cloth fabric

E.105. PUBLIC ADDRESS SYSTEM

E.105.1. A public address system shall be installed with a hand held microphone.

E.105.2. The system shall include a solid-state amplifier of sufficient power and quality that the operator's voice can be clearly heard without distortion.

E.105.3. The amplifier shall be firmly secured in a protective area.

E.105.4. The PA system shall use the vehicles 6 speakers for sound.

E.105.5. A power switch for the PA system shall be mounted on the dash to provide operation for the inside and amplifier off.

E.105.6. Any noise suppression due to alternator, lighting, engine or other source is required of the contractor.

E.106. PASSENGER SIGNAL SYSTEM PULL CORD

E.106.1. The Stop Request system shall have the following features:

E.106.1.1. Separate provisions for W/C passengers and ambulatory passengers to signal a Stop request.

E.106.1.2. Must uses a yellow pull cord run below the windows for the ambulatory request and a large yellow push pad mounted at least 15" above the floor, but not more than 48". There must be a touch pad per W/C space for the passengers to signal a stop request.

E.106.1.3. The driver should have a means of telling if a W/C passenger has signaled. There must be a Blue dash light to signal a W/C passenger request and a RED light to signal an ambulatory passenger request.

E.106.1.4. The "Stop Request" lighted sign should show if a W/C passenger has signaled; the sign shall be a universal W/C symbol which lights in blue.

E.106.1.5. There shall be an audible signal when a stop is requested and must be able to be heard by the driver.

E.106.1.6. Once the pull cord is pulled, the sign will light, the driver's red light goes on, and a chime sounds. The sign will stay lit until the bus is stopped and the entry door is opened. The system automatically re sets itself

E.106.1.7. When the W/C passenger signals a stop request, the W/C portion of the sign lights, the chime sounds, and the blue light on the dash goes on. The sign will stay lit until the W/C lift is deployed and then stowed and the W/C door is closed again.

E.107. PASSENGER STOP REQUEST SIGNS

E.107.1. Passenger stop request sign must be Transign, or equivalent.

E.107.2. The signs must be back-lighted stop requests and shall be mounted overhead on the front ceiling end closure.

E.107.3. The sign shall be so designated as to remain illuminated when activated (by the passenger signal system) until it is extinguished by opening the door.

E.108. FARE COLLECTION BOX

E.108.1. Fare collection box must be GFI Genfare "Cents a bill" fare box or compatible.

E.108.2. With this option, the mounted fare box will eliminate the front passenger seat and make the bus a 14 passenger.

E.108.3. Also must have the OEM Co-Driver seat covered with same fabric as the other passenger seats shipped loose with the bus. Co-Driver door shall have the same type of running board as driver's door.

E.109. DESTINATION SIGNS

E.109.1. Destination signs must be Twinvision, or equivalent. The automatic electronic destination sign system shall be furnished on the front and on the right side near the front door of the vehicle. Display areas of destination signs shall be clearly visible in direct sunlight and/or at night. The sign system shall provide optimum visibility of the message display units for passengers and shall meet applicable ADA requirements defined in 49 CFR, Part 38.39. Destination signs shall be installed in such a manner as to facilitate easy access for replacement of the entire sign assembly, or components such as fluorescent lamps/LED's and electronic control modules, from inside the bus within 30 minutes by a mechanic. Lamps and associated parts shall be commercially available.

E.109.2. Destination messages, route designations, and public relations messages shall be independently selectable via a single Operator's Control Panel (OCP) which shall include a display monitor. The OCP display monitor readout shall show the exact information displayed on the destination signs. The OCP shall be conveniently located for the bus operator and mounted in such a manner that will not pose any safety hazard. The OCP shall utilize a durable weatherproof keypad with tactile feel for destination message control functions.

E.109.3. The destination sign system shall be capable of programming 10,000 message lines. The number of public relations messages shall be limited only by the remaining number of message lines not used for destination purposes. Sign displays shall have alternating message capability with programmable blanking time between message lines as may be required. Variable blanking times shall be programmable between 0.5 to 25 seconds in duration. Each line message or blanking time for each message shall be individually programmable. The message display units shall incorporate an automatic blanking feature that will cause the display area to blank within 30 seconds of the bus master power switch being turned off.

E.109.4. An emergency message shall be initiated by the closure, or opening, of a dry contact switch or relay. The emergency message shall be displayed on the exterior of the bus only. The OCP shall not display the emergency message. The destination sign shall automatically resume normal operation when the remote emergency switch is returned to its normal position.

E.109.5. Destination Sign Programming: The electronic sign system shall be programmable via an integral connector located in the front destination sign area. Software shall be furnished for programming the sign system via an IBM-compatible, laptop computer. Software shall be capable of providing a high degree of flexibility to create, or select preprogrammed, fonts and graphic displays. The sign shall have the capability of being programmed in the field using a PC or field programmer. Message program information shall be transferable to and/or from the field programmer device as specified by the transit system in attachments to Part 5: Technical Specifications.

E.109.6. The destination sign compartments shall be designed to prevent condensation and entry of moisture and dirt. Additional provisions shall be included, if necessary, to prevent fogging of both destination sign compartment window and glazing on unit itself. Access shall be provided to allow cleaning of inside of destination sign compartment window and unit glazing.

E.109.7. A complete listing of destination sign readings for initial sign programming by the manufacturer are provided in attachments to Part 5: Technical Specifications.

E.109.8. Front Signs

E.109.8.1. Sign Size

E.109.8.1.1. A 16 Row by 148 Column Spectrum Route Multi-Color Sign that shall have no less than 3,264 LEDs with a message display area of not less than 8.0 inches high by not less than 64.6 inches wide. The LEDs displays shall consist of red-blue-green LEDs and amber colored LEDs. The color LEDs shall be rated by their manufacturers for a life expectancy of 50,000 hours to 100,000 hours and shall support up to 27 colors.

E.109.8.2. Sign Readability

E.109.8.2.1. The destination message shall be readable by a person with 20/20 vision from a distance of 250 feet. The sign shall have an equal readability at 65 degrees on either side of the line perpendicular to the center of the mean plane of the display. The entire display area of all signs shall be clearly visible and readable both in direct sunlight and at night.

E.109.9. Side Signs

E.109.9.1. Sign Size:

E.109.9.1.1. An 8 Row by 96 Column Spectrum Route Multi-Color Sign that shall have no less than 768 LEDs with a message display area of not less than 2.8 inches high by not less than 36.3 inches wide. The LEDs shall be rated by their manufacturers for a 100,000-hour life expectancy.

E.109.9.2. Sign Readability:

E.109.9.2.1. The destination message shall be easily read from the sidewalk level. The entire display area of all signs shall be clearly visible and readable both in direct sunlight and at night.

E.110. SYSTEM CONTROL CONSOLE – OPERATOR DISPLAY AND KEYBOARD

E.110.1. The system control console shall be used to view and update display messages. The system control console shall utilize a 28-key conductive rubber pad keyboard with tactile feel, designed especially for the harsh transit environment or approved equal.

The system control console shall contain a 16 x 128 pixel vacuum fluorescent display. The system control console shall contain an audio annunciator that beeps to alert the operator to view the display for a message, or beeps indicating that a key is depressed. The system control console shall continuously display the complete message associated with the selected destination code.

E.111. MEMORY TRANSFER

E.111.1. The sign system shall be reprogrammable through the system control console by either a PCMCIA flash card or a Memory Transfer Unit.

E.112. EMERGENCY MESSAGE DISPLAY

E.112.1. If required, a special emergency message can be activated by a switch. This message shall be displayed on signs, facing outside the vehicle, while the signs inside the vehicle, including the system control console, remain unchanged. The emergency message shall be canceled by entering a new destination code or by removing the emergency signal.

E.113. PROGRAMMING

E.113.1. A programming software package shall be furnished to generate message lists for the destination sign system. A PCMCIA flash memory card having a minimum of 8 megabytes of memory shall be provided to facilitate bus system programming. The software must be compatible with Windows NT, Windows 2000, Windows XP, Windows Vista and Windows 7

The programming software shall use techniques that require minimal operator training and that are intended for use by operators that are not trained in complex computer operations. All operator screens shall utilize pull down and pop-up menus.

E.114. BICYCLE RACKS

E.114.1. Manufacturer/model should be Sportworks DL-2 or equivalent.

E.114.2. Racks must have a 2 (two) bike capacity, and follow the specs noted below.

E.114.2.1. The bike rack must meet OSHA requirements for lifting by a single individual and be capable of being raised or lowered with one hand

E.114.2.2. The bike rack must accommodate all bicycles with wheels 16" (for example, the Dahon folding bicycle series) or larger diameter, excluding tandems and recumbent type bicycles. The rack must accommodate all bicycles 80" and longer.

E.114.2.3. The bike rack frame must be manufactured with 304 stainless steel tubing with a minimum wall thickness of 0.125 in., outside corners to be rounded, pinch joints minimized and welds smoothed.

E.114.2.4. All nuts, bolts and washers shall be either AISI Type 304 stainless steel or Grade 8 yellow zinc plated steel

E.114.2.5. The bike rack must be mounted to the front of the bus and accommodate two (2) bicycles. In the stowed position, folded up against the front of the bus, it shall protrude no more than 8" from the front bumper. The protrusion shall be no more than 36" when deployed.

E.114.2.6. The latching mechanism must automatically lock the bike rack in the stowed and deployed positions.

E.114.2.7. The bike rack, when stowed, shall not interfere with any access panels/doors, windshield wipers or driver vents.

E.114.2.8. The bike rack shall be designed for loading and unloading from the front, curbside, of the bus. The securement can only contact the bicycle's tires as to not do any damage to the bicycle's frame. The bike

rack shall have a positive securement with a four (4) point locking system, contacting the wheel in such a way that greater than half the circumference of the wheel is captured. Straps, cords, and/or springs shall not be required to secure a bicycle.

- E.114.2.9.** The carrier shall not interfere with the ability of the driver to safely operate the vehicle. This includes, but is not limited to, the obstruction of the windshield view and the operation of the windshield wipers, turn signals, and headlights.
- E.114.2.10.** The carrier shall be compatible with automated bus washing systems and shall be capable of repeated use with automated washing equipment without sustaining damage to the carrier, vehicle, of the washing equipment. The carrier shall be designed as not to accumulate water internally.
- E.114.2.11.** The use of this rack shall not affect route scheduling. The bike rack shall have a design capability of being loaded or unloaded in 20 seconds or less.
- E.114.2.12.** The mounting bracket/ pivot plate assembly must be designed to fit all urban transit buses, both standard floor and low floor.
- E.114.2.13.** The bicycle rack shall be warranted against defects in materials and workmanship for a period of one (1) year from date of installation.
- E.114.2.14.** The bicycle rack manufacture is required to furnish all the complete parts and service (maintenance) books.
- E.114.2.15.** The bicycle rack should have a latching system in both positions, stowed and deployed; this will need to be explained in detail
- E.114.2.16.** The racks should be in a friendly design and a tire only mount.
- E.114.2.17.** The mounting brackets should be detailed at to what bus needs with brackets.

E.115. PRODUCT STANDARDS

- E.115.1.** Only first quality materials, workmanship and finish shall be acceptable.

All general materials and workmanship shall be guaranteed to be free of defects for a minimum of at least one (1) year from date of installation except as noted below. Any defects shall be rectified or replaced to meet specifications at the expense of the manufacturer, including freight, parts and labor.

Any exposed fasteners shall be colored to match the finish of the framework components.

E.116. SPARE PARTS

- E.116.1.** The contractor will provide pricing and the delivery time on the available spare parts for each bicycle rack and maintain adequate stock levels.

E.117. DELETE COPILOT DOOR, SEAT AND B PILLAR

- E.117.1.** This Moves the Passenger door from the coach Body to the chassis cab section. This delete's the Copilot door; seat and B pillar section of the cab. This will add 2 seats positions in Coach Body.

E.118. DELETE ALTRO CHROMA FLOORING

- E.118.1.** This delete's the Altro Chroma Floor covering to install the Gray RCA Rubber Transit-Flor. The step well, entrance area, and center aisle floor area shall be overlaid with ribbed, slip resistant, oil resistant commercial 3/16" step tread thickness. The 1/8" thickness flooring under the seats and in the wheelchair area shall be smooth, slip resistant, and oil resistant. The flooring shall extend up the sidewall and rear wall to the seat rail line and shall be coved at the floor/wall joint to form a smooth water-tight transition. Flooring adhesive shall be oil resistant.

E.119. DELETE YELLOW POWDER COAT ON HANDRAILS

- E.119.1.** This delete's the yellow powder coating on the stainless steel handrails, grab handles and stanchions. They will be the natural brushed Stainless steel Color.

E.120. 100% NIDA-CORE[®] STRUCTURE OR APPROVED EQUAL:

- E.120.1.** Resin Hardened Nida-Core[®] or approved equal Polypropylene Copolymer honeycomb (1" thickness, minimum) Throughout 100% of the entire body structure, walls, roof, front and rear caps must be used instead of Honeycomb Paper Vertical. This is to eliminate any possibility of rotting in any area of the body structure.

E.121. COMPOSITE FLOOR

- E.121.1.** Composite Space-age Synthetics Thermo-Lite Board-Tough Series or approved equal Floor that will not rot and is lighter than the standard marine grade plywood floor.

E.122. SIDE DOOR SLIDE OUT BATTERY TRAY

E.122.1. Must have an Extra Heavy Duty Stainless Steel slide out Battery Tray for all auxiliary batteries mounted under Bus. Battery Box must have OEM type battery hold down brackets to securely hold batteries in place. Cloth hold down straps is not ALLOWED. Battery box must be sealed to keep mud from getting on batteries.

E.123. DIESEL ENGINE

E.123.1. Current Power plant for the make and model of chassis

E.124. REAR SPARE TIRE HOLDER

E.124.1. A rear spare tire holder that shall be affixed to the vehicle in a way to allow easy removal of spare tire.

E.125. ADJUSTABLE REAR SUPSENIOR SYSTEM

E.125.1. System shall be a MOR/ryde suspension system or equal shall be used with the following:

E.125.1.1. Installed as per the manufactures recommendations.

E.125.1.2. Fully adjusted for each bus installed on.

E.125.1.3. Warranty to be a 5 year 100,000 mile.

E.126. MEMO/PAMPHLET RACK

E.126.1. The memo/Pamphlet rack will be bolted to inside side wall of bus. (See Figure 6)

E.127. TDSS FOLD AWAY SEAT

E.127.1. Seat will be bolted to structural steel. (See Figure 7)

E.128. METAL BOX

E.128.1. Metal box should be bolted and placed between the passenger and driver's seat. (See Figure 8)

E.129. SEAT BELT EXTENSIONS

E.129.1. Extra Seat belt Extensions

SECTION "E"

24' 15 Passenger Metal Bus

RESPONSE SHEET

BASE VEHICLE COST PER UNIT

BASE VEHICLE	COST PER UNIT
TRANSIT BUS (GAS ENGINE)	\$

CHASSIS SPECIFICATIONS

Specify Overall Vehicle Length (outside of front bumper to outside of Rear bumper): _____

SPECIFICATIONS	MINIMUM/MAXIMUM IN INCHES	SUPPLIER'S RESPONSE
OVERALL VEHICLE LENGTH	282" minimum	
OVERALL VEHICLE LENGTH	307" maximum	
WIDTH EXTERIOR	95" minimum	
WIDTH INTERIOR	91" minimum	
HEIGHT EXTERIOR	105" minimum	
HEIGHT EXTERIOR	124" maximum	
HEIGHT INTERIOR	75" minimum	
WHEELBASE	176" minimum	
WHEELBASE	190" maximum	

AIR CONDITIONING

Make and Model of Rear A/C Unit and Cooling Capacity of rear Unit BTU's/Hr. Include literature on unit being proposed.

MAKE/MODEL	
BTU/HR OF REAR UNIT ONLY	

HEATING

MAKE/MODEL	
BTU/HR OF REAR UNIT ONLY	

OPTIONAL ITEMS

COST

OPTIONAL ITEMS	COST PER ITEM
CNG CONVERSION CHASSIS	
CNG BIFUEL CONVERSION CHASSIS	
PROPANE DEDICATED CONVERSION	
PROPANE DUEL FUEL CONVERSION	
BACK-UP MONITOR SYSTEM	
TWO-WAY RADIO (UHF)	

TWO-WAY RADIO (VHF)	
TWO-WAY RADIO (800 MZ)	
DRIVER'S SHIELD	
PAINTED LOWER SKIRTS	
OUTSIDE PASSENGER DOOR SWITCH	
BUS CAMERA SYSTEM	
FABRIC INSERT ON CEILING	
STREET SIDE EXHAUST	
INTEGRATED CHILD SEATS	
VINYL SEATS (PRICE DEDUCTION)	
PUBLIC ADDRESS SYSTEM	
PASSENGER SIGNAL SYSTEM PULL CORD	
PASSENGER STOP REQUEST SIGNS	
FARE COLLECTION BOX	
DESTINATION SIGNS	
BICYCLE RACKS	
DELETE ALTRO CHROMA FLOORING (PRICE DEDUCTION)	
DELETE YELLOW POWDER COATING ON HANDRAILS, GRAB RAILS, AND STANCHIONS (PRICE DEDUCTION)	
100% NIDA-CORE STRUCTURE	
COMPOSITE FLOOR	
SIDE DOOR SLIDE OUT BATTERY BOX	
DIESEL ENGINE	
REAR SPARE TIRE HOLDER	
ADJUSTABLE REAR SUSPENSION SYSTEM	
MEMO/PAMPHLET RACK (See Figure 6)	
FREEDMAN SEATING TDSS (OR EQUIVALENT) FOLD AWAY SEAT (See Figure 7)	
METAL BOX (See Figure 8)	
EXTRA SEAT BELT EXTENSIONS	

A LIST OF OPTIONAL EQUIPMENT AND/OR ACCESSORIES SHALL BE PROVIDED. THE LIST MUST CONTAIN

- Item
- Description and functionality detail
- Cost of item installed in final delivery of vehicle
- Any changes to listed specifications as outlined above to accommodate options

PROPOSAL EXCEPTIONS

Supplier must list any exceptions here to be used as a part of the Proposal evaluation and analysis. Please list the roman numerical on the standard specs or the number for the options when listing any Proposal exceptions.

FIGURE 1

Figure 1

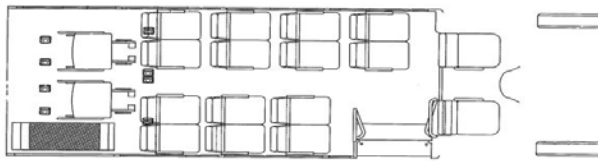


FIGURE 2



FIGURE 3

Figure 1

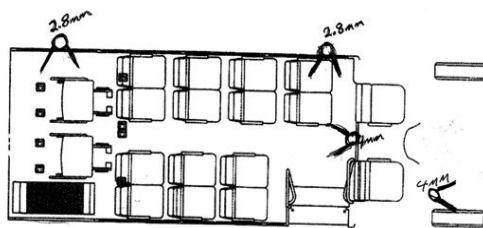


FIGURE 4



FIGURE 5



FIGURE 6



FIGURE 7

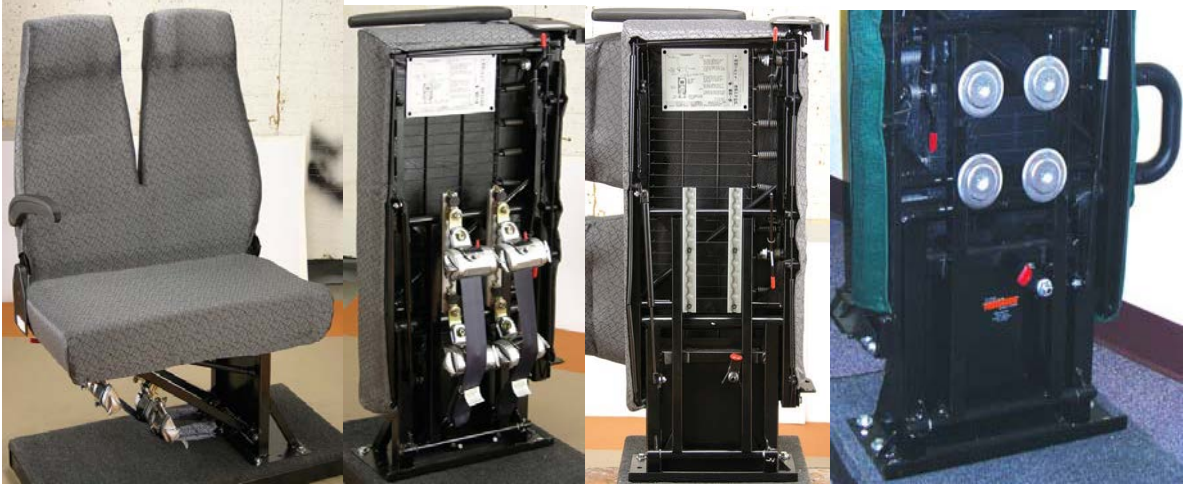


FIGURE 8



F. SOLICITATION SPECIFICATIONS FOR 24' 20 PASSENGER, FRONT LIFT COMPOSITE TRANSIT VEHICLES

F.1. DELIVERY:

- F.1.1.** Vehicle must be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following:
- F.1.1.1.** The vehicle must have a full tank of fuel when delivered.
 - F.1.1.2.** Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
 - F.1.1.3.** All parts added, as part of the modification process shall be new.
 - F.1.1.4.** Headlights properly aligned
 - F.1.1.5.** Engine Tuned
 - F.1.1.6.** All accessories properly adjusted
 - F.1.1.7.** Electrical, braking and suspension systems inspected
 - F.1.1.8.** Both batteries Charged
 - F.1.1.9.** Front-end alignment must be done after body is put on chassis. Chamber, caster and toe must be adjusted to the center of OEM specs. Ford chassis buses must have adjustable caster, camber bushings installed. Standard OEM bushings will not be accepted. Each bus must come with documentation stating before and after actual alignment readings of bus.
 - F.1.1.10.** All wheels balanced, including spare
 - F.1.1.11.** All lubricants checked, and greased if needed
 - F.1.1.12.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
 - F.1.1.13.** Warranty papers and owner's guide
 - F.1.1.14.** Exterior and interior cleaned and washed.
 - F.1.1.15.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.
 - F.1.1.16.** Under no circumstances are tow vehicles to be attached to any buses.
 - F.1.1.17.** Each vehicle must be delivered to the agency submitting the P.O.

F.2. CERTIFICATE OF ORIGINS

- F.2.1.** Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order five business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery is not acceptable.

F.3. NOTIFICATION

- F.3.1.** Vendor shall notify buyer of vehicle delivery ten business days prior. NOTE: If these specifications contradict any listed in the Federal Regulations, they are superseded by those of the Federal Regulations.

F.4. NO PROTOTYPES

- F.4.1.** Must be a Current production Model, B Pillar type bus that has been in Production for a minimum of one year.

F.5. BODY STRUCTURE

- F.5.1.** Fiberglass Reinforced Plastic (FRP) Composite Unitized-type Body
- F.5.2.** The bus body shall have a heavy-duty unitized structure and shall be of durable fiberglass reinforced plastic (FRP) composite construction. All the body panels shall consist of an exterior high gloss gel coat (.020" thickness, minimum) on a resin-hardened FRP (.125" thickness, minimum) attached to a center layer of
- F.5.3.** Resin Hardened Nida-Core[®] or approved equal Polypropylene Copolymer Honeycomb (1" thickness, minimum) must be used in all high moisture areas around the fuel fill cutout, fender flare cutout, front to back of the bus at floor level to keep any road splash from degrading the structure on both driver and pass sides, roof hatch cutout,

rear window cutout and lift door area. Resin Hardened Paper Vertical Honeycomb (1" thickness, minimum) can be used in all other non high moisture locations.

- F.5.4.** Steel perimeter and transverse supports, completely fiber glassed to adjoining body parts. It shall use proper adhesive materials to adequately bond and mechanically fasten all joints and points of stress with sufficient strength to comply with the FMVSS 220 rollover protection test. Each supplier shall provide certification with the Proposal that the bus as proposed meets or exceeds FMVSS 220 and FMVSS 221 requirements.
- F.5.5.** All exterior side and roof panels when completed shall be at a minimum 1 1/8" thick. Bond lines at the side walls, rear end cap, roof, and front cap shall be interlocked by adhesives, resin saturated fiberglass matting, and mechanical fasteners, forming a unibody design without exposed fasteners or protruding moldings. Imbedded reinforcements equal to the structural members of the body shall be installed at all door openings in order to support door mounting hardware and door operating mechanisms. All door openings shall have full structural framing to maintain integrity of the body structure. **All door frame structure's including wheel chair door frame shall be made of 304 Grade stainless steel powder coated OEM white.**
- F.5.6.** Interior panels may be an integral part of the FRP composite panel or may be made of scuff-resistant laminate/FRP finished material. Molded ABS may be used as trim but not for interior panels. Where threaded fasteners are in the trim/interior panel only, an imbedded reinforcing nut or a reinforcing steel panel shall be integrated into the FRP composite for added strength and fastener retention.
- F.5.7.** Where self-tapping fasteners are used in body panels, the body panels shall have an imbedded reinforcing nut or a steel reinforcing panel shall be integrated into the FRP composite for added strength and fastener retention.
- F.5.8.** Window openings cut into body panels shall have a maximum frame clearance of 1/8" on each side, to minimize the need for caulking. All openings cut into body exterior panels must have the exposed edges of the cutout properly coated to prevent moisture intrusion before further assembly or painting occurs. Steel window frames in the body shall be Zinc Dipped to prevent corrosion and windows shall be properly caulked/sealed to prevent intrusion of moisture and dust.
- F.5.9.** Fiberglass Roof must be a one piece molded unit that has molded sides to connect to side walls. Bending a flat sheet of fiberglass to connect to walls is NOT ALLOWED.

F.6. OEM CHASIS FRAME

- F.6.1.** The rear overhang, measured from the center of the rear axle to the outer edge of the rear bumper, cannot exceed 1/3 of the overall vehicle length.
- F.6.2.** Further, ODOT will not allow re-certification of the chassis OEM GVWR and GAWR.
- F.6.3.** Any vehicle that exceeds the OEM GVWR and/or GAWR will not be accepted. NOTE: Supplier must provide detailed documentation if chassis modification must be made to accommodate length of wheelbase from OEM. This documentation shall include, but not limited to type of modification, frame supports, out sourcing of frame work, drive shafts, or quality control.

F.7. DOORS

- F.7.1.** Passenger Entry Door: Passenger entry door must have a Two (2)-panel door design providing a minimum 32"X 80" clear opening. A&M door actuator, or equivalent.
 - F.7.1.1.** Door is located in coach body and electrically power operated controlled by the driver.
 - F.7.1.2.** Each door panel shall be actuated together by a single electric powered overhead actuator.
 - F.7.1.3.** Actuator is equipped with an emergency manual release lever.
 - F.7.1.4.** Vertical door shafts shall be an integral part of the door panels.
 - F.7.1.5.** The top portion of the shaft shall be designed to prevent door panels from rotating out of alignment.
 - F.7.1.6.** Shafts shall pivot on a top-mounted, bronze thrust bushing and a lower stud-mounted alignment pivot, accommodated with a glass-filled molded bearing equal to A&M door actuator, or equivalent.
 - F.7.1.7.** Perimeter door edges shall be sealed with neoprene 2" leading edge seals.
 - F.7.1.8.** Seals shall overlap front and rear to provide an air and watershed.
 - F.7.1.9.** Upper and lower edges of doors shall be tightly sealed against entrance of air drafts and water, including spray from vehicle washing.
 - F.7.1.10.** Operating controls should be located within easy reach of the driver.

F.8. PASSENGERS DOOR INTERLOCK

- F.8.1.** Electric Passenger door in coach body will only work when transmission in Park.

F.9. WHEELCHAIR LIFT DOORS

- F.9.1.** A double door entrance shall be provided on the right (curb) side of the vehicle in front of the vehicle's rear wheels.
- F.9.2.** The door opening shall be at minimum width of 48" and height of 70" to accommodate the wheelchair lift specified within this document.
- F.9.3.** Clearance between the top of the door opening and the raised lift platform shall be a minimum of 68".
- F.9.4.** Each door shall be equipped with an A.L. Hansen Type 23 Door Check or equivalent which is a Top Mounted Spring Loaded Device that will securely hold the door in the open position while the wheelchair lift is in operation. (Sliding door is not acceptable).
- F.9.5.** Each door must have a window which shall be the same height as the passenger windows.

F.10. COACH BODY DOOR LOCKS

- F.10.1.** All doors shall be equipped with a lock.

F.11. DRIVER'S DOOR AND CO-DRIVER'S DOOR

- F.11.1.** Must have Power windows, Power door locks

F.12. RUNNING BOARDS

- F.12.1.** Extra Heavy-duty Running Boards that are bolted to Coach Body for added step strength
- F.12.2.** Steps must be able to hold over 400lbs.

F.13. HANDRAIL

- F.13.1.** Handrails (left and right) of the front passenger door shall be provided. Cross-sectional diameter of handrail shall be between 1 ¼" and 1½".
- F.13.2.** Entrance handrails shall not be padded.
- F.13.3.** Must have at minimum a wall thickness of 18 gauge steel.
- F.13.4.** Two overhead ceiling-mounted handrails with mounting brackets at 24" on centers placed over the aisle shall be provided for the full length of the vehicle's passenger aisle way, except in wheelchair lift area and over passenger entry door.
- F.13.5.** All handrails must be Powder coated Steel that will not rattle or Flex and mounting bolts shall be bolted into Structural steel.
- F.13.6.** Color of Handrails shall be bright yellow (to assist the visually impaired),
- F.13.7.** **Wood mounting** is not allowed.

F.14. GRAB RAILS

- F.14.1.** Must have grab rails with the following:
 - F.14.1.1.** Shall be installed in the entrance to the vehicle running parallel to the steps in a configuration which allows persons with disabilities to grasp while entering or exiting the vehicle.
 - F.14.1.2.** Cross-sectional diameter of grab rail shall be between 1 ¼" and 1½"
 - F.14.1.3.** Must be at minimum a wall thickness of 18 gauge steel.
 - F.14.1.4.** All Grab rails must be Powder Coated Steel that will not Rattle or Flex and mounting bolts shall be bolted into Structural steel.
 - F.14.1.5.** Color of grab rails shall be bright yellow (to assist the visually impaired).
 - F.14.1.6.** **Wood mounting** is not allowed.

F.15. STANCHIONS

- F.15.1.** Must be at minimum a wall thickness of 18 gauge steel.
- F.15.2.** All stanchions must be Powder Coated Steel that will not Rattle or Flex and mounting bolts shall be bolted into Structural steel.
- F.15.3.** **Wood mounting** is not allowed.
- F.15.4.** Color of stanchions shall be bright yellow (to assist the visually impaired),
- F.15.5.** A stanchion and vinyl padded modestly panel shall be provided at entrance door in front of first passenger seat.

- F.15.6.** A stanchion from the floor to roof shall be installed on the interior left side of the front passenger door approximately 14 inches inside the vehicle.
- F.15.7.** A horizontal handrail shall be installed between the stanchion and the right wall approximately 30 inches above the floor.
- F.15.8.** A stanchion shall be located in the rear of the driver's seat at the edge of the aisle and a handrail shall extend from the stanchion to the side wall of the vehicle behind the driver's seat.
- F.15.9.** The stanchion shall not interfere with a rearward travel of the driver's power seat adjustment.

F.16. MODESTY PANEL

- F.16.1.** A modesty panel shall be positioned at the rear edge of the step well.
- F.16.2.** This will be made up of a stanchion at the inner rear corner of the step well with a rail running from that stanchion to the wall at windowsill height and the modesty panel installed therein.
- F.16.3.** Panel shall have no less than 1 ½" between the bottom of the panel and the floor to facilitate cleaning of the floor.
- F.16.4.** Fastening of the panel shall be by bolt and nut type system.
- F.16.5.** **Screws** will not be acceptable.

F.17. STEPWELL

- F.17.1.** Must be made of minimum 14 gauge 304 Stainless steel to prevent rusting and powder coated white.
- F.17.2.** Must have two steps covered with the same slip resistant floor covering as specified within this document.
- F.17.3.** maximum 12" minimum 10" from ground to first step,
- F.17.4.** 9" riser, Tread depth minimum 8½".
- F.17.5.** All steps to get up to floor level must be in step well area.

F.18. INTERIOR

- F.18.1.** **All interior panels shall have** AZDEL SuperLite backing or equivalent behind vinyl coated metal, FRP or Federal Foam or equivalent.
- F.18.2.** Vendor shall provide a list of available colors at their quoted price and may also include a list of colors available at additional cost.
- F.18.3.** Interior shall be trimmed with an attractive molding, covering all seams.
- F.18.4.** All surfaces and items or hardware in passenger compartment having sharp edges, corners, or angles that could cause injury shall be passed with heavy-duty vinyl covered foam-type material.
- F.18.5.** Door and instrument panel is to be painted or otherwise finished to match overall tones of interior panels

F.19. DRIVERS AREA

- F.19.1.** The drivers area shall consist of an ergonomically designed molded dash console, located conveniently to the driver's seated position and in full view of the driver.
- F.19.2.** Supplemental control panels mounted above the driver's head or above windshield are not accepted.
- F.19.3.** All switches are to be properly labeled and illuminated.
- F.19.4.** The instrument control panel shall be painted or otherwise finished with non-reflective, anti-glare black finish.

F.20. STORAGE COMPARTMENT

- F.20.1.** Vehicle must have a large overhead driver storage compartment.
- F.20.2.** This compartment must have a lip on the inside to protect objects from opening compartment door. Also shall provide easy access to clearance lights connectors through top of Storage Compartment. And provide a door latch to hold door open.

F.21. FLOOR ASSEMBLY

- F.21.1.** **The floor shall consist of** 3/4 inch Marine Grade Plywood with edge undercoating.
- F.21.2.** Construction of sufficient strength and support to not allow flexing of the finished or surface floor. The chassis, body and flooring shall be attached in such a manner as to act as one unit without any movement or flexing at the joints.
- F.21.3.** Shall have Floor Coving material at wall.

F.22. SLIP-RESISTANT FLOOR COVERING

- F.22.1.** Floor covering shall be slip resistant vinyl flooring, constructed with aluminum oxide, silicon carbide and optional PVC chip blended throughout a high quality vinyl wear surface.
- F.22.2.** **Top coating** is not acceptable.
- F.22.3.** Backing to be polyester/cellulose material with fiberglass fiber reinforced center scrim for additional durability.
- F.22.4.** Bacteriostats will be incorporated providing all exposed surfaces with excellent anti-bacterial properties.
- F.22.5.** **Must be** Altro Chroma with a minimum thickness of 2.2 millimeters or equivalent
- F.22.6.** Color to be selected from current Altro color range by each agency.
- F.22.7.** The whole floor will be a uniform thickness throughout the vehicle, eliminating the need for ribbed surfaces, while exceeding the ADA minimum slip resistance standard rating of .06 static coefficient of friction under dry or wet conditions.
- F.22.8.** Coving material is to be installed to support floor when rolling floor covering up the sidewall of vehicle to the seat track.
- F.22.9.** Seams must be heat welded to provide a permanent waterproof seal against water penetration leading to premature sub-floor failure or curling leading to possible tripping hazards.
- F.22.10.** Landing area and step edgings are to be Altro yellow safety vinyl edging.
- F.22.11.** Edging is to heat welded to the main floor and step tread to provide for a long lasting seam.
- F.22.12.** The floor must be installed according to manufacturer's directions using proper tools, accessories and adhesives.
NOTE: If the flooring is not installed according to the flooring manufacture (heat welded and adhesives) specifications the bus will not be accepted.

F.23. GAUGES

- F.23.1.** Vehicles shall be equipped with the following needle-type gauges (lights in lieu of gauges are not acceptable): and all shall be in easy view of driver.
- F.23.2.** If OEM gauges are not available then Stewart Warner gauges or equivalent shall be used.
 - F.23.2.1.** OEM chassis Voltmeter Plus a Auxiliary Voltmeter Gauge
 - F.23.2.2.** Oil pressure
 - F.23.2.3.** Temperature
 - F.23.2.4.** Fuel level
 - F.23.2.5.** Speedometer
 - F.23.2.6.** Odometer
 - F.23.2.7.** Tachometer
 - F.23.2.8.** Engine hour meter

F.24. BUMPERS

- F.24.1.** Front and rear bumpers shall be securely fastened to the chassis frame to adequately absorb shock from impact. In no case are the bumpers to be fastened directly to the vehicle body.
- F.24.2.** Rear bumper must be an energy absorbing Romeo Rim with Heavy Duty bumper mounting brackets that use four 7/16 grade 8 bolts per bracket or equivalent.
- F.24.3.** Front bumper and grille shall be chrome plated.

F.25. INSULATION

- F.25.1.** Insulation shall be provided in both walls, roof, front cap, rear wall and roof side radius area where roof meets walls.
- F.25.2.** Adequate insulating properties shall be provided to ensure minimum heat, cold and noise penetration into the vehicle interior.
- F.25.3.** Insulation may be accomplished through the use of fiberglass, vacuum design or equivalent.
- F.25.4.** Must have a minimum R-value of 6, and fire resistant.

F.26. AIR CONDITIONING

- F.26.1.** Air conditioning efficiency is of paramount concern to the purchaser. Air conditioning shall be adequate to cool both the passengers and driver areas. Only vehicles offering top of the line commercial transit type air conditioning systems will be considered.
- F.26.2.** The vehicle's electrical system shall be designed and integrated such that ample electrical supply is provided to maintain optimum air conditioning performance without battery discharge.
- F.26.3.** The air conditioning system offered shall have a proven transit performance record and shall be provided by a nationally recognized manufacturer of bus air conditioning.
- F.26.4.** The OEM Dash unit and Rear Air Conditioning unit shall be two separate stand alone systems. Tying into the front OEM dash system is not allowed.
- F.26.5.** Rear evaporator shall have an easy accessible return air filter; having to remove evaporator cover housing to gain access to filter will not be accepted.
- F.26.5.1.** The rear air conditioning system shall provide a minimum cooling_capacity of 65,000 BTU/Hr.
- F.26.5.2.** A Carrier model AC-833MAX System or equivalent. The Combined Total cooling Capacity of the OEM dash unit and Rear Unit shall be a minimum of 78,000 BTU/hr.
- F.26.5.3.** Rear Evaporator shall have an easy accessible return air filter; having to remove the evaporator cover housing to gain access to filter will not be accepted.
- F.26.6.** The Rear A/C System must have the following specified components.
- F.26.6.1.** Carrier EM-3 Evaporator or equivalent
- F.26.6.2.** Carrier CM-3 Condenser or equivalent
- F.26.6.3.** Carrier TM-21 Compressor or equivalent
- F.26.6.4.** Carrier Flex CLICK SAE J-2064 Type E Color coded hoses or equivalent.
- F.26.6.5.** Service Ports for rear Air conditioning System must be easily accessible and located under the bus near the rear A/C Condenser.
- F.26.7.** A conventional dash mounted unit for the front of the driver's area of the vehicle. Both units shall be equipped with multi-speed fans (minimum 2 speeds).
- F.26.7.1.** Evaporator fans shall produce a minimum of 1600 CFM.
- F.26.8.** The Rear system shall include a skirt mounted commercial condenser. Condenser fan(s) shall produce a minimum of 2400 CFM of airflow over the coils. All components of the condenser unit shall be coated or constructed with a corrosion resistant material to protect the unit from road salts other foreign substances that might be sprayed on the unit.
- F.26.8.1.** Condenser unit shall be positioned so as not to draw air from under vehicle. NOTE: Air conditioning refrigerant lines, to include their foam covering, will not be exposed to road hazards or elements of the weather. All air conditioning refrigerant lines, which extend from the engine area to the rear evaporator, shall be protected from damage. And all drain lines, hoses and wiring from evaporator shall be covered from view.
- F.26.9. VENTILATION:**
- F.26.9.1.** Vents provided in driver area.
- F.26.10. HEATING:**
- F.26.10.1.** Front & rear heater core factory installed hot water type, of sufficient capacity to warm cabin area and clear windows of snow, ice and fog.
- F.26.10.2.** An easily accessible clearly marked shut-off ¼ turn ball valves shall be installed in heater supply and return lines which will allow the water to be cut off to the rear heater core.
- F.26.10.3.** The water lines for the rear heater core shall be protected from damage.
- F.26.10.4.** Rear heating unit shall provide a minimum of 65,000 BTU's/Hr. this is in addition to front dash unit. State BTU/HR of rear heating unit you are proposing.

F.27. SAFETY EQUIPMENT

- F.27.1.** All miscellaneous equipment must be secured to the vehicle and easily accessible.
- F.27.2.** First aid kit: (24M – National Standard School Bus Metal)
- F.27.2.1.** Must be Certified Safety Mfg. Model S203-045 or equivalent.
- F.27.3.** Fire extinguisher – Multi-purpose Stored Pressure Dry Chemical Extinguisher.

F.27.3.1. Must be a 5 lb. type 3A:40B: C Pro Line, Kiddie Model # FXBND9 or equivalent.

F.27.3.2. Must have a gauge to indicate state of charge and mounted to vehicle using a bracket and having a heavy duty vinyl cover.

F.27.4. Triangle warning devices (3), with storage container.

F.27.4.1. must meet FMVSSP # 125

F.27.5. Bloodborne Pathogens infection control kit.

F.27.5.1. Must be Certified Safety Mfg. Model #FK200-931, or equivalent.

F.27.6. Seat belt cutter

F.28. MIRRORS

F.28.1. Exterior:

F.28.1.1. Heavy Duty Heated Power Mirrors by Velvac Model 2020 Deluxe Head with Turn Signals or equivalent.

F.28.1.2. Mirrors are to be mounted to the driver and copilot doors in the same position as the OEM mirrors.

F.28.2. Interior:

F.28.3. Vehicle must have the two (2) following mirrors.

F.28.3.1. Must be OEM Day/night, 10" rear view mirror, confirming to FMVSS No. 111. (This mirror will be deleted if purchaser chooses backup camera as an option).

F.28.3.2. Passenger viewing and backup mirror shall be made of safety glass, having rounded corners and protective edges, and a 6" x 16". This mirror is in addition to the mirror mounted on windshield.

F.28.4. Fresnel Lens: 11" x 14" Lens on rear window.

F.29. SEATS

F.29.1. Driver's Seat and Co-Driver's Seat:

F.29.1.1. The driver seat must be a deluxe bucket, OEM high back 6-way power seat.

F.29.1.2. The Co-Driver's Seat must be adjustable fore and aft.

F.29.1.3. Seats must be padded with allergy-free material and upholstered with a durable transit quality level 5-cloth fabric.

F.29.1.4. Both seats must have adjustable lumbar

F.29.1.5. Both seats must have a certified seat belt and shoulder harness with retractor shall be attached to frame.

F.29.1.6. Both seats must have reclining backs and padded armrests. NOTE: Supplier must supply seating diagram reflecting all listed dimensions for approval.

F.30. PASSENGER SEATS

F.30.1. Seating shall be provided for fourteen (14) ambulatory passengers with three (3) foldaway seats that will accommodate six (6) passengers for a total seating capacity of twenty (20) passengers.

F.30.2. Wheelchair spaces will each be equipped with a wheelchair securement tie down and occupant restraint system, which meets the Americans with Disabilities Act requirements.

F.30.3. All seats shall be "bucket" semi-contoured transit type.

F.30.4. Seats are to be consistent with what is accepted as transit quality construction. School bus type seats are not acceptable.

F.30.5. Seat frames are to be welded.

F.30.6. Seats must be padded with allergy-free material and upholstered with a durable transit quality level 5-cloth fabric.

F.30.7. If the seating configuration being proposed is different than that shown in Figure 1, a diagram must be furnished.

F.30.8. Aisle seats must have padded fold up armrests and Anti-Vandal grab handles on the seat backs.

F.30.9. Seats must be Freedman Seating Mid Back type bucket seat or equivalent.

F.30.10. Seat belts to be installed at each seat position, and must be a Retractable under Seat Retractor, type of seat belts.

F.30.11. Must include Two (2) Seat Belt Extensions that will fit Passenger Seat Belts.

- F.30.12.** A commercial quality seat belt knife fastened to bus in driver's reach.
- F.30.13.** All seats shall provide a minimum seat width of 17" per passenger, or 34" per two (2) -passenger seats.
- F.30.14.** Minimum depth of seat (front to back contour) 18"
- F.30.15.** All seats including any foldaway seats must be bolted to structural steel.
- F.30.16.** Bolting seats to plywood floor without bolting into structural steel under floor is NOT ALLOWED.
- F.30.17.** All seat tracks must be welded to steel sidewalls and steel floor sections. Riveting or bolting seat tracks to sidewalls is NOT ALLOWED.
- F.30.18.** Seats shall be fully padded and shall be constructed with a no-sag spring bottom suspension. Plywood seat bottoms are unacceptable.
- F.30.19.** Seats shall be covered with a durable transit quality level 5-cloth fabric.
- F.30.20.** Seats shall be spaced on a minimum of 28 1/2" centers, allowing for a minimum of 10" between the front of the bottom cushion and the back of the next forward seat.
- F.30.21.** Minimum aisle width shall be 16".
- F.30.22.** All seats shall meet, as minimum, FMVSSP 302 207 requirements. Any additional requirements would be optional.

F.31. PRIORITY SEATING SIGNS

- F.31.1.** Each vehicle shall contain sign(s), which indicate that, the row of forward –facing seats located in the front of the vehicle are priority seats for persons with disabilities, and that other passengers should make such seats available to those who wish to use them.
- F.31.2.** The signs shall be located on the interior walls directly above the front row of forward-facing seats.
- F.31.3.** Signs must follow FTA 49CFR38 Section 38.27 for the required lettering characters of the signs.

F.32. LIGHTING

- F.32.1.** All manufacturers' lighting added to the vehicle (both interior and exterior) shall be provided with light-emitting diode (LED) lights.
- F.32.2.** Door activated 4 way flashers that are activated when passenger door is opened. This includes 2 additional amber LED flashing lights mounted high on each side of the rear wall.
- F.32.3.** The location, type and hookup of all exterior lights and reflectors to conform to Federal Motor Vehicle Safety Standards and Procedures.
- F.32.4.** The number of interior lights and their light output shall be determined by providing a minimum average of 7 foot-candles of illumination on a 1 square foot plane, at an angle of 45 degrees from horizontal, centered 33 inches above the floor and 24 inches in front of the seat back at each seat position.
- F.32.5.** Floor surface in the aisles shall be a minimum of 10 foot-candles.
- F.32.6.** Each vehicle shall be equipped with OEM daytime running lights.
- F.32.7.** Must have Red LED lights over all emergency exits
- F.32.8.** All interior lighting in the passenger area shall be mounted in the ceiling cove at the sidewall with a minimum of three (3) fixtures on each side of the vehicle. Lighting fixtures shall be installed on the interior walls and ceiling in a manner that does not present a head strike to the passengers. NOTE: All clearance lights front, rear and side shall have metal armored shields. This shall protect lights from tree limb damage.
- F.32.9.** Tail lights are to be recessed and shall not protrude more than 2 inches from the body; they shall include a pair of amber combinational hazard and signal lights. Rear tail-lamps shall also include a pair of red tail lights and red stop lights, which may be combinational. (Ref: Dialight 46121RB-Red, 46121AB-Amber or equivalent)
- F.32.10.** Side signal lamps, with marker, shall be provided independently or be incorporated into the center of the vehicle. Location must be above and in front of the rear wheel opening and provide visibility from behind the rear wheel opening. (Ref.: Dialight 18001AB811 or equivalent)
- F.32.11.** Clearance marker lights shall be installed surface-mounted, facing the front, rear, and each side at rear. (Ref.: Dialight 15001RB, 15001AB or equivalent)
- F.32.12.** The third brake light shall be center-mounted above the rear window, minimum 18" in length. (Ref.: Dialight 87121RB or equivalent)
- F.32.13.** Two back-up lights, one mounted on each side of the body rear cap. (Ref.: Dialight 46001CB or equivalent)

- F.32.14.** Step lighting shall be mounted to provide light for the entire step-well and an area a minimum of three (3) feet beyond the first step on the ground area outside the bus (Ref.: Dialight 170-81CB or equal). Note: The step lights shall be extinguished when the front door has closed.
- F.32.15.** Raised floor step lighting shall be provided by one strip light mounted in the step riser. Light strip shall be a minimum of 18 inches and recess-mounted to protect from accidental damage by passengers contacting light while using the step. (Ref.: Dialight 87121CB or equivalent).
- F.32.16.** Exterior step light shall be mounted away from wheel splash. (Ref.: Dialight #VSW-CC-19B-35-801 or equivalent)
- F.32.17.** Wheelchair lift area light shall be positioned in the manufacturer's standard location in order to illuminate the area in the immediate vicinity of the wheelchair lift platform for night operation. The light shall be automatically activated only when the wheelchair lift doors are open. (Ref.: Dialight Light #46121CB or equivalent)

F.33. ELECTRICAL WIRING

- F.33.1.** All wiring shall meet the requirements of SAE recommended practice J878a, Type SXL.
- F.33.2.** Connections with 3 to 12 circuits shall be environmentally sealed high impact plastic connectors with pull apart locking tabs.
- F.33.3.** All non-OEM connections containing one or two circuits shall be made with Posi-lick connectors.
- F.33.4.** No butt connectors will be allowed.
- F.33.5.** All added wiring shall be in a loom and securely clipped for maximum protection and routed in separate hangers from the heater hoses or air conditioning hoses.
- F.33.6.** Clips shall be rubber or plastic coated to prevent them from cutting the wiring insulation.
- F.33.7.** All electrical wiring shall be automotive stranded and sufficient size to carry the required current without excessive voltage drop and shall be color, number and function coded at a minimum of eighteen (18) inch intervals.
- F.33.8.** No electrical, stationary or mechanical device may block the removal of the engine cover inside the bus.
- F.33.9.** All wiring passing through the body metal shall have anti-chaffing grommets.
- F.33.10.** Each vehicle shall contain a set of detailed system by system "as built" wiring schematics covering all electrical equipment and electrical circuits installed, complete with wiring codes for each vehicle ordered.
- F.33.11.** Identification on the wiring diagram must tie the diagram to the bus.

F.34. WINDOWS

- F.34.1.** All windows to be of tempered safety glass and water and airtight.
- F.34.2.** Window in driver's door, windshield and entrance door glass are all to be tinted.
- F.34.3.** All the windows in the passenger area are to be factory-installed smoked glass with at minimum 30 percent tint. No Add on Film
- F.34.4.** Windows must be a top horizontal sliding T- transit type that the ventilation openings are located at the top of the window.
- F.34.5.** Must be constructed of corrosion resistant aluminum frames. NOTES: All windows and emergency exits must meet the performance and operational requirements as outlined in the Federal Motor Vehicle Safety Standards and Procedures.

F.35. EMERGENCY EXITS

- F.35.1.** At least one (1) window on each side at or near the rear of the vehicle shall be equipped with emergency release latches to provide emergency exits.
- F.35.2.** Release instructions shall be provided at or near the release handles and an audible alarm shall be installed near the driver, which will be activated when the window is released.

F.36. BACK-UP ALARM

- F.36.1.** Alarm shall be waterproof ECCO #530 or equivalent.
- F.36.2.** Must be mounted in the rear of the vehicle
- F.36.3.** Must be readily audible outside the vehicle when the transmission is in reverse.

F.37. WHEELCHAIR LIFT

- F.37.1.** An electric powered hydraulic wheelchair lift shall be installed inside the vehicle at the side door.
- F.37.2.** Bus must meet FMVSS 403-404 lift installation requirements.

F.37.3. Wheelchair lift shall meet the following MINIMUM requirements.

F.37.3.1. A Braun wheel chair Lift NL919FIB-2 (Millennium-2 Series) or equivalent. **Ground cable from lift must be connected to vehicle frame.**

F.37.3.2. Connecting ground cable to lifts mounting bolts is NOT ALLOWED.

F.37.3.3. 800 pound load capacity lifts assembly.

F.37.3.4. An electric hydraulic pump, powered by vehicle's electrical system.

F.37.3.5. Platform dimensions 34" wide by 51" long.

F.37.3.6. Platform to be constructed of 11 gauge expanded metal.

F.37.3.7. Platform shall be stored in an upright position within the vehicle.

F.37.3.8. Powered operation for (1) unfolding and folding the platforms and (2) raising and lowering the platform.

F.37.3.9. Emergency platforms release to permit the platform to be unfolded manually and lowered by gravity.

F.37.3.10. To prevent the wheelchair from rolling off, a barrier 1 ½" at minimum shall be provided on the outer edges of the platform and have an outboard roll stop that engages and locks before the platform leaves the ground to form a safety barrier when platform is raised or lowered

F.37.3.11. A free floating bridge plate will be replaced between the lift platform and the vehicle. This bridge plate will be hinged in a manner to permit upward movement should a person's foot become entangled.

F.37.3.12. Lift shall be securely bolted to the floor and floor reinforced as necessary to support the load.

F.37.3.13. To permit the lift platform to be raised without electrical power, a hand pump that allows the operator to raise the platform shall be installed.

F.37.3.14. An interior light shall be provided to illuminate the lift area;

F.37.3.15. All moving parts likely to cause personal injury shall be shielded.

F.37.3.16. Working parts, such as cables, pulleys, and shafts, which can be expected to wear, and upon which the lift depends for support of the load, shall have a safety factor of at least six, based on the ultimate strength of the material. Nonworking parts, such as platform, frame, and attachment hardware, which would not be expected to wear, shall have a safety factor of at least three, based on the ultimate strength of the material.

F.37.3.17. Lift shall be installed as specified by the manufacturer and shall be thoroughly tested prior to delivery.

F.37.3.18. Repair manual, parts list and instructions for adjusting hydraulic valves and electrical equipment shall be provided.

F.37.3.19. Lift controls shall be interlocked with the vehicle brakes, transmission, or door, or shall provide other appropriate mechanisms or systems to ensure that the vehicle cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks or systems are engaged.

F.37.3.20. The left control cord must be secured in a manner not to interfere with the door being closed.

F.38. USE BY STANDEES

F.38.1. Lift shall accommodate persons using walkers, crutches, canes or braces or who otherwise have difficulty using steps. The platform may be marked to indicate a preferred standing position.

F.39. HANDRAILS

F.39.1. Platform on lift shall be equipped with handrails on two sides, which move in tandem with the lift, and which shall be graspable and provide support to standees throughout the entire lift operation.

F.39.2. Handrails shall have a usable component at least 8" long with the lowest portion a minimum 30" above the platform and the highest portion a maximum 38" above the platform.

F.39.3. Capability of withstanding a force of 100 pounds concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure required.

F.39.4. Cross-sectional diameter of handrail shall be between 1 ¼" and 1½", and shall have eased edges with corner radii of not less than 1/8".

F.39.5. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

F.40. WHEELCHAIR SECUREMENT

F.40.1. Wheelchair parking space shall have clear floor area of 30" wide by 52" long and be equipped with a four-point wheelchair securement tie-down.

- F.40.2.** Occupant restraint system must be Q'Straint Q-8306-SC or equivalent. Shall have a Retractable lap/shoulder belt combo with a Retractable height adjuster that are anchored to floor and wall with L Tracks that meet SAE J2249 and ADA requirements.
- F.40.3.** Tracks shall be recessed into the floor and not shift position under anticipated loads. Any tracks overlapping the access path must be flush with the floor to prevent passengers from tripping.
- F.40.4.** The L tracks and Slide N Click anchors must be bolted to structural steel.
- F.40.5.** Bolting to plywood floor without bolting into structural steel under floor IS NOT ALLOWED.
- F.40.6. Wheel Chair Securement system must be** Q'Straint QRT MAX Automatic Retractor System with Slide N Click anchorage system and J-Hooks, or equivalent.
- F.40.7.** There must be 52" at minimum and 54" maximum measured from center to center between front and rear Slide N Click anchor points. And be fully assembled and ready to use.
- F.40.8.** Must have securement pouches attached to wall to store wheelchair securement tie-downs.
- F.40.9.** Must include eight (8) Q'Straint Q5-7580 Webbing Loops or equivalent for Securing Scooters. Wheelchair location must be in the rear of bus, one beside the other. NOTE: Each wheelchair securement location shall have sign designating it as such. Lettering size and type on these signs shall comply with the Americans with disabilities Act Regulations,

F.41. WHEELCHAIR ACCESSIBILITY SYMBOL

- F.41.1.** The vehicle will display the international wheelchair accessibility symbol of a person in a wheelchair that is outlined in white on blue background.
- F.41.2.** This symbol will be placed on all four sides of the bus.

F.42. VEHICLE COLORS

- F.42.1.** Body: Vendor to supply list of colors and prices available.

F.43. WINDOW BLACKOUT PAINT

- F.43.1.** Bus must have window blackout paint.
- F.43.2.** NOTE: See Figure 2

F.44. COLOR OF SEATS

- F.44.1.** Proposal must include all colors available
- F.44.2.** Successful vendor shall coordinate with the agency issuing this purchase order in the selection of material and color of the seats.
- F.44.3.** Seats shall be fully padded.

F.45. VEHICLE FLOOR PLAN

- F.45.1.** A proposed floor plan including all pertinent interior dimensions such as overall length, width, distance between seats, etc.,
- F.45.2.** Shall be submitted with the proposal.

F.46. CHASSIS SPECIFICATIONS:

- F.46.1.** GVWR, axle, spring and tire:
 - F.46.1.1.** 14,500 lb. GVWR minimum
 - F.46.1.2.** Front axle- 5,000 lb. GAWR minimum
 - F.46.1.3.** Rear axle – 9,500 lb. GAWR minimum
 - F.46.1.4.** (Dual wheel are required on rear axle.)
 - F.46.1.5.** Front springs – heavy duty, 5,000 lb minimum
 - F.46.1.6.** Rating combined at ground.
 - F.46.1.7.** Rear springs – heavy duty, 9,500 lb minimum
 - F.46.1.8.** Ratings each, at ground.
- F.46.2.** It is the Supplier's responsibility to calculate the actual loaded weight, spring and axle ratings so that the vehicle is engineered for safety.

F.47. TIRES

- F.47.1.** Tire size must meet 14,500 GVWR minimum and must be steel radial with "E" load rating.
- F.47.2.** Steel or brass valve stems 1.5" in length shall be used on all wheels with elbow extensions on the inside rear dual for access.
- F.47.3.** Stainless steel or brass valve caps with an inner air seal shall be used.
- F.47.4.** One mounted spare tire and wheel to match existing tires/wheels to be shipped loose.

F.48. ENGINE: GASOLINE

- F.48.1.** Minimum – (6.8 liter) displacement.
- F.48.2.** Must Have a CNG Capable Engine with hardened intake and exhaust valves with hardened intake and exhaust valve seats Ford Option # 91G.

F.49. RADIATOR

- F.49.1.** Heavy Duty, with factory installed recovery system.
- F.49.2.** The cooling system must be winterized with ethylene glycol for temperatures to –20 degrees F (-28.8889 C).

F.50. TRANSMISSION

- F.50.1.** At minimum, heavy-duty 5-speed automatic with overdrive, lock-up converter, lock in park and a heavy-duty auxiliary transmission cooler.

F.51. WHEEL WELLS

- F.51.1.** The wheel housing shall be of sturdy heavy-duty construction of a minimum 14 gauge galvanized steel or stainless steel and provide ample tire clearance during all operating conditions.
- F.51.2.** Fender and splash aprons (underskirt) of durable construction shall be provided so as to provide maximum deflection of the wheel splash.
- F.51.3.** There shall be sufficient clearance to enable easy removal of wheels mounted with inflated tires.

F.52. REAR FENDER FLARES

- F.52.1.** Vehicle must have Rubber or Fiberglass Fender Flares.

F.53. DRIVE SHAFT

- F.53.1.** Drive shaft must be properly supported, balanced and guaranteed not to vibrate. Each drive shaft shall be equipped with a protective metal guard or guards to prevent whipping through the floor or dropping to the ground in the event of a tube or universal joint failure, or if the drive shaft breaks.

F.54. WHEEL COVERS

- F.54.1.** Bright Metal Stainless Steel Wheel inserts.

F.55. BRAKES

- F.55.1.** Two (2) braking systems are required. Service brakes shall be dual hydraulic, disc front and disc rear.
- F.55.2.** The parking brake system shall be operated by a cable to the rear wheels, or Drive Shaft Drum Brake.
- F.55.3.** The braking system shall be adequate for the GVWR of the vehicle.

F.56. GEAR RATIO

- F.56.1.** Must be a 4:56 gear ratio

F.57. FUEL CAPACITY

- F.57.1.** Must be at minimum of 55 gallons

F.58. FUEL PUMP ACCESS DOOR

- F.58.1.** An aluminum diamond plate access door shall be provided in the floor of the vehicle above the fuel tank to allow the fuel pump to be serviced without removal of the tank. NOTE: Door must be Large enough and centered over fuel pump to allow easy removal of pump.

F.59. SHOCK ABSORBERS

- F.59.1.** Must have heavy duty, front and rear shock absorbers.
- F.59.2.** Rear Shock Absorbers upper mounting brackets shall Not be Covered by any Body Braces that would prevent easy access to Upper Shock Mounting Bolts and Nuts.

F.60. SUSPENSION

F.60.1. Rear shall have Leaf Springs.

F.60.2. Right rear shall have an extra leaf to compensate for weight of wheelchair lift.

F.61. STEERING

F.61.1. Must have power-assisted steering

F.61.2. Must have tilt wheel,

F.61.3. Must have factory installed cruise control.

F.62. AIR CLEANER

F.62.1. Must have a heavy duty, dry type air cleaner

F.63. OIL FILTER

F.63.1. Must have a heavy duty, throw away type oil filter.

F.64. ALTERNATOR

F.64.1. Ford OEM 225-amp Alternator or equivalent.

F.65. BATTERIES

F.65.1. Two (2) heavy duty, maintenance free, minimum 650 CCA at 0 degrees F (-17.778 C) Batteries must be wired together in a parallel circuit to increase total battery capacity.

F.65.2. Front OEM battery must have OEM type battery hold down brackets to securely hold battery in place.

F.65.3. Instep Battery Box that is bolted down securely and must be sealed to keep mud and debris from getting on Rear Coach Battery.

F.65.4. Battery must be bolted within this instep box. Cloth holds down straps are not ALLOWED.

F.65.5. Battery box must be sealed to keep mud from getting on batteries. SEE FIGURE 4 & 5

F.66. GROUNDS

F.66.1. A ground of the battery cable size, shall be installed between the engine and chassis frame.

F.66.2. The vehicle body shall be properly grounded to the chassis frame at least 2 (two) places.

F.66.3. Engine and body grounds shall be installed to handle subsystem electrical capacity.

F.66.4. Grounding wires fastened to the frame shall use a bolt with a nut installed in a proper sized hole with dielectric compound applied to the cleaned surfaces, bolt, and cable end.

F.66.5. Lift pump motor shall be grounded directly to chassis frame using a cable of the same size as the pump motor feed wire.

F.66.6. All exterior lights and accessories added by the body manufacture shall be grounded by an in harness ground attached at a fuse panel common grounding point.

F.66.7. For all ground wire connections paint shall be removed at the grounding point to provide a surface, cable end, bolt, and nut where each positive or grounding cable is attached.

F.67. STABILIZER BAR

F.67.1. Heavy Duty Front and rear

F.68. HORN

F.68.1. Vehicle must have a dual, electric horn.

F.69. SIGNAL

F.69.1. Directional and self-canceling with hazard warning flashers.

F.70. TOW HOOKS

F.70.1. Shall have 2 tow hooks on Rear.

F.71. WINDSHIELD WIPERS

F.71.1. Minimum two speeds with intermittent feature and washer.

F.72. KEYS

F.72.1. Vehicle must include three (3) sets of keys for the entire bus.

F.73. RADIO

F.73.1. Must have an AM & FM CD radio

F.73.2. Radio must be of same manufacture as chassis. Radio must be mounted in the Chassis OEM Location in dash.

F.73.3. Must have a minimum of six speaker's two (2) OEM speakers in front chassis doors. The coach body's four (4) speakers shall be a 3-way standard speakers.

F.74. PAINTING, DECALS AND MONOGRAMS

F.74.1. All signs required by State and federal law shall be affixed to each vehicle exterior and interior.

F.74.2. It is up to the bus dealer/manufacture to add such signs and decals upon delivery of vehicle.

F.74.3. No decals, name plates, or painted identification of the bus dealer/manufacture are to be added to the vehicle.

F.75. UNDERCOATING

F.75.1. Floor and wheel housing, anti-rust factory installed.

F.76. WARRANTY REQUIREMENTS

F.76.1. The contractor warrants and guarantees to the original Procuring Agency each complete bus and specific subsystem and components for 100% parts and labor as follows:

F.76.1.1. OEM standard factory warranties for chassis and engine.

F.76.1.2. Complete bus body and body structure, exterior, wiring, flooring installation, and paint are warranted to be free from defects, related defects and to maintain structural integrity for a period of Five (5) year or 100,000 miles

F.76.1.3. Add-on components shall have component manufacture's standard warranty.

F.76.1.4. Warranty shall begin on the date that the vehicle delivery is accepted by the agency issuing the purchase order.

F.76.1.5. The wheelchair lift shall have a five (5) year unlimited mileage and unlimited cycles.

F.76.1.6. The air-conditioning system shall have a minimum 2 years unlimited mileage.

F.76.1.7. The chassis powertrain shall be warrantied for a period or Five (5) years or 100,000 miles.

F.76.1.8. Any parts under warranty must be available and delivered to the purchasing transportation provider or their repair shop within 5 days of the time they requested/ordered them. The bus vendor/manufacture shall bear all reasonable financial costs of shipment of parts.

F.76.1.9. The warranty, as well as any recall notifications, shall cover each vehicle of the ultimate purchaser or recipient agency. The vendor shall provide a copy of any recall notice to each purchasing agency.

F.77. BUS TESTING

F.77.1. Certification shall be provided that in accordance with 49 CFR Part 665,

F.77.2. Bus Testing, the vehicle either does not need to be tested (with justification specified for exemption) or has been tested at the bus testing facility and a test report is included.

F.78. BUS WATER TESTING

F.78.1. The roofs, windows, windshield and all doors of all coaches shall be water tested, as follows:

F.78.1.1. The waster test shall consist of a series of nozzles that are strategically located around the perimeter of the vehicle so as to the nozzles spray water over the entire surface of the vehicle.

F.78.1.2. The nozzles shall eject a volume of water no less than 2.6 gallons per minute under a pressure of no less than twenty-two (22) pounds per square inch measured at the nozzle tip.

F.78.1.3. There shall be no less than twenty (20) nozzles installed in the water test area, each capable of directing a force of water as indicated above.

F.78.1.4. The Vendor/Manufacture shall be required to water test each vehicle, under the conditions set forth above, for no less than five (5) minutes, in order to determine whether or not there are any body leaks at the window areas, door areas, roof panels, etc.

F.78.1.5. The Vendor/Manufacture shall take the necessary corrective action when body leaks are found to exist as a result of the above test, and conduct a second water test to recheck for body leaks following corrective action.

F.79. ALTOONA TESTING

F.79.1. Vehicle must be tested in the 7-year/200,000 mile category at the Altoona Bus Testing Facility in Duncansville, PA. And a copy of the full report must be submitted with the Proposal.

F.80. GENERAL

F.80.1. All equipment cataloged as standard for the basic vehicle, unless superseded by these specifications, must be furnished and included in the purchase price of each vehicle. Complete printed specifications, published literature, and photos, or illustrations of the basic units that the supplier proposes to furnish with this Proposal must accompany each Proposal.

F.81. QUALITY OF MATERIALS

F.81.1. Welding procedures and materials shall be in accordance with standards of the American Society of Testing Materials and the American Welding Society. All visible welds shall be ground smooth. Where metal is welded, the contact surface shall be free of scale, spatter, and grease and shall be treated to preclude rusting.

F.82. PUBLICATIONS AND PRINTED MATERIALS

F.82.1. Each vehicle shall have a complete set of operation, quality assurance, and warranty publications.

F.82.2. The information shall be organized in a three ring binder format with each sections clearly identified.

F.82.3. As built wiring diagram and as built parts manuals for body and all auxiliary equipment.

F.82.4. Maintenance and inspection schedule incorporating the required maintenance and inspection of the basic vehicle and its sub-systems.

F.82.5. Operator's manual: A complete operations manual and troubleshooting guide with a detailed manufacturer's parts list that covers the conversion features on the vehicle as listed in this specification. The manual will provide complete, comprehensive instructions for the wheelchair accessories, wheelchair list deployment, air conditioning system, tie downs, heater, deployment of seats, wiring diagram and related equipment.

F.82.6. Warranty papers for chassis, body, and additional equipment.

F.82.7. Warranty Information: Each vehicle must have a published listing of contractor warranty repair locations, including address, telephone number, and contact names for the State of Oklahoma.

F.83. PRE-AWARD AUDIT

F.83.1. The vehicles are not considered delivered to the purchasing agency until the required FTA documents are completed by a Government Official.

F.83.2. A Pre-Award Audit shall be conducted to determine if the proposal meets specifications. The supplier shall submit documents, which include certification of the manufacturer's compliance with the Federal Transit Administration (FTA) Pre-Award Buy America Audit Requirements. The document submitted shall include the following information for each major component used on vehicle Proposal:

F.83.2.1. Name and address of each supplier.

F.83.2.2. Cost of each major component and subcomponent. In order to protect proprietary information, the document may reflect the percentage of total cost each item represents instead of the actual cost.

F.83.2.3. Country of origin of each major component and subcomponent.

F.83.2.4. Name and address of company where final assembly occurs.

F.83.2.5. Cost of final assembly

F.83.2.6. Signature of authorized representative of vehicle manufacturer.

F.84. POST- DELIVERY AUDIT

F.84.1. A Post Delivery Audit of the vehicle(s) shall be conducted at the purchaser's facility, to determine that the completed vehicle(s) meets specifications. Once this process has been satisfactorily completed, the vehicle(s) shall be considered acceptable.

F.85. ACCESSIBILITY REQUIREMENTS

- F.85.1.** When submitting a Proposal for an accessible vehicle for the disabled, the vendor shall provide a list of the vehicle related equipment illustrating the component cost and related installation charges. The purpose of this list is to reflect an accurate cost for those vehicle related items, which are required to make the vehicle accessible to the disabled.

F.86. ACCEPTANCE OF VEHICLES

- F.86.1.** Upon delivery at the designed location specified within this document the final acceptance will occur after the vehicles have been inspected, road tested and all FTA required post audit delivery requirements have been met.
- F.86.2.** All vehicles shall be insured by the supplier until the post audit delivery has been conducted at minimum.

F.87. SPECIFICATIONS FOR OPTIONAL ITEMS:

F.87.1. CNG CONVERSION FORD CHASSIS

- F.87.1.1.** OEM engine shall be converted to operate on dedicated CNG. A WESTPORT/BAF Cal Comp System or approved equal shall be provided. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional control module will be accepted. Dual fuel systems will not be accepted. System must comply with the following:

F.87.1.1.1. Closed-loop fuel control

F.87.1.1.2. Sequential fuel injection (SFI)

F.87.1.1.3. Optimized ignition timing

F.87.1.1.4. Must maintain original fault codes (DTCs)

F.87.1.1.5. Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner

F.87.1.1.6. CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.

F.87.1.1.7. The minimum CNG tank capacity on the mini-buses should be 39 Gasoline Gallon Equivalent

F.87.1.1.8. CNG interlock – Engine will not run when filling CNG tanks.

F.87.1.1.9. Must provide a detailed floor plan of the placement of the CNG tanks.

F.87.1.1.10. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

F.88. CNG BIFUEL CONVERSION FORD CHASSIS

- F.88.1.** OEM engine shall be converted to operate on CNG and Gasoline. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional module will be accepted. System shall be capable of switching between CNG and Gasoline. The Gasoline fuel tank will be installed as per OEM specifications. The system must comply with the following:

F.88.1.1. Closed-loop fuel control

F.88.1.2. Sequential fuel injection (SFI)

F.88.1.3. Optimized ignition timing

F.88.1.4. Must maintain original fault codes (DTCs)

F.88.1.5. Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner

F.88.1.6. CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.

F.88.1.7. The minimum CNG tank capacity on the mini-buses should be 29 Gasoline Gallon Equivalent

F.88.1.8. Must provide a detailed floor plan of the placement of the CNG tanks.

F.88.1.9. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

F.89. DEDICATED PROPANE AUTOGAS INJECTION

- F.89.1.** The system shall be a Roush CleanTech System or approved equal. The system must be CARB, EPA certified, and OBDII Compliant. The system shall have the following system components:

F.89.1.1. PCM Calibration

- F.89.1.2.** Billet aluminum high-pressure fuel rail.
- F.89.1.3.** Appropriate fuel injectors
- F.89.1.4.** Appropriate fuel lines
- F.89.1.5.** Appropriate OEM engine prep package
- F.89.1.6.** Coverage of Five (5) year/ 60,000 mile warranty.
- F.89.1.7.** System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

F.90. DUAL FUEL VEHICLE PROPANE AUTOGAS INJECTION

- F.90.1.** System shall be a Roush CleanTech System or approved equal.
- F.90.2.** The system shall be a Roush CleanTech System or approved equal. The system must be CARB, EPA certified, and OBDII Compliant. The system shall have the following system components:
 - F.90.2.1.** PCM Calibration
 - F.90.2.2.** Billet aluminum high-pressure fuel rail.
 - F.90.2.3.** Appropriate fuel injectors
 - F.90.2.4.** Appropriate fuel lines
 - F.90.2.5.** Appropriate OEM engine prep package
 - F.90.2.6.** Coverage of Five (5) year/ 60,000 mile warranty.
 - F.90.2.7.** System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

F.91. BACK-UP MONITOR SYSTEM

- F.91.1.** ASA Voyager AOM562A or approved equal with a 5.6" color LCD screen mounted on rear view mirror OEM Bracket. With a rear mounted outside backup camera and a second inside front mounted camera to view passengers.

F.92. TWO-WAY RADIO SYSTEM UHF

- F.92.1. ICOM F6021 UHF two-way Radio System with a PCTEL MUF4505 UHF antenna and coax or approved equal.**
 - F.92.1.1.** Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.
 - F.92.1.2.** Radio must be mounted in an easy accessible location for the driver.
 - F.92.1.3.** Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

F.93. TWO-WAY RADIO SYSTEM

- F.93.1. ICOM F5021 VHF two-way Radio System with a PCTEL MHB5800 VHF antenna and coax or approved equal.**
 - F.93.1.1.** Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.
 - F.93.1.2.** Radio must be mounted in an easy accessible location for the driver.
 - F.93.1.3.** Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

F.94. TWO-WAY RADIO SYSTEM 800 MHZ

- F.94.1. Kenwood NX-900K 800 mhz two-way Radio System with a PCTEL MUF8003 antenna and coax or approved equal.**
 - F.94.1.1.** Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.
 - F.94.1.2.** Radio must be mounted in an easy accessible location for the driver.
 - F.94.1.3.** Radio must be programmed with the correct Frequencies and the antenna tuned for agency issuing this purchase.

F.95. DRIVER'S SHIELD

- F.95.1.** A clear Plexiglas barrier shall be erected behind the driver and extend from the stanchion crossbar behind the driver up to the ceiling.

F.95.2. This shield start at the wall on the driver's left side (close enough to prevent a passenger from reaching through to the driver) and should extend 3 inches past the right side of the driver's seat, but shall not obstruct the view from the rear view mirror.

F.95.3. This barrier shall consist of clear Plexiglas and shall be at least ¼ inch thick.

F.95.4. A 1 ½ inch clearance between the stanchion and barrier should be provided to allow a hand hold on the right side.

F.96. PAINTED LOWER SKIRTS

F.96.1. Paint to purchaser's color specs.

F.96.2. See Figure 2.

F.97. OUTSIDE PASSENGER DOOR SWITCH

F.97.1. Outside keyed electric passenger door switch outside. Switch must be water proof.

F.98. BUS CAMERA SYSTEM

F.98.1. REI Bus-Watch R4001 with 500GB Hard drive and four cameras or approved equal. Successful vendor shall coordinate with the agency issuing this purchase for location of Camera's.

F.98.2. See Figure 3 for camera type and location of cameras.

F.99. FABRIC INSERT ON CEILING

F.99.1. Must match seat fabric and pattern.

F.100. STREET SIDE EXHAUST

F.100.1. Exhaust to be turned out opposite side of Wheel Chair lift

F.101. INTEGRATED CHILD SEAT

F.101.1. Integrated Child Restraint Seat must be a Freedman Seating ICS-10 or equivalent

F.101.2. Must have an integrated 4-point safety harness. for children 22-78 Lbs with under seat retractor seat belts for adults

F.102. VINYL SEATS

F.102.1. This will be a price deduction from the durable transit style level 5 cloth fabrics.

F.102.2. Vinyl deduction is for passenger seats only

F.102.3. Pilot and co-pilot seats shall be durable transit quality level 5-cloth fabric

F.103. PUBLIC ADDRESS SYSTEM

F.103.1. A public address system shall be installed with a hand held microphone.

F.103.2. The system shall include a solid-state amplifier of sufficient power and quality that the operator's voice can be clearly heard without distortion.

F.103.3. The amplifier shall be firmly secured in a protective area.

F.103.4. The PA system shall use the vehicles 6 speakers for sound.

F.103.5. A power switch for the PA system shall be mounted on the dash to provide operation for the inside and amplifier off.

F.103.6. Any noise suppression due to alternator, lighting, engine or other source is required of the contractor.

F.104. PASSENGER SIGNAL SYSTEM PULL CORD

F.104.1. The Stop Request system shall have the following features:

F.104.1.1. Separate provisions for W/C passengers and ambulatory passengers to signal a Stop request.

F.104.1.2. Must uses a yellow pull cord run below the windows for the ambulatory request and a large yellow push pad mounted at least 15" above the floor, but not more than 48". There must be a touch pad per W/C space for the passengers to signal a stop request.

F.104.1.3. The driver should have a means of telling if a W/C passenger has signaled. There must be a Blue dash light to signal a W/C passenger request and a RED light to signal an ambulatory passenger request.

F.104.1.4. The "Stop Request" lighted sign should show if a W/C passenger has signaled; the sign shall be a universal W/C symbol which lights in blue.

F.104.1.5. There shall be an audible signal when a stop is requested and must be able to be heard by the driver.

F.104.1.6. Once the pull cord is pulled, the sign will light, the driver's red light goes on, and a chime sounds. The sign will stay lit until the bus is stopped and the entry door is opened. The system automatically re sets itself

F.104.1.7. When the W/C passenger signals a stop request, the W/C portion of the sign lights, the chime sounds, and the blue light on the dash goes on. The sign will stay lit until the W/C lift is deployed and then stowed and the W/C door is closed again.

F.105. PASSENGER STOP REQUEST SIGNS

F.105.1. Passenger stop request sign must be Transign, or equivalent.

F.105.2. The signs must be back-lighted stop requests and shall be mounted overhead on the front ceiling end closure.

F.105.3. The sign shall be so designated as to remain illuminated when activated (by the passenger signal system) until it is extinguished by opening the door.

F.106. FARE COLLECTION BOX

F.106.1. Fare collection box must be GFI Genfare "Cents a bill" fare box or compatible.

F.106.2. With this option, the mounted fare box will eliminate the front passenger seat and make the bus a 14 passenger.

F.106.3. Also must have the OEM Co-Driver seat covered with same fabric as the other passenger seats shipped loose with the bus. Co-Driver door shall have the same type of running board as driver's door.

F.107. DESTINATION SIGNS

F.107.1. Destination signs must be Twinvision, or equivalent. The automatic electronic destination sign system shall be furnished on the front and on the right side near the front door of the vehicle. Display areas of destination signs shall be clearly visible in direct sunlight and/or at night. The sign system shall provide optimum visibility of the message display units for passengers and shall meet applicable ADA requirements defined in 49 CFR, Part 38.39. Destination signs shall be installed in such a manner as to facilitate easy access for replacement of the entire sign assembly, or components such as fluorescent lamps/LED's and electronic control modules, from inside the bus within 30 minutes by a mechanic. Lamps and associated parts shall be commercially available.

F.107.2. Destination messages, route designations, and public relations messages shall be independently selectable via a single Operator's Control Panel (OCP) which shall include a display monitor. The OCP display monitor readout shall show the exact information displayed on the destination signs. The OCP shall be conveniently located for the bus operator and mounted in such a manner that will not pose any safety hazard. The OCP shall utilize a durable weatherproof keypad with tactile feel for destination message control functions.

F.107.3. The destination sign system shall be capable of programming 10,000 message lines. The number of public relations messages shall be limited only by the remaining number of message lines not used for destination purposes. Sign displays shall have alternating message capability with programmable blanking time between message lines as may be required. Variable blanking times shall be programmable between 0.5 to 25 seconds in duration. Each line message or blanking time for each message shall be individually programmable. The message display units shall incorporate an automatic blanking feature that will cause the display area to blank within 30 seconds of the bus master power switch being turned off.

F.107.4. An emergency message shall be initiated by the closure, or opening, of a dry contact switch or relay. The emergency message shall be displayed on the exterior of the bus only. The OCP shall not display the emergency message. The destination sign shall automatically resume normal operation when the remote emergency switch is returned to its normal position.

F.107.5. Destination Sign Programming: The electronic sign system shall be programmable via an integral connector located in the front destination sign area. Software shall be furnished for programming the sign system via an IBM-compatible, laptop computer. Software shall be capable of providing a high degree of flexibility to create, or select preprogrammed, fonts and graphic displays. The sign shall have the capability of being programmed in the field using a PC or field programmer. Message program information shall be transferable to and/or from the field programmer device as specified by the transit system in attachments to Part 5: Technical Specifications.

F.107.6. The destination sign compartments shall be designed to prevent condensation and entry of moisture and dirt. Additional provisions shall be included, if necessary, to prevent fogging of both destination sign compartment window and glazing on unit itself. Access shall be provided to allow cleaning of inside of destination sign compartment window and unit glazing.

F.107.7. A complete listing of destination sign readings for initial sign programming by the manufacturer are provided in attachments to Part 5: Technical Specifications.

F.108. FRONT SIGNS

F.108.1. Sign Size:

F.108.1.1. A 16 Row by 148 Column Spectrum Route Multi-Color Sign that shall have no less than 3,264 LEDs with a message display area of not less than 8.0 inches high by not less than 64.6 inches wide. The LEDs displays shall consist of red-blue-green LEDs and amber colored LEDs. The color LEDs shall be rated by their manufacturers for a life expectancy of 50,000 hours to 100,000 hours and shall support up to 27 colors.

F.108.2. Sign Readability:

F.108.2.1. The destination message shall be readable by a person with 20/20 vision from a distance of 250 feet. The sign shall have an equal readability at 65 degrees on either side of the line perpendicular to the center of the mean plane of the display. The entire display area of all signs shall be clearly visible and readable both in direct sunlight and at night.

F.109. SIDE SIGNS

F.109.1. Sign Size:

F.109.1.1. An 8 Row by 96 Column Spectrum Route Multi-Color Sign that shall have no less than 768 LEDs with a message display area of not less than 2.8 inches high by not less than 36.3 inches wide. The LEDs shall be rated by their manufacturers for a 100,000-hour life expectancy.

F.109.2. Sign Readability:

F.109.2.1. The destination message shall be easily read from the sidewalk level. The entire display area of all signs shall be clearly visible and readable both in direct sunlight and at night.

F.110. SYSTEM CONTROL CONSOLE – OPERATOR DISPLAY AND KEYBOARD

F.110.1. The system control console shall be used to view and update display messages. The system control console shall utilize a 28-key conductive rubber pad keyboard with tactile feel, designed especially for the harsh transit environment or approved equal.

The system control console shall contain a 16 x 128 pixel vacuum fluorescent display. The system control console shall contain an audio annunciator that beeps to alert the operator to view the display for a message, or beeps indicating that a key is depressed. The system control console shall continuously display the complete message associated with the selected destination code.

F.111. MEMORY TRANSFER

F.111.1. The sign system shall be reprogrammable through the system control console by either a PCMCIA flash card or a Memory Transfer Unit.

F.112. EMERGENCY MESSAGE DISPLAY

F.112.1. If required, a special emergency message can be activated by a switch. This message shall be displayed on signs, facing outside the vehicle, while the signs inside the vehicle, including the system control console, remain unchanged. The emergency message shall be canceled by entering a new destination code or by removing the emergency signal.

F.113. PROGRAMMING

F.113.1. A programming software package shall be furnished to generate message lists for the destination sign system. A PCMCIA flash memory card having a minimum of 8 megabytes of memory shall be provided to facilitate bus system programming. The software must be compatible with Windows NT, Windows 2000, Windows XP, Windows Vista and Windows 7

The programming software shall use techniques that require minimal operator training and that are intended for use by operators that are not trained in complex computer operations. All operator screens shall utilize pull down and pop-up menus.

F.114. BICYCLE RACKS

F.114.1. Manufacturer/model should be Sportworks **DL-2** or equivalent.

F.114.2. Racks must have a 2 (two) bike capacity, and follow the specs noted below.

F.114.2.1. The bike rack must meet OSHA requirements for lifting by a single individual and be capable of being raised or lowered with one hand

F.114.2.2. The bike rack must accommodate all bicycles with wheels 16" (for example, the Dahon folding bicycle series) or larger diameter, excluding tandems and recumbent type bicycles. The rack must accommodate all bicycles 80" and longer.

F.114.2.3. The bike rack frame must be manufactured with 304 stainless steel tubing with a minimum wall thickness of 0.125 in., outside corners to be rounded, pinch joints minimized and welds smoothed.

- F.114.2.4.** All nuts, bolts and washers shall be either AISI Type 304 stainless steel or Grade 8 yellow zinc plated steel
- F.114.2.5.** The bike rack must be mounted to the front of the bus and accommodate two (2) bicycles. In the stowed position, folded up against the front of the bus, it shall protrude no more than 8" from the front bumper. The protrusion shall be no more than 36" when deployed.
- F.114.2.6.** The latching mechanism must automatically lock the bike rack in the stowed and deployed positions.
- F.114.2.7.** The bike rack, when stowed, shall not interfere with any access panels/doors, windshield wipers or driver vents.
- F.114.2.8.** The bike rack shall be designed for loading and unloading from the front, curbside, of the bus. The securement can only contact the bicycle's tires as to not do any damage to the bicycle's frame. The bike rack shall have a positive securement with a four (4) point locking system, contacting the wheel in such a way that greater than half the circumference of the wheel is captured. Straps, cords, and/or springs shall not be required to secure a bicycle.
- F.114.2.9.** The carrier shall not interfere with the ability of the driver to safely operate the vehicle. This includes, but is not limited to, the obstruction of the windshield view and the operation of the windshield wipers, turn signals, and headlights.
- F.114.2.10.** The carrier shall be compatible with automated bus washing systems and shall be capable of repeated use with automated washing equipment without sustaining damage to the carrier, vehicle, of the washing equipment. The carrier shall be designed as not to accumulate water internally.
- F.114.2.11.** The use of this rack shall not affect route scheduling. The bike rack shall have a design capability of being loaded or unloaded in 20 seconds or less.
- F.114.2.12.** The mounting bracket/ pivot plate assembly must be designed to fit all urban transit buses, both standard floor and low floor.
- F.114.2.13.** The bicycle rack shall be warranted against defects in materials and workmanship for a period of one (1) year from date of installation.
- F.114.2.14.** The bicycle rack manufacture is required to furnish all the complete parts and service (maintenance) books.
- F.114.2.15.** The bicycle rack should have a latching system in both positions, stowed and deployed; this will need to be explained in detail
- F.114.2.16.** The racks should be in a friendly design and a tire only mount.
- F.114.2.17.** The mounting brackets should be detailed at to what bus needs with brackets.

F.115. PRODUCT STANDARDS

- F.115.1.** Only first quality materials, workmanship and finish shall be acceptable.

All general materials and workmanship shall be guaranteed to be free of defects for a minimum of at least one (1) year from date of installation except as noted below. Any defects shall be rectified or replaced to meet specifications at the expense of the manufacturer, including freight, parts and labor.

Any exposed fasteners shall be colored to match the finish of the framework components.

F.116. SPARE PARTS

- F.116.1.** The contractor will provide pricing and the delivery time on the available spare parts for each bicycle rack and maintain adequate stock levels.

F.117. DELETE COPILOT DOOR, SEAT AND B PILLAR :

- F.117.1.** This Moves the Passenger door from the coach Body to the chassis cab section. This delete's the Copilot door; seat and B pillar section of the cab. This will add 2 seats positions in Coach Body.

F.118. DELETE ALTRO CHROMA FLOORING:

- F.118.1.** This delete's the Altro Chroma Floor covering to install the Gray RCA Rubber Transit-Flor. The step well, entrance area, and center aisle floor area shall be overlaid with ribbed, slip resistant, oil resistant commercial 3/16" step tread thickness. The 1/8" thickness flooring under the seats and in the wheelchair area shall be smooth, slip resistant, and oil resistant. The flooring shall extend up the sidewall and rear wall to the seat rail line and shall be coved at the floor/wall joint to form a smooth water-tight transition. Flooring adhesive shall be oil resistant.

F.119. DELETE YELLOW POWDER COAT ON HANDRAILS

- F.119.1.** This delete's the yellow powder coating on the stainless steel handrails, grab handles and stanchions. They will be the natural brushed Stainless steel Color.

F.120. 100% NIDA-CORE[®] STRUCTURE OR APPROVED EQUAL

F.120.1. Resin Hardened Nida-Core[®] or approved equal Polypropylene Copolymer honeycomb (1" thickness, minimum) Throughout 100% of the entire body structure, walls, roof, front and rear caps must be used instead of Honeycomb Paper Vertical. This is to eliminate any possibility of rotting in any area of the body structure.

F.121. COMPOSITE FLOOR

F.121.1. Composite Space-age Synthetics Thermo-Lite Board-Tough Series or approved equal Floor that will not rot and is lighter than the standard marine grade plywood floor.

F.122. SIDE DOOR SLIDE OUT BATTERY TRAY

F.122.1. Must have an Extra Heavy Duty Stainless Steel slide out Battery Tray for all auxiliary batteries mounted under Bus. Battery Box must have OEM type battery hold down brackets to securely hold batteries in place. Cloth hold down straps is not ALLOWED. Battery box must be sealed to keep mud from getting on batteries.

F.123. DELETE 3 FOLDAWAY SEATS

F.123.1. This delete's the three foldaway seats for a total seating capacity of fourteen (14) passengers.

F.124. DIESEL ENGINE

F.124.1. Current Power plant for the make and model of chassis

F.125. REAR SPARE TIRE HOLDER

F.125.1. A rear spare tire holder that shall be affixed to the vehicle in a way to allow easy removal of spare tire.

F.126. ADJUSTABLE REAR SUPSENIOR SYSTEM

F.126.1. System shall be a MOR/ryde suspension system or equal shall be used with the following:

F.126.1.1. Installed as per the manufactures recommendations.

F.126.1.2. Fully adjusted for each bus installed on.

F.126.1.3. Warranty to be a 5 year 100,000 mile.

F.127. MEMO/PAMPHLET RACK

F.127.1. The memo/Pamphlet rack will be bolted to inside side wall of bus. (See Figure 6)

F.128. TDSS Fold Away Seat

F.128.1. Seat will be bolted to structural steel. (See Figure 7)

F.129. METAL BOX

F.129.1. Metal box should be bolted and placed between the passenger and driver's seat. (See Figure 8)

F.130. SEAT BELT EXTENSIONS

F.130.1. Extra Seat belt Extensions

SECTION "F"
24' 20 Passenger Composite Bus
RESPONSE SHEET

BASE VEHICLE	COST PER UNIT
TRANSIT BUS (GAS ENGINE)	\$

CHASSIS SPECIFICATIONS

Specify Overall Vehicle Length (outside of front bumper to outside of Rear bumper): _____

SPECIFICATIONS	MINIMUM/MAXIMUM IN INCHES	SUPPLIER'S RESPONSE
OVERALL VEHICLE LENGTH	282" minimum	
OVERALL VEHICLE LENGTH	307" maximum	
WIDTH EXTERIOR	96" minimum	
WIDTH INTERIOR	91" minimum	
HEIGHT EXTERIOR	110" minimum	
HEIGHT EXTERIOR	124" maximum	
HEIGHT INTERIOR	75" minimum	
WHEELBASE	176" minimum	
WHEELBASE	186" maximum	

AIR CONDITIONING

Make and Model of Rear A/C Unit and Cooling Capacity of rear Unit BTU's/Hr. Include literature on unit being proposed.

MAKE/MODEL	
BTU/HR OF REAR UNIT ONLY	

HEATING

MAKE/MODEL	
BTU/HR OF REAR UNIT ONLY	

OPTIONAL ITEMS

COST

OPTIONAL ITEMS	COST PER ITEM
CNG CONVERSION CHASSIS	
CNG BIFUEL CONVERSION CHASSIS	
PROPANE DEDICATED CONVERSION	
PROPANE DUEL FUEL CONVERSION	
BACK-UP MONITOR SYSTEM	
TWO-WAY RADIO (UHF)	

TWO-WAY RADIO (VHF)	
TWO-WAY RADIO (800 MZ)	
DRIVER'S SHIELD	
PAINTED LOWER SKIRTS	
OUTSIDE PASSENGER DOOR SWITCH	
BUS CAMERA SYSTEM	
FABRIC INSERT ON CEILING	
STREET SIDE EXHAUST	
INTEGRATED CHILD SEATS	
VINYL SEATS (PRICE DEDUCTION)	
PUBLIC ADDRESS SYSTEM	
PASSENGER SIGNAL SYSTEM PULL CORD	
PASSENGER STOP REQUEST SIGNS	
FARE COLLECTION BOX	
DESTINATION SIGNS	
BICYCLE RACKS	
DELETE ALTRO CHROMA FLOORING (PRICE DEDUCTION)	
DELETE YELLOW POWDER COATING ON HANDRAILS, GRAB RAILS, AND STANCHIONS (PRICE DEDUCTION)	
100% NIDA-CORE STRUCTURE	
COMPOSITE FLOOR	
SIDE DOOR SLIDE OUT BATTERY BOX	
DIESEL ENGINE	
REAR SPARE TIRE HOLDER	
ADJUSTABLE REAR SUSPENSION SYSTEM	
MEMO/PAMPHLET RACK (See Figure 6)	
FREEDMAN SEATING TDSS (OR EQUIVALENT) FOLD AWAY SEAT (See Figure 7)	
METAL BOX (See Figure 8)	
EXTRA SEAT BELT EXTENSIONS	

A LIST OF OPTIONAL EQUIPMENT AND/OR ACCESSORIES SHALL BE PROVIDED. THE LIST MUST CONTAIN:

- Item
- Description and functionality detail
- Cost of item installed in final delivery of vehicle
- Any changes to listed specifications as outlined above to accommodate options

PROPOSAL EXCEPTIONS

Supplier must list any exceptions here to be used as a part of the Proposal evaluation and analysis. Please list the roman numerical on the standard specs or the number for the options when listing any Proposal exceptions.

FIGURE 1

Figure 1

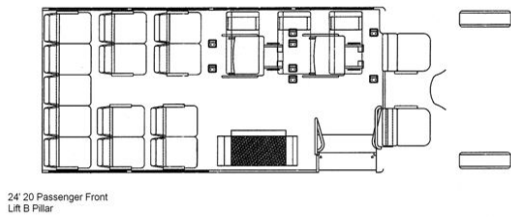


FIGURE 2



FIGURE 3

Figure 1

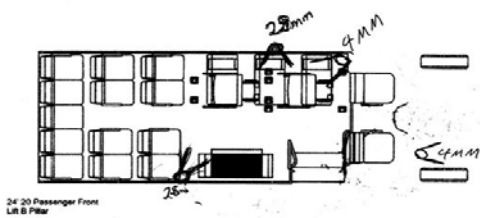


FIGURE 4



FIGURE 5



FIGURE 6



FIGURE 7



FIGURE 8



G. SOLICITATION SPECIFICATIONS FOR 26' 20 PASSENGER, FRONT LIFT METAL TRANSIT VEHICLES

G.1. DELIVERY

- G.1.1.** Vehicle must be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following:
 - G.1.1.1.** The vehicle must have a full tank of fuel when delivered.
 - G.1.1.2.** Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
 - G.1.1.3.** All parts added, as part of the modification process shall be new.
 - G.1.1.4.** Headlights properly aligned
 - G.1.1.5.** Engine Tuned
 - G.1.1.6.** All accessories properly adjusted
 - G.1.1.7.** Electrical, braking and suspension systems inspected
 - G.1.1.8.** Both batteries Charged
 - G.1.1.9.** Front-end alignment must be done after body is put on chassis. Chamber, caster and toe must be adjusted to the center of OEM specs. Ford chassis buses must have adjustable caster, camber bushings installed. Standard OEM bushings will not be accepted. Each bus must come with documentation stating before and after actual alignment readings of bus.
 - G.1.1.10.** All wheels balanced, including spare
 - G.1.1.11.** All lubricants checked, and greased if needed
 - G.1.1.12.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
 - G.1.1.13.** Warranty papers and owner's guide
 - G.1.1.14.** Exterior and interior cleaned and washed.
 - G.1.1.15.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.
 - G.1.1.16.** Under no circumstances are tow vehicles to be attached to any buses.
 - G.1.1.17.** Each vehicle must be delivered to the agency submitting the P.O.

G.2. CERTIFICATE OF ORIGINS

- G.2.1.** Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order five business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery is not acceptable.

G.3. NOTIFICATION

- G.3.1.** Vendor shall notify buyer of vehicle delivery ten business days prior. NOTE: If these specifications contradict any listed in the Federal Regulations, they are superseded by those of the Federal Regulations.

G.4. NO PROTOTYPES

- G.4.1.** Must be a Current production Model, B Pillar type bus that has been in Production for a minimum of one year.

G.5. BODY STRUCTURE

- G.5.1.** The vehicle shall have a purpose-built body, which will provide for a minimum floor to ceiling distance of **75"** at the center aisle.
- G.5.2.** The floor frame must be welded or bolted to the sidewall frame, and the sidewall frame must be welded or bolted to the roof frame.

- G.5.3.** Steel roll cage must form a complete Unitized body and a steel support cage behind front and rear cap to prevent flexing. All steel joints must have gussets for additional strength. All steel parts shall either be galvanized, powder coated or primed to prevent rusting.
- G.5.4.** Composite construction is not acceptable.
- G.5.5.** Construction methods utilizing double-sided tape to secure sidewall skin will not be accepted.
- G.5.6.** If utilizing aluminum for the roof or sidewall skin it must be a minimum of .060" thick with AZDEL SuperLite backing or equivalent.
- G.5.7.** All surfaces and hardware having sharp edges, corners, or angles that could cause injury shall be covered and padded with heavy-duty vinyl-foam type material.
- G.5.8.** The roof will be constructed of the same reinforced materials as the body of the vehicle and of sufficient strength to prevent vibration, drumming and flexing.
- G.5.9.** If exterior roof or sidewall skin is made of Fiberglass it must be a Minimum of 3/16" thick this is not including any FRP, Luan, plywood or foam backings.
- G.5.10.** Fiberglass Roof must be a one piece molded unit that has molded sides to connect to side walls. Bending a flat sheet of fiberglass to connect to walls is NOT ALLOWED.
- G.5.11.** If exterior roof or sidewall skin is made of Galvanized steel it must be a minimum of .024" thick with AZDEL SuperLight backing or equivalent.
 - G.5.11.1.** Roof design shall prevent pooling of water on the roof.

G.6. OEM CHASIS FRAME

- G.6.1.** The rear overhang, measured from the center of the rear axle to the outer edge of the rear bumper, cannot exceed 1/3 of the overall vehicle length.
- G.6.2.** Further, ODOT will not allow re-certification of the chassis OEM GVWR and GAWR.
- G.6.3.** Any vehicle that exceeds the OEM GVWR and/or GAWR will not be accepted. NOTE: Supplier must provide detailed documentation if chassis modification must be made to accommodate length of wheelbase from OEM. The documentation shall include, but not limited to type of modification, frame support, out sourcing of frame work, drive shafts, or quality control.

G.7. DOORS

- G.7.1.** Passenger Entry Door: Passenger entry door must have a Two (2)-panel door design providing a minimum 32" X 80" clear opening. A&M door actuator, or equivalent.
 - G.7.1.1.** Door is located in coach body and electrically power operated controlled by the driver.
 - G.7.1.2.** Each door panel shall be actuated together by a single electric powered overhead actuator.
 - G.7.1.3.** Actuator is equipped with an emergency manual release lever.
 - G.7.1.4.** Vertical door shafts shall be an integral part of the door panels.
 - G.7.1.5.** The top portion of the shaft shall be designed to prevent door panels from rotating out of alignment.
 - G.7.1.6.** Shafts shall pivot on a top-mounted, bronze thrust bushing and a lower stud-mounted alignment pivot, accommodated with a glass-filled molded bearing equal to A&M door actuator, or equivalent.
 - G.7.1.7.** Perimeter door edges shall be sealed with neoprene 2" leading edge seals.
 - G.7.1.8.** Seals shall overlap front and rear to provide an air and watershed.
 - G.7.1.9.** Upper and lower edges of doors shall be tightly sealed against entrance of air drafts and water, including spray from vehicle washing.
 - G.7.1.10.** Operating controls should be located within easy reach of the driver.

G.8. PASSENGERS DOOR INTERLOCK

- G.8.1.** Electric Passenger door in coach body will only work when transmission in Park.

G.9. WHEELCHAIR LIFT DOORS

- G.9.1.** A double door entrance shall be provided on the right (curb) side of the vehicle in front the vehicle's rear wheels.
- G.9.2.** The door opening shall be at minimum width of 48" and height of 70" to accommodate the wheelchair lift specified within this document.
- G.9.3.** Clearance between the top of the door opening and the raised lift platform shall be a minimum of 68".

G.9.4. Each door shall be equipped with an A.L. Hansen Type 23 Door Check or equivalent which is a Top Mounted Spring Loaded Device that will securely hold the door in the open position while the wheelchair lift is in operation. (Sliding door is not acceptable).

G.9.5. Each door must have a window which shall be the same height as the passenger windows.

G.10. COACH BODY DOOR LOCKS

G.10.1. All doors shall be equipped with a lock.

G.11. DRIVER'S DOOR AND CO-DRIVER'S DOOR

G.11.1. Must have Power windows, Power door locks

G.12. RUNNING BOARDS

G.12.1. Extra Heavy-duty Running Boards that are bolted to Coach Body for added step strength

G.12.2. Steps must be able to hold over 400lbs.

G.13. HANDRAIL

G.13.1. Handrails (left and right) of the front passenger door shall be provided. Cross-sectional diameter of handrail shall be between 1 ¼" and 1½".

G.13.2. Entrance handrails shall not be padded.

G.13.3. Must have at minimum a wall thickness of 18 gauge steel.

G.13.4. Two overhead ceiling-mounted handrails with mounting brackets at 24" on centers placed over the aisle shall be provided for the full length of the vehicle's passenger aisle way, except in wheelchair lift area and over passenger entry door.

G.13.5. All handrails must be Powder coated Steel that will not rattle or Flex and mounting bolts shall be bolted into Structural steel.

G.13.6. Color of Handrails shall be bright yellow (to assist the visually impaired),

G.13.7. Wood mounting is not allowed.

G.14. GRAB RAILS

G.14.1. Must have grab rails with the following:

G.14.1.1. Shall be installed in the entrance to the vehicle running parallel to the steps in a configuration which allows persons with disabilities to grasp while entering or exiting the vehicle.

G.14.1.2. Cross-sectional diameter of grab rail shall be between 1 ¼" and 1½"

G.14.1.3. Must be at minimum a wall thickness of 18 gauge steel.

G.14.1.4. All Grab rails must be Powder Coated Steel that will not Rattle or Flex and mounting bolts shall be bolted into Structural steel.

G.14.1.5. Color of grab rails shall be bright yellow (to assist the visually impaired),

G.14.1.6. Wood mounting is not allowed.

G.15. STANCHIONS

G.15.1. Must be at minimum a wall thickness of 18 gauge steel.

G.15.2. All stanchions must be Powder Coated Steel that will not Rattle or Flex and mounting bolts shall be bolted into Structural steel.

G.15.3. Wood mounting is not allowed.

G.15.4. Color of stanchions shall be bright yellow (to assist the visually impaired),

G.15.5. A stanchion and vinyl padded modestly panel shall be provided at entrance door in front of first passenger seat.

G.15.6. A stanchion from the floor to roof shall be installed on the interior left side of the front passenger door approximately 14 inches inside the vehicle.

G.15.7. A horizontal handrail shall be installed between the stanchion and the right wall approximately 30 inches above the floor.

G.15.8. A stanchion shall be located in the rear of the driver's seat at the edge of the aisle and a handrail shall extend from the stanchion to the side wall of the vehicle behind the driver's seat.

G.15.9. The stanchion shall not interfere with a rearward travel of the driver's power seat adjustment.

G.16. MODESTY PANEL

- G.16.1.** A modesty panel shall be positioned at the rear edge of the step well.
- G.16.2.** This will be made up of a stanchion at the inner rear corner of the step well with a rail running from that stanchion to the wall at windowsill height and the modesty panel installed therein.
- G.16.3.** Panel shall have no less than 1 ½" between the bottom of the panel and the floor to facilitate cleaning of the floor.
- G.16.4.** Fastening of the panel shall be by bolts or rivets.
- G.16.5.** **Screws** will not be acceptable.

G.17. STEPWELL

- G.17.1.** Must be made of minimum 14 gauge 304 Stainless steel to prevent rusting and powder coated white.
- G.17.2.** Must have two steps covered with the same slip resistant floor covering as specified within this document.
- G.17.3.** maximum 12" minimum 10" from ground to first step,
- G.17.4.** 9" riser, Tread depth minimum 8½".
- G.17.5.** All steps to get up to floor level must be in step well area.

G.18. INTERIOR

- G.18.1.** All interior panels shall be vinyl coated with AZDEL SuperLite backing, vinyl coated metal, FRP or equivalent with same durability and cleaning ease.
- G.18.2.** Vendor shall provide a list of available colors at their quoted price and may also include a list of colors available at additional cost.
- G.18.3.** Interior shall be trimmed with an attractive molding, covering all seams.
- G.18.4.** All surfaces and items or hardware in passenger compartment having sharp edges, corners, or angles that could cause injury shall be passed with heavy-duty vinyl covered foam-type material.
- G.18.5.** Door and instrument panel is to be painted or otherwise finished to match overall tones of interior panels

G.19. DRIVERS AREA

- G.19.1.** The drivers area shall consist of an ergonomically designed molded dash console, located conveniently to the driver's seated position and in full view of the driver.
- G.19.2.** Supplemental control panels mounted above the driver's head or above windshield are not accepted.
- G.19.3.** All switches are to be properly labeled and illuminated.
- G.19.4.** The instrument control panel shall be painted or otherwise finished with non-reflective, anti-glare black finish.

G.20. STORAGE COMPARTMENT

- G.20.1.** Vehicle must have a large overhead driver storage compartment.
- G.20.2.** This compartment must have a lip on the inside to protect objects from opening compartment door. Also shall provide easy access to clearance lights connectors through top of Storage Compartment. And provide a door latch to hold door open.

G.21. FLOOR ASSEMBLY

- G.21.1.** **The floor shall consist of** 3/4 inch Advantech Engineered flooring or equivalent with Undercoating.
- G.21.2.** Construction of sufficient strength and support to not allow flexing of the finished or surface floor. The chassis, body and flooring shall be attached in such a manner as to act as one unit without any movement or flexing at the joints.
- G.21.3.** Shall have Floor Coving material at wall.

G.22. SLIP-RESISTANT FLOOR COVERING

- G.22.1.** Floor covering shall be slip resistant vinyl flooring, constructed with aluminum oxide, silicon carbide and optional PVC chip blended throughout a high quality vinyl wear surface.
- G.22.2.** **Top coating** is not acceptable.
- G.22.3.** Backing to be polyester/cellulose material with fiberglass fiber reinforced center scrim for additional durability.
- G.22.4.** Bacteriostats will be incorporated providing all exposed surfaces with excellent anti-bacterial properties.

- G.22.5. Must be** Altro Chrome with a minimum thickness of 2.2 millimeters or equivalent
- G.22.6.** Color to be selected from current Altro color range by each agency.
- G.22.7.** The whole floor will be a uniform thickness throughout the vehicle, eliminating the need for ribbed surfaces, while exceeding the ADA minimum slip resistance standard rating of .06 static coefficient of friction under dry or wet conditions.
- G.22.8.** Coving material is to be installed to support floor when rolling floor covering up the sidewall of vehicle to the seat track.
- G.22.9.** Seams must be heat welded to provide a permanent waterproof seal against water penetration leading to premature sub-floor failure or curling leading to possible tripping hazards.
- G.22.10.** Landing area and step edgings are to be Altro yellow safety vinyl edging.
- G.22.11.** Edging is to heat welded to the main floor and step tread to provide for a long lasting seam.
- G.22.12.** The floor must be installed according to manufacturer's directions using proper tools, accessories and adhesives.
NOTE: If the flooring is not installed according to the flooring manufacture (heat welded and adhesives) specifications the bus will not be accepted.

G.23. GAUGES

- G.23.1.** Vehicles shall be equipped with the following needle-type gauges (lights in lieu of gauges are not acceptable): and all shall be in easy view of driver.
- G.23.2.** If OEM gauges are not available then Stewart Warner gauges or equivalent shall be used.
 - G.23.2.1.** OEM chassis Voltmeter Plus a Auxiliary Voltmeter Gauge
 - G.23.2.2.** Oil pressure
 - G.23.2.3.** Temperature
 - G.23.2.4.** Fuel level
 - G.23.2.5.** Speedometer
 - G.23.2.6.** Odometer
 - G.23.2.7.** Tachometer
 - G.23.2.8.** Engine hour meter

G.24. BUMPERS

- G.24.1.** Front and rear bumpers shall be securely fastened to the chassis frame to adequately absorb shock from impact. In no case are the bumpers to be fastened directly to the vehicle body.
- G.24.2.** Rear bumper must be an energy absorbing Romeo Rim with Heavy Duty bumper mounting brackets that use four 7/16 grade 8 bolts per bracket or equivalent.
- G.24.3.** Front bumper and grille shall be chrome plated.

G.25. INSULATION

- G.25.1.** Insulation shall be provided in both walls, roof, front cap, rear wall and roof side radius area where roof meets walls.
- G.25.2.** Adequate insulating properties shall be provided to ensure minimum heat, cold and noise penetration into the vehicle interior.
- G.25.3.** Insulation may be accomplished through the use of fiberglass, vacuum design or equivalent.
- G.25.4.** Must have a minimum R-value of 6, and fire resistant.

G.26. AIR CONDITIONING

- G.26.1.** Air conditioning efficiency is of paramount concern to the purchaser. Air conditioning shall be adequate to cool both the passengers and driver areas. Only vehicles offering top of the line commercial transit type air conditioning systems will be considered.
- G.26.2.** The vehicle's electrical system shall be designed and integrated such that ample electrical supply is provided to maintain optimum air conditioning performance without battery discharge.
- G.26.3.** The air conditioning system offered shall have a proven transit performance record and shall be provided by a nationally recognized manufacturer of bus air conditioning.

- G.26.4.** The OEM Dash unit and Rear Air Conditioning unit shall be two separate stand alone systems. Tying into the front OEM dash system is not allowed.
- G.26.5.** Rear evaporator shall have an easy accessible return air filter; having to remove evaporator cover housing to gain access to filter will not be accepted.
 - G.26.5.1.** The rear air conditioning system shall provide a minimum cooling capacity of 65,000 BTU/Hr.
 - G.26.5.2.** A Carrier model AC-833MAX System or equivalent. The Combined Total cooling Capacity of the OEM dash unit and Rear Unit shall be a minimum of 78,000 BTU/hr.
 - G.26.5.3.** Rear Evaporator shall have an easy accessible return air filter; having to remove the evaporator cover housing to gain access to filter will not be accepted.
- G.26.6.** THE REAR A/C SYSTEM MUST HAVE THE FOLLOWING SPECIFIED COMPONENTS
 - G.26.6.1.** Carrier EM-3 Evaporator or equivalent
 - G.26.6.2.** Carrier CM-3 Condenser or equivalent
 - G.26.6.3.** Carrier TM-21 Compressor or equivalent
 - G.26.6.4.** Carrier Flex CLICK SAE J-2064 Type E Color coded hoses or equivalent.
 - G.26.6.5.** Service Ports for rear Air conditioning System must be easily accessible and located under the bus near the rear A/C Condenser.
 - G.26.6.6.** A conventional dash mounted unit for the front of the driver's area of the vehicle. Both units shall be equipped with multi-speed fans (minimum 2 speeds).
 - G.26.6.6.1. Evaporator fans shall produce a minimum of 1600 CFM.
 - G.26.6.7.** The Rear system shall include a skirt mounted commercial condenser. Condenser fan(s) shall produce a minimum of 2400 CFM of airflow over the coils. All components of the condenser unit shall be coated or constructed with a corrosion resistant material to protect the unit from road salts other foreign substances that might be sprayed on the unit.
 - G.26.6.7.1. Condenser unit shall be positioned so as not to draw air from under vehicle. NOTE: Air conditioning refrigerant lines, to include their foam covering, will not be exposed to road hazards or elements of the weather. All air conditioning refrigerant lines, which extend from the engine area to the rear evaporator, shall be protected from damage. And all drain lines, hoses and wiring from evaporator shall be covered from view.
- G.26.7.** VENTILATION
 - G.26.7.1.** Vents provided in driver area.
- G.26.8.** HEATING
 - G.26.8.1.** Front & rear heater core factory installed hot water type, of sufficient capacity to warm cabin area and clear windows of snow, ice and fog.
 - G.26.8.2.** An easily accessible clearly marked shut-off ¼ turn ball valves shall be installed in heater supply and return lines which will allow the water to be cut off to the rear heater core.
 - G.26.8.3.** The water lines for the rear heater core shall be protected from damage.
 - G.26.8.4.** Rear heating unit shall provide a minimum of 65,000 BTU's/Hr. this is in addition to front dash unit.

G.27. SAFETY EQUIPMENT

- G.27.1.** All miscellaneous equipment must be secured to the vehicle and easily accessible.
- G.27.2.** First aid kit: (24M – National Standard School Bus Metal)
 - G.27.2.1.** Must be Certified Safety Mfg. Model S203-045 or equivalent.
- G.27.3.** Fire extinguisher – Multi-purpose Stored Pressure Dry Chemical Extinguisher.
 - G.27.3.1.** **Must be a** 5 lb. type 3A:40B: C Pro Line, Kiddie Model # FXBND9 or equivalent.
 - G.27.3.2.** Must have a gauge to indicate state of charge and mounted to vehicle using a bracket and having a heavy duty vinyl cover.
- G.27.4.** Triangle warning devices (3), with storage container.
 - G.27.4.1.** must meet FMVSSP # 125
- G.27.5.** Bloodborne Pathogens infection control kit.
 - G.27.5.1.** Must be Certified Safety Mfg. Model #FK200-931, or equivalent.

G.27.6. Seat belt cutter

G.28. MIRRORS

G.28.1. Exterior:

G.28.1.1. **Heavy Duty Heated Power Mirrors** by Velvac Model 2020 Deluxe Head with Turn Signals or equivalent.

G.28.1.2. Mirrors are to be mounted to the driver and copilot doors in the same position as the OEM mirrors.

G.28.2. Interior:

G.28.2.1. Vehicle must have the two (2) following mirrors.

G.28.2.2. Must be OEM Day/night, 10" rear view mirror, confirming to FMVSS No. 111. (This mirror will be deleted if purchaser chooses backup camera as an option).

G.28.2.3. Passenger viewing and backup mirror shall be made of safety glass, having rounded corners and protective edges, and a 6" x 16". This mirror is in addition to the mirror mounted on windshield

G.28.3. Fresnel Lens: 11" x 14" Lens on rear window.

G.29. SEATS

G.29.1. Driver's Seat and Co-Driver's Seat:

G.29.1.1. The driver seat must be a deluxe bucket, OEM high back 6-way power seat.

G.29.1.2. The Co-Driver's Seat must be adjustable fore and aft.

G.29.1.3. Seats must be padded with allergy-free material and upholstered with a durable transit quality level 5-cloth fabric.

G.29.1.4. Both seats must have adjustable lumbar

G.29.1.5. Both seats must have a certified seat belt and shoulder harness with retractor shall be attached to frame.

G.29.1.6. Both seats must have reclining backs and padded armrests. NOTE: Supplier must supply seating diagram reflecting all listed dimensions for approval.

G.30. PASSENGER SEATS

G.30.1. Seating shall be provided for fourteen (14) ambulatory passengers with three (3) foldaway seats that will accommodate six (6) passengers for a total seating capacity of twenty (20) passengers.

G.30.2. Wheelchair spaces will each be equipped with a wheelchair securement tie down and occupant restraint system, which meets the Americans with Disabilities Act requirements.

G.30.3. All seats shall be "bucket" semi-contoured transit type.

G.30.4. Seats are to be consistent with what is accepted as transit quality construction. School bus type seats are not acceptable.

G.30.5. Seat frames are to be welded.

G.30.6. Seats must be padded with allergy-free material and upholstered with a durable transit quality level 5-cloth fabric.

G.30.7. If the seating configuration being proposed is different than that shown in Figure 1, a diagram must be furnished.

G.30.8. Aisle seats must have padded fold up armrests and Anti-Vandal grab handles on the seat backs.

G.30.9. **Seats must be** Freedman Seating Mid Back type bucket seat or equivalent.

G.30.10. Seat belts to be installed at each seat position, and must be a Retractable under Seat Retractor, type of seat belts.

G.30.11. Must include Two (2) Seat Belt Extensions that will fit Passenger Seat Belts.

G.30.12. A commercial quality seat belt knife fastened to bus in driver's reach.

G.30.13. All seats shall provide a minimum seat width of 17" per passenger, or 34" per two (2) -passenger seats.

G.30.14. Minimum depth of seat (front to back contour) 18"

G.30.15. All seats including any foldaway seats must be bolted to structural steel.

G.30.16. Bolting seats to plywood floor without bolting into structural steel under floor is NOT ALLOWED.

- G.30.17.** All seat tracks must be welded to steel sidewalls and steel floor sections. Riveting or bolting seat tracks to sidewalls is NOT ALLOWED.
- G.30.18.** Seats shall be fully padded and shall be constructed with a no-sag spring bottom suspension. Plywood seat bottoms are unacceptable.
- G.30.19.** Seats shall be covered with a durable transit quality level 5-cloth fabric.
- G.30.20.** Seats shall be spaced on a minimum of 28 1/2" centers, allowing for a minimum of 10" between the front of the bottom cushion and the back of the next forward seat.
- G.30.21.** Minimum aisle width shall be 16".
- G.30.22.** All seats shall meet, as minimum, FMVSSP 302 207 requirements. Any additional requirements would be optional.

G.31. PRIORITY SEATING SIGNS

- G.31.1.** Each vehicle shall contain sign(s), which indicate that, the row of forward –facing seats located in the front of the vehicle are priority seats for persons with disabilities, and that other passengers should make such seats available to those who wish to use them.
- G.31.2.** The signs shall be located on the interior walls directly above the front row of forward-facing seats.
- G.31.3.** Signs must follow FTA 49CFR38 Section 38.27 for the required lettering characters of the signs.

G.32. LIGHTING

- G.32.1.** All manufacturers' lighting added to the vehicle (both interior and exterior) shall be provided with light-emitting diode (LED) lights.
- G.32.2.** Door activated 4 way flashers that are activated when passenger door is opened. This includes 2 additional amber LED flashing lights mounted high on each side of the rear wall.
- G.32.3.** The location, type and hookup of all exterior lights and reflectors to conform to Federal Motor Vehicle Safety Standards and Procedures.
- G.32.4.** The number of interior lights and their light output shall be determined by providing a minimum average of 7 foot-candles of illumination on a 1 square foot plane, at an angle of 45 degrees from horizontal, centered 33 inches above the floor and 24 inches in front of the seat back at each seat position.
- G.32.5.** Floor surface in the aisles shall be a minimum of 10 foot-candles.
- G.32.6.** Each vehicle shall be equipped with OEM daytime running lights.
- G.32.7.** Must have Red LED lights over all emergency exits
- G.32.8.** All interior lighting in the passenger area shall be mounted in the ceiling cove at the sidewall with a minimum of three (3) fixtures on each side of the vehicle. Lighting fixtures shall be installed on the interior walls and ceiling in a manner that does not present a head strike to the passengers.
- G.32.9.** All clearance lights front, rear and side shall have metal armored shields. This shall protect lights from tree limb damage.
- G.32.10.** Tail lights are to be recessed and shall not protrude more than 2 inches from the body; they shall include a pair of amber combinational hazard and signal lights. Rear tail-lamps shall also include a pair of red tail lights and red stop lights, which may be combinational. (Ref: Dialight 46121RB-Red, 46121AB-Amber or equivalent)
- G.32.11.** Side signal lamps, with marker, shall be provided independently or be incorporated into the center of the vehicle. Location must be above and in front of the rear wheel opening and provide visibility from behind the rear wheel opening. (Ref.: Dialight 18001AB811 or equivalent)
- G.32.12.** Clearance marker lights shall be installed surface-mounted, facing the front, rear, and each side at rear. (Ref.: Dialight 15001RB, 15001AB or equivalent)
- G.32.13.** The third brake light shall be center-mounted above the rear window, minimum 18" in length. (Ref.: Dialight 87121RB or equivalent)
- G.32.14.** Two back-up lights, one mounted on each side of the body rear cap. (Ref.: Dialight 46001CB or equivalent)
- G.32.15.** Step lighting shall be mounted to provide light for the entire step-well and an area a minimum of three (3) feet beyond the first step on the ground area outside the bus (Ref.: Dialight 170-81CB or equal). Note: The step lights shall be extinguished when the front door has closed.
- G.32.16.** Raised floor step lighting shall be provided by one strip light mounted in the step riser. Light strip shall be a minimum of 18 inches and recess-mounted to protect from accidental damage by passengers contacting light while using the step. (Ref.: Dialight 87121CB or equivalent).

- G.32.17.** Exterior step light shall be mounted away from wheel splash. (Ref.: Dialight #VSW-CC-19B-35-801 or equivalent)
- G.32.18.** Wheelchair lift area light shall be positioned in the manufacturer's standard location in order to illuminate the area in the immediate vicinity of the wheelchair lift platform for night operation. The light shall be automatically activated only when the wheelchair lift doors are open. (Ref.: Dialight Light #46121CB or equivalent)

G.33. ELECTRICAL WIRING

- G.33.1.** All wiring shall meet the requirements of SAE recommended practice J878a, Type SXL.
- G.33.2.** Connections with 3 to 12 circuits shall be environmentally sealed high impact plastic connectors with pull apart locking tabs.
- G.33.3.** All non-OEM connections containing one or two circuits shall be made with Posi-lick connectors.
- G.33.4.** No butt connectors will be allowed.
- G.33.5.** All added wiring shall be in a loom and securely clipped for maximum protection and routed in separate hangers from the heater hoses or air conditioning hoses.
- G.33.6.** Clips shall be rubber or plastic coated to prevent them from cutting the wiring insulation.
- G.33.7.** All electrical wiring shall be automotive stranded and sufficient size to carry the required current without excessive voltage drop and shall be color, number and function coded at a minimum of eighteen (18) inch intervals.
- G.33.8.** No electrical, stationary or mechanical device may block the removal of the engine cover inside the bus.
- G.33.9.** All wiring passing through the body metal shall have anti-chaffing grommets.
- G.33.10.** Each vehicle shall contain a set of detailed system by system "as built" wiring schematics covering all electrical equipment and electrical circuits installed, complete with wiring codes for each vehicle ordered.
- G.33.11.** Identification on the wiring diagram must tie the diagram to the bus.

G.34. WINDOWS

- G.34.1.** All windows to be of tempered safety glass and water and airtight.
- G.34.2.** Window in driver's door, windshield and entrance door glass are all to be tinted.
- G.34.3.** All the windows in the passenger area are to be factory-installed smoked glass with at minimum 30 percent tint. No Add on Film
- G.34.4.** Windows must be a top horizontal sliding T- transit type that the ventilation openings are located at the top of the window.
- G.34.5.** Must be constructed of corrosion resistant aluminum frames. NOTE: All windows and emergency exits must meet the performance and operational requirements as outlined in the Federal Motor Vehicle Safety Standards and Procedures.

G.35. EMERGENCY EXITS

- G.35.1.** At least one (1) window on each side at or near the rear of the vehicle shall be equipped with emergency release latches to provide emergency exits.
- G.35.2.** Release instructions shall be provided at or near the release handles and an audible alarm shall be installed near the driver, which will be activated when the window is released.

G.36. BACK-UP ALARM

- G.36.1.** Alarm shall be waterproof ECCO #530 or equivalent.
- G.36.2.** Must be mounted in the rear of the vehicle
- G.36.3.** Must be readily audible outside the vehicle when the transmission is in reverse.

G.37. WHEELCHAIR LIFT

- G.37.1.** An electric powered hydraulic wheelchair lift shall be installed inside the vehicle at the side door.
- G.37.2.** Bus must meet FMVSS 403-404 lift installation requirements.
- G.37.3.** Wheelchair lift shall meet the following MINIMUM requirements.
- G.37.3.1.** A Braun wheel chair Lift NL919FIB-2 (Millennium-2 Series) or equivalent. Ground cable from lift must be connected to vehicle frame. Connecting ground cable to lifts mounting bolts is NOT ALLOWED.
- G.37.3.2.** 800 pound load capacity lifts assembly.
- G.37.3.3.** An electric hydraulic pump, powered by vehicle's electrical system.

- G.37.3.4.** Platform dimensions 34" wide by 51" long.
- G.37.3.5.** Platform to be constructed of 11 gauge expanded metal.
- G.37.3.6.** Platform shall be stored in an upright position within the vehicle.
- G.37.3.7.** Powered operation for (1) unfolding and folding the platforms and (2) raising and lowering the platform.
- G.37.3.8.** Emergency platforms release to permit the platform to be unfolded manually and lowered by gravity.
- G.37.3.9.** To prevent the wheelchair from rolling off, a barrier 1 ½" at minimum shall be provided on the outer edges of the platform and have an outboard roll stop that engages and locks before the platform leaves the ground to form a safety barrier when platform is raised or lowered
- G.37.3.10.** A free floating bridge plate will be replaced between the lift platform and the vehicle. This bridge plate will be hinged in a manner to permit upward movement should a person's foot become entangled.
- G.37.3.11.** Lift shall be securely bolted to the floor and floor reinforced as necessary to support the load.
- G.37.3.12.** To permit the lift platform to be raised without electrical power, a hand pump that allows the operator to raise the platform shall be installed.
- G.37.3.13.** An interior light shall be provided to illuminate the lift area;
- G.37.3.14.** All moving parts likely to cause personal injury shall be shielded.
- G.37.3.15.** Working parts, such as cables, pulleys, and shafts, which can be expected to wear, and upon which the lift depends for support of the load, shall have a safety factor of at least six, based on the ultimate strength of the material. Nonworking parts, such as platform, frame, and attachment hardware, which would not be expected to wear, shall have a safety factor of a least three, based on the ultimate strength of the material.
- G.37.3.16.** Lift shall be installed as specified by the manufacturer and shall be thoroughly tested prior to delivery.
- G.37.3.17.** Repair manual, parts list and instructions for adjusting hydraulic valves and electrical equipment shall be provided.
- G.37.3.18.** Lift controls shall be interlocked with the vehicle brakes, transmission, or door, or shall provide other appropriate mechanisms or systems to ensure that the vehicle cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks or systems are engaged.
- G.37.3.19.** The left control cord must be secured in a manner not to interfere with the door being closed.

G.38. USE BY STANDEES

- G.38.1.** Lift shall accommodate persons using walkers, crutches, canes or braces or who otherwise have difficulty using steps. The platform may be marked to indicate a preferred standing position

G.39. HANDRAILS

- G.39.1.** Platform on lift shall be equipped with handrails on two sides, which move in tandem with the lift, and which shall be graspable and provide support to standees throughout the entire lift operation.
- G.39.2.** Handrails shall have a usable component at least 8" long with the lowest portion a minimum 30" above the platform and the highest portion a maximum 38" above the platform.
- G.39.3.** Capability of withstanding a force of 100 pounds concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure required.
- G.39.4.** Cross-sectional diameter of handrail shall be between 1 ¼" and 1½", and shall have eased edges with corner radii of not less than 1/8".
- G.39.5.** Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

G.40. WHEELCHAIR SECUREMENT

- G.40.1.** Wheelchair parking space shall have clear floor area of 30" wide by 52" long and be equipped with a four-point wheelchair securement tie-down.
- G.40.2.** Occupant restraint system must be Q'Straint Q-8306-SC or equivalent. Shall have a Retractable lap/shoulder belt combo with a Retractable height adjuster that are anchored to floor and wall with L Tracks that meet SAE J2249 and ADA requirements.
- G.40.3.** Tracks shall be recessed into the floor and not shift position under anticipated loads. Any tracks overlapping the access path must be flush with the floor to prevent passengers from tripping.
- G.40.4.** The L tracks and Slide N Click anchors must be bolted to structural steel.
- G.40.5.** Bolting to plywood floor without bolting into structural steel under floor IS NOT ALLOWED.

- G.40.6. Wheel Chair Securement system must be** Q'Straint QRT MAX Automatic Retractor System Q-8306-SC with Slide N Click anchorage system and J-Hooks, or equivalent.
- G.40.7.** There must be 52" at minimum and 54" maximum measured from center to center between front and rear Slide N Click anchor points. And be fully assembled and ready to use.
- G.40.8.** Must have securement pouches attached to wall to store wheelchair securement tie-downs.
- G.40.9.** Must include eight (8) Q'Straint Q5-7580 Webbing Loops or equivalent for Securing Scooters. Wheelchair location must be in the rear of bus, one beside the other. NOTE: Each wheelchair securement location shall have sign designating it as such. Lettering size and type on these signs shall comply with the Americans with disabilities Act Regulations,

G.41. WHEELCHAIR ACCESSIBILITY SYMBOL

- G.41.1.** The vehicle will display the international wheelchair accessibility symbol of a person in a wheelchair that is outlined in white on blue background.
- G.41.2.** This symbol will be placed on all four sides of the bus.

G.42. VEHICLE COLORS

- G.42.1.** Body: Vendor to supply list of colors and prices available.

G.43. WINDOW BLACKOUT PAINT

- G.43.1.** Bus must have window blackout paint.
- G.43.2.** See Figure 2

G.44. COLOR OF SEATS

- G.44.1.** Proposal must include all colors available
- G.44.2.** Successful vendor shall coordinate with the agency issuing this purchase order in the selection of material and color of the seats.
- G.44.3.** Seats shall be fully padded.

G.45. VEHICLE FLOOR PLAN

- G.45.1.** A proposed floor plan including all pertinent interior dimensions such as overall length, width, distance between seats, etc.,
- G.45.2.** Shall be submitted with the proposal.

G.46. CHASSIS SPECIFICATIONS:

- G.46.1.** GVWR, axle, spring and tire:
 - G.46.1.1.** 14,500 lb. GVWR minimum
 - G.46.1.2.** Front axle- 5,000 lb. GAWR minimum
 - G.46.1.3.** Rear axle – 9,500 lb. GAWR minimum
 - G.46.1.4.** (Dual wheel are required on rear axle.)
 - G.46.1.5.** Front springs – heavy duty, 5,000 lb minimum
 - G.46.1.6.** Rating combined at ground.
 - G.46.1.7.** Rear springs – heavy duty, 9,500 lb minimum
 - G.46.1.8.** Ratings each, at ground.
- G.46.2.** It is the supplier's responsibility to calculate the actual loaded weight, spring and axle ratings so that the vehicle is engineered for safety.

G.47. TIRES

- G.47.1.** Tire size must meet 14,500 GVWR minimum and must be steel radial with "E" load rating.
- G.47.2.** Steel or brass valve stems 1.5" in length shall be used on all wheels with elbow extensions on the inside rear dual for access.
- G.47.3.** Stainless steel or brass valve caps with an inner air seal shall be used.
- G.47.4.** One mounted spare tire and wheel to match existing tires/wheels to be shipped loose.

G.48. ENGINE: GASOLINE

G.48.1. Minimum – (6.8 liter) displacement.

G.48.2. Must Have a CNG Capable Engine with hardened intake and exhaust valves with hardened intake and exhaust valve seats Ford Option # 91G.

G.49. RADIATOR

G.49.1. Heavy Duty, with factory installed recovery system.

G.49.2. The cooling system must be winterized with ethylene glycol for temperatures to –20 degrees F (-28.8889 C).

G.50. TRANSMISSION

G.50.1. At minimum, heavy-duty 5-speed automatic with overdrive, lock-up converter, lock in park and a heavy-duty auxiliary transmission cooler.

G.51. WHEEL WELLS

G.51.1. The wheel housing shall be of sturdy heavy-duty construction of a minimum 14 gauge galvanized steel or stainless steel and provide ample tire clearance during all operating conditions.

G.51.2. Fender and splash aprons (underskirt) of durable construction shall be provided so as to provide maximum deflection of the wheel splash.

G.51.3. There shall be sufficient clearance to enable easy removal of wheels mounted with inflated tires.

G.52. REAR FENDER FLARES

G.52.1. Vehicle must have Rubber or Fiberglass Fender Flares.

G.53. DRIVE SHAFT

G.53.1. Drive shaft must be properly supported, balanced and guaranteed not to vibrate. Each drive shaft shall be equipped with a protective metal guard or guards to prevent whipping through the floor or dropping to the ground in the event of a tube or universal joint failure, or if the drive shaft breaks.

G.54. WHEEL COVERS

G.54.1. Bright Metal Stainless Steel Wheel inserts.

G.55. BRAKES

G.55.1. Two (2) braking systems are required. Service brakes shall be dual hydraulic, disc front and disc rear.

G.55.2. The parking brake system shall be operated by a cable to the rear wheels, or Drive Shaft Drum Brake.

G.55.3. The braking system shall be adequate for the GVWR of the vehicle.

G.56. GEAR RATIO

G.56.1. Must be a 4:56 gear ratio

G.57. FUEL CAPACITY

G.57.1. Must be at minimum of 55 gallons

G.58. FUEL PUMP ACCESS DOOR

G.58.1. An aluminum diamond plate access door shall be provided in the floor of the vehicle above the fuel tank to allow the fuel pump to be serviced without removal of the tank.

G.58.2. Door must be Large enough and centered over fuel pump to allow easy removal of pump.

G.59. SHOCK ABSORBERS

G.59.1. Must have heavy duty, front and rear shock absorbers.

G.59.2. Rear Shock Absorbers upper mounting brackets Shall Not be Covered by any Body Braces that would prevent easy access to Upper Shock Mounting Bolts and Nuts.

G.60. SUSPENSION

G.60.1. Rear shall have Leaf Springs.

G.60.2. Right rear shall have an extra leaf to compensate for weight of wheelchair lift.

G.61. STEERING

G.61.1. Must have power-assisted steering

G.61.2. Must have tilt wheel,

G.61.3. Must have factory installed cruise control.

G.62. AIR CLEANER

G.62.1. Must have a heavy duty, dry type air cleaner

G.63. OIL FILTER

G.63.1. Must have a heavy duty, throw away type oil filter.

G.64. ALTERNATOR

G.64.1. Vehicle shall have Ford OEM 225-amp Alternator or equivalent.

G.65. BATTERIES

G.65.1. Two (2) heavy duty, maintenance free, minimum 650 CCA at 0 degrees F (-17.778 C) Batteries must be wired together in a parallel circuit to increase total battery capacity.

G.65.2. Front OEM battery must have OEM type battery hold down brackets to securely hold battery in place.

G.65.3. Instep Battery Box that is bolted down securely and must be sealed to keep mud and debris from getting on Rear Coach Battery.

G.65.4. Battery must be bolted within this instep box. Cloth holds down straps are not ALLOWED.

G.65.5. Battery box must be sealed to keep mud from getting on batteries. SEE FIGURE 4 & 5

G.66. GROUNDS

G.66.1. A ground of the battery cable size, shall be installed between the engine and chassis frame.

G.66.2. The vehicle body shall be properly grounded to the chassis frame at least 2 (two) places.

G.66.3. Engine and body grounds shall be installed to handle subsystem electrical capacity.

G.66.4. Grounding wires fastened to the frame shall use a bolt with a nut installed in a proper sized hole with dielectric compound applied to the cleaned surfaces, bolt, and cable end.

G.66.5. Lift pump motor shall be grounded directly to chassis frame using a cable of the same size as the pump motor feed wire.

G.66.6. All exterior lights and accessories added by the body manufacture shall be grounded by an in harness ground attached at a fuse panel common grounding point.

G.66.7. For all ground wire connections paint shall be removed at the grounding point to provide a surface, cable end, bolt, and nut where each positive or grounding cable is attached.

G.67. STABILIZER BAR

G.67.1. Heavy Duty Front and rear

G.68. HORN

G.68.1. Vehicle must have a dual, electric horn

G.69. SIGNAL

G.69.1. Directional and self-canceling with hazard warning flashers.

G.70. TOW HOOKS

G.70.1. Shall have 2 tow hooks on Rear.

G.71. WINDSHIELD WIPERS

G.71.1. Minimum two speeds with intermittent feature and washer.

G.72. KEYS

G.72.1. Vehicle must include three (3) sets of keys for the entire bus.

G.73. RADIO

G.73.1. Must have an AM & FM CD radio

G.73.2. Radio must be of same manufacture as chassis. Radio must be mounted in the Chassis OEM Location in dash.

G.73.3. Must have a minimum of six speaker's two (2) OEM speakers in front chassis doors. The coach body's four (4) speakers shall be a 3-way standard speakers.

G.74. PAINTING, DECALS AND MONOGRAMS

- G.74.1.** All signs required by State and federal law shall be affixed to each vehicle exterior and interior.
- G.74.2.** It is up to the bus dealer/manufacture to add such signs and decals upon delivery of vehicle.
- G.74.3.** No decals, name plates, or painted identification of the bus dealer/manufacture are to be added to the vehicle.

G.75. UNDERCOATING

- G.75.1.** Floor and wheel housing, anti-rust factory installed.

G.76. WARRANTY REQUIREMENTS

- G.76.1.** The contractor warrants and guarantees to the original Procuring Agency each complete bus and specific subsystem and components for 100% parts and labor as follows:
 - G.76.1.1.** OEM standard factory warranties for chassis and engine.
 - G.76.1.2.** Complete bus body and body structure, exterior, wiring, flooring installation, and paint are warranted to be free from defects, related defects and to maintain structural integrity for a period of Five (5) year or 100,000 miles.
 - G.76.1.3.** Add-on components shall have component manufacture's standard warranty.
 - G.76.1.4.** Warranty shall begin on the date that the vehicle delivery is accepted by the agency issuing the purchase order.
 - G.76.1.5.** The wheelchair lift shall have a five (5) year unlimited mileage and unlimited cycles.
 - G.76.1.6.** The air-conditioning system shall have a minimum 2 years unlimited mileage.
 - G.76.1.7.** The Chassis powertrain should be warrantied for a five (5) years or 100,000 miles.
 - G.76.1.8.** Any parts under warranty must be available and delivered to the purchasing transportation provider or their repair shop within 5 days of the time they requested/ordered them. The bus vendor/manufacture shall bear all reasonable financial costs of shipment of parts.
 - G.76.1.9.** The warranty, as well as any recall notifications, shall cover each vehicle of the ultimate purchaser or recipient agency. The vendor shall provide a copy of any recall notice to the purchasing agency.

G.77. BUS TESTING

- G.77.1.** Certification shall be provided that in accordance with 49 CFR Part 665,
- G.77.2.** Bus Testing, the vehicle either does not need to be tested (with justification specified for exemption) or has been tested at the bus testing facility and a test report is included.

G.78. BUS WATER TESTING

- G.78.1.** The roofs, windows, windshield and all doors of all coaches shall be water tested, as follows:
 - G.78.1.1.** The waster test shall consist of a series of nozzles that are strategically located around the perimeter of the vehicle so as to the nozzles spray water over the entire surface of the vehicle.
 - G.78.1.2.** The nozzles shall eject a volume of water no less than 2.6 gallons per minute under a pressure of no less than twenty-two (22) pounds per square inch measured at the nozzle tip.
 - G.78.1.3.** There shall be no less than twenty (20) nozzles installed in the water test area, each capable of directing a force of water as indicated above.
 - G.78.1.4.** The Vendor/Manufacture shall be required to water test each vehicle, under the conditions set forth above, for no less than five (5) minutes, in order to determine whether or not there are any body leaks at the window areas, door areas, roof panels, etc.
 - G.78.1.5.** The Vendor/Manufacture shall take the necessary corrective action when body leaks are found to exist as a result of the above test, and conduct a second water test to recheck for body leaks following corrective action.

G.79. ALTOONA TESTING

- G.79.1.** Vehicle must be tested in the 7-year/200,000 mile category at the Altoona Bus Testing Facility in Duncansville, PA. And a copy of the full report must be submitted with the proposal.

G.80. GENERAL

- G.80.1.** All equipment cataloged as standard for the basic vehicle, unless superseded by these specifications, must be furnished and included in the purchase price of each vehicle. Complete printed specifications, published literature, and photos, or illustrations of the basic units that the supplier proposes to furnish with this proposal must accompany each proposal.

G.81. QUALITY OF MATERIALS

- G.81.1.** Welding procedures and materials shall be in accordance with standards of the American Society of Testing Materials and the American Welding Society. All visible welds shall be grounded smooth. Where metal is welded, the contact surface shall be free of scale, spatter, and grease and shall be treated to preclude rusting.

G.82. PUBLICATIONS AND PRINTED MATERIALS

- G.82.1.** Each vehicle shall have a complete set of operation, quality assurance, and warranty publications.
- G.82.2.** The information shall be organized in a three ring binder format with each sections clearly identified.
- G.82.3.** As built wiring diagram and as built parts manuals for body and all auxiliary equipment.
- G.82.4.** Maintenance and inspection schedule incorporating the required maintenance and inspection of the basic vehicle and its sub-systems.
- G.82.5.** Operator's manual: A complete operations manual and troubleshooting guide with a detailed manufacturer's parts list that covers the conversion features on the vehicle as listed in this specification. The manual will provide complete, comprehensive instructions for the wheelchair accessories, wheelchair list deployment, air conditioning system, tie downs, heater, deployment of seats, wiring diagram and related equipment.
- G.82.6.** Warranty papers for chassis, body, and additional equipment.
- G.82.7.** Warranty Information: Each vehicle must have a published listing of contractor warranty repair locations, including address, telephone number, and contact names for the State of Oklahoma.

G.83. PRE-AWARD AUDIT

- G.83.1.** The vehicles are not considered delivered to the purchasing agency until the required FTA documents are completed by a Government Official.
- G.83.2.** A Pre-Award Audit shall be conducted to determine if the proposal meets specifications. The supplier shall submit documents, which include certification of the manufacturer's compliance with the Federal Transit Administration (FTA) Pre-Award Buy America Audit Requirements. The document submitted shall include the following information for each major component used on vehicle:
- G.83.2.1.** Name and address of each supplier.
- G.83.2.2.** Cost of each major component and subcomponent. In order to protect proprietary information, the document may reflect the percentage of total cost each item represents instead of the actual cost.
- G.83.2.3.** Country of origin of each major component and subcomponent.
- G.83.2.4.** Name and address of company where final assembly occurs.
- G.83.2.5.** Cost of final assembly
- G.83.2.6.** Signature of authorized representative of vehicle manufacturer.

G.84. POST- DELIVERY AUDIT

- G.84.1.** A Post Delivery Audit of the vehicle(s) shall be conducted at the purchaser's facility, to determine that the completed vehicle(s) meets specifications. Once this process has been satisfactorily completed, the vehicle(s) shall be considered acceptable.

G.85. ACCESSIBILITY REQUIREMENTS

- G.85.1.** When submitting a proposal for an accessible vehicle for the disabled, the vendor shall provide a list of the vehicle related equipment illustrating the component cost and related installation charges. The purpose of this list is to reflect an accurate cost for those vehicle related items, which are required to make the vehicle accessible to the disabled.

G.86. ACCEPTANCE OF VEHICLES

- G.86.1.** Upon delivery at the designed location specified within this document the final acceptance will occur after the vehicles have been inspected, road tested and all FTA required post audit delivery requirements have been met.
- G.86.2.** All vehicles shall be insured by the supplier until the post audit delivery has been conducted at minimum.

G.87. SPECIFICATIONS FOR OPTIONAL ITEMS

G.87.1. CNG CONVERSION FORD CHASSIS

G.87.1.1. OEM engine shall be converted to operate on dedicated CNG. A WESTPORT/BAF Cal Comp System or approved equal shall be provided. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional control module will be accepted. Dual fuel systems will not be accepted. System must comply with the following:

G.87.1.1.1. Closed-loop fuel control

G.87.1.1.2. Sequential fuel injection (SFI)

G.87.1.1.3. Optimized ignition timing

G.87.1.1.4. Must maintain original fault codes (DTCs)

G.87.1.1.5. Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner

G.87.1.1.6. CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.

G.87.1.1.7. The minimum CNG tank capacity on the mini-buses should be 39 Gasoline Gallon Equivalent

G.87.1.1.8. CNG interlock – Engine will not run when filling CNG tanks.

G.87.1.1.9. Must provide a detailed floor plan of the placement of the CNG tanks.

G.87.1.1.10. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

G.88. CNG BIFUEL CONVERSION FORD CHASSIS

G.88.1. OEM engine shall be converted to operate on CNG and Gasoline. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional module will be accepted. System shall be capable of switching between CNG and Gasoline. The Gasoline fuel tank will be installed as per OEM specifications. The system must comply with the following:

G.88.1.1. Closed-loop fuel control

G.88.1.2. Sequential fuel injection (SFI)

G.88.1.3. Optimized ignition timing

G.88.1.4. Must maintain original fault codes (DTCs)

G.88.1.5. Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner

G.88.1.6. CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.

G.88.1.7. The minimum CNG tank capacity on the mini-buses should be 29 Gasoline Gallon Equivalent

G.88.1.8. Must provide a detailed floor plan of the placement of the CNG tanks.

G.88.1.9. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

G.89. DEDICATED PROPANE AUTOGAS INJECTION

G.89.1. The system shall be a Roush CleanTech System or approved equal. The system must be CARB, EPA certified, and OBDII Compliant. The system shall have the following system components:

G.89.1.1. PCM Calibration

G.89.1.2. Billet aluminum high-pressure fuel rail.

G.89.1.3. Appropriate fuel injectors

G.89.1.4. Appropriate fuel lines

G.89.1.5. Appropriate OEM engine prep package

G.89.1.6. Coverage of Five (5) year/ 60,000 mile warranty.

G.89.1.7. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

G.90. DUAL FUEL VEHICLE PROPANE AUTOGAS INJECTION

G.90.1. System shall be a Roush CleanTech System or approved equal.

G.90.2. The system shall be a Roush CleanTech System or approved equal. The system must be CARB, EPA certified, and OBDII Compliant. The system shall have the following system components:

G.90.2.1. PCM Calibration

G.90.2.2. Billet aluminum high-pressure fuel rail.

G.90.2.3. Appropriate fuel injectors

G.90.2.4. Appropriate fuel lines

G.90.2.5. Appropriate OEM engine prep package

G.90.2.6. Coverage of Five (5) year/ 60,000 mile warranty.

G.90.2.7. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

G.91. BACK-UP MONITOR SYSTEM

G.91.1. ASA Voyager AOM562A or approved equal with a 5.6" color LCD screen mounted on rear view mirror OEM Bracket. With a rear mounted outside backup camera and a second inside front mounted camera to view passengers.

G.92. TWO-WAY RADIO SYSTEM UHF

G.92.1. ICOM F6021 UHF two-way Radio System with a PCTEL MUF4505 UHF antenna and coax or approved equal.

G.92.1.1. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

G.92.1.2. Radio must be mounted in an easy accessible location for the driver.

G.92.1.3. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

G.93. TWO-WAY RADIO SYSTEM

G.93.1. ICOM F5021 VHF two-way Radio System with a PCTEL MHB5800 VHF antenna and coax or approved equal.

G.93.1.1. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

G.93.1.2. Radio must be mounted in an easy accessible location for the driver.

G.93.1.3. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

G.94. TWO-WAY RADIO SYSTEM 800 MHZ

G.94.1. Kenwood NX-900K 800 mhz two-way Radio System with a PCTEL MUF8003 antenna and coax or approved equal.

G.94.1.1. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

G.94.1.2. Radio must be mounted in an easy accessible location for the driver.

G.94.1.3. Radio must be programmed with the correct Frequencies and the antenna tuned for agency issuing this purchase.

G.95. DRIVER'S SHIELD

G.95.1. A clear Plexiglas barrier shall be erected behind the driver and extend from the stanchion crossbar behind the driver up to the ceiling.

G.95.2. This shield start at the wall on the driver's left side (close enough to prevent a passenger from reaching through to the driver) and should extend 3 inches past the right side of the driver's seat, but shall not obstruct the view from the rear view mirror.

G.95.3. This barrier shall consist of clear Plexiglas and shall be at least ¼ inch thick.

G.95.4. A 1 ½ inch clearance between the stanchion and barrier should be provided to allow a hand hold on the right side.

G.96. PAINTED LOWER SKIRTS

G.96.1. Paint to purchaser's color specs.

G.96.2. See Figure 2.

G.97. OUTSIDE PASSENGER DOOR SWITCH

G.97.1. Outside keyed electric passenger door switch outside. Switch must be water proof.

G.98. BUS CAMERA SYSTEM

- G.98.1.** REI Bus-Watch R4001 with 500GB Hard drive and four cameras or approved equal. Successful vendor shall coordinate with the agency issuing this purchase for location of Camera's.
- G.98.2.** See Figure 3 for camera type and location of cameras.

G.99. FABRIC INSERT ON CEILING

- G.99.1.** Must match seat fabric and pattern.

G.100. STREET SIDE EXHAUST

- G.100.1.** Exhaust to be turned out opposite side of Wheel Chair lift

G.101. INTEGRATED CHILD SEAT

- G.101.1.** Integrated Child Restraint Seat must be a Freedman Seating ICS-10 or equivalent
- G.101.2.** Must have an integrated 4-point safety harness. for children 22-78 Lbs with under seat retractor seat belts for adults

G.102. VINYL SEATS

- G.102.1.** This will be a price deduction from the durable transit style level 5 cloth fabrics.
- G.102.2.** Vinyl deduction is for passenger seats only
- G.102.3.** Pilot and co-pilot seats shall be durable transit quality level 5-cloth fabric

G.103. PUBLIC ADDRESS SYSTEM:

- G.103.1.** A public address system shall be installed with a hand held microphone.
- G.103.2.** The system shall include a solid-state amplifier of sufficient power and quality that the operator's voice can be clearly heard without distortion.
- G.103.3.** The amplifier shall be firmly secured in a protective area.
- G.103.4.** The PA system shall use the vehicles 6 speakers for sound.
- G.103.5.** A power switch for the PA system shall be mounted on the dash to provide operation for the inside and amplifier off.
- G.103.6.** Any noise suppression due to alternator, lighting, engine or other source is required of the contractor.

G.104. PASSENGER SIGNAL SYSTEM PULL CORD

- G.104.1.** The Stop Request system shall have the following features:
 - G.104.1.1.** Separate provisions for W/C passengers and ambulatory passengers to signal a Stop request.
 - G.104.1.2.** Must use a yellow pull cord run below the windows for the ambulatory request and a large yellow push pad mounted at least 15" above the floor, but not more than 48". There must be a touch pad per W/C space for the passengers to signal a stop request.
 - G.104.1.3.** The driver should have a means of telling if a W/C passenger has signaled. There must be a Blue dash light to signal a W/C passenger request and a RED light to signal an ambulatory passenger request.
 - G.104.1.4.** The "Stop Request" lighted sign should show if a W/C passenger has signaled; the sign shall be a universal W/C symbol which lights in blue.
 - G.104.1.5.** There shall be an audible signal when a stop is requested and must be able to be heard by the driver.
 - G.104.1.6.** Once the pull cord is pulled, the sign will light, the driver's red light goes on, and a chime sounds. The sign will stay lit until the bus is stopped and the entry door is opened. The system automatically re sets itself
 - G.104.1.7.** When the W/C passenger signals a stop request, the W/C portion of the sign lights, the chime sounds, and the blue light on the dash goes on. The sign will stay lit until the W/C lift is deployed and then stowed and the W/C door is closed again.

G.105. PASSENGER STOP REQUEST SIGNS

- G.105.1.** Passenger stop request sign must be Transign, or equivalent.
- G.105.2.** The signs must be back-lighted stop requests and shall be mounted overhead on the front ceiling end closure.

G.105.3. The sign shall be so designated as to remain illuminated when activated (by the passenger signal system) until it is extinguished by opening the door.

G.106. FARE COLLECTION BOX

G.106.1. Fare collection box must be GFI Genfare "Cents a bill" farebox or compatible.

G.106.2. With this option, the mounted fare box will eliminate the front passenger seat and make the bus a 14 passenger.

G.106.3. Also must have the OEM Co-Driver seat covered with same fabric as the other passenger seats shipped loose with the bus. Co-Driver door shall have the same type of running board as driver's door.

G.107. DESTINATION SIGNS

G.107.1. Destination signs must be Twinvision, or equivalent. The automatic electronic destination sign system shall be furnished on the front and on the right side near the front door of the vehicle. Display areas of destination signs shall be clearly visible in direct sunlight and/or at night. The sign system shall provide optimum visibility of the message display units for passengers and shall meet applicable ADA requirements defined in 49 CFR, Part 38.39. Destination signs shall be installed in such a manner as to facilitate easy access for replacement of the entire sign assembly, or components such as fluorescent lamps/LED's and electronic control modules, from inside the bus within 30 minutes by a mechanic. Lamps and associated parts shall be commercially available.

G.107.2. Destination messages, route designations, and public relations messages shall be independently selectable via a single Operator's Control Panel (OCP) which shall include a display monitor. The OCP display monitor readout shall show the exact information displayed on the destination signs. The OCP shall be conveniently located for the bus operator and mounted in such a manner that will not pose any safety hazard. The OCP shall utilize a durable weatherproof keypad with tactile feel for destination message control functions.

G.107.3. The destination sign system shall be capable of programming 10,000 message lines. The number of public relations messages shall be limited only by the remaining number of message lines not used for destination purposes. Sign displays shall have alternating message capability with programmable blanking time between message lines as may be required. Variable blanking times shall be programmable between 0.5 to 25 seconds in duration. Each line message or blanking time for each message shall be individually programmable. The message display units shall incorporate an automatic blanking feature that will cause the display area to blank within 30 seconds of the bus master power switch being turned off.

G.107.4. An emergency message shall be initiated by the closure, or opening, of a dry contact switch or relay. The emergency message shall be displayed on the exterior of the bus only. The OCP shall not display the emergency message. The destination sign shall automatically resume normal operation when the remote emergency switch is returned to its normal position.

G.107.5. Destination Sign Programming: The electronic sign system shall be programmable via an integral connector located in the front destination sign area. Software shall be furnished for programming the sign system via an IBM-compatible, laptop computer. Software shall be capable of providing a high degree of flexibility to create, or select preprogrammed, fonts and graphic displays. The sign shall have the capability of being programmed in the field using a PC or field programmer. Message program information shall be transferable to and/or from the field programmer device as specified by the transit system in attachments to Part 5: Technical Specifications.

G.107.6. The destination sign compartments shall be designed to prevent condensation and entry of moisture and dirt. Additional provisions shall be included, if necessary, to prevent fogging of both destination sign compartment window and glazing on unit itself. Access shall be provided to allow cleaning of inside of destination sign compartment window and unit glazing.

G.107.7. A complete listing of destination sign readings for initial sign programming by the manufacturer are provided in attachments to Part 5: Technical Specifications.

G.108. FRONT SIGNS

G.108.1. Sign Size:

G.108.1.1. A 16 Row by 148 Column Spectrum Route Multi-Color Sign that shall have no less than 3,264 LEDs with a message display area of not less than 8.0 inches high by not less than 64.6 inches wide. The LEDs displays shall consist of red-blue-green LEDs and amber colored LEDs. The color LEDs shall be rated by their manufacturers for a life expectancy of 50,000 hours to 100,000 hours and shall support up to 27 colors.

G.108.2. Sign Readability:

G.108.2.1. The destination message shall be readable by a person with 20/20 vision from a distance of 250 feet. The sign shall have an equal readability at 65 degrees on either side of the line perpendicular to the center of the mean plane of the display. The entire display area of all signs shall be clearly visible and readable both in direct sunlight and at night.

G.109. SIDE SIGNS

G.109.1. Sign Size:

G.109.1.1. An 8 Row by 96 Column Spectrum Route Multi-Color Sign that shall have no less than 768 LEDs with a message display area of not less than 2.8 inches high by not less than 36.3 inches wide. The LEDs shall be rated by their manufacturers for a 100,000-hour life expectancy.

G.109.2. Sign Readability:

G.109.2.1. The destination message shall be easily read from the sidewalk level. The entire display area of all signs shall be clearly visible and readable both in direct sunlight and at night.

G.110. SYSTEM CONTROL CONSOLE – OPERATOR DISPLAY AND KEYBOARD

G.110.1. The system control console shall be used to view and update display messages. The system control console shall utilize a 28-key conductive rubber pad keyboard with tactile feel, designed especially for the harsh transit environment or approved equal.

G.110.2. The system control console shall contain a 16 x 128 pixel vacuum fluorescent display. The system control console shall contain an audio annunciator that beeps to alert the operator to view the display for a message, or beeps indicating that a key is depressed. The system control console shall continuously display the complete message associated with the selected destination code.

G.111. MEMORY TRANSFER

G.111.1. The sign system shall be reprogrammable through the system control console by either a PCMCIA flash card or a Memory Transfer Unit.

G.112. EMERGENCY MESSAGE DISPLAY

G.112.1. If required, a special emergency message can be activated by a switch. This message shall be displayed on signs, facing outside the vehicle, while the signs inside the vehicle, including the system control console, remain unchanged. The emergency message shall be canceled by entering a new destination code or by removing the emergency signal.

G.113. PROGRAMMING

G.113.1. A programming software package shall be furnished to generate message lists for the destination sign system. A PCMCIA flash memory card having a minimum of 8 megabytes of memory shall be provided to facilitate bus system programming. The software must be compatible with Windows NT, Windows 2000, Windows XP, Windows Vista and Windows 7

The programming software shall use techniques that require minimal operator training and that are intended for use by operators that are not trained in complex computer operations. All operator screens shall utilize pull down and pop-up menus.

G.114. BICYCLE RACKS

G.114.1. Manufacturer/model should be Sportworks DL-2 or equivalent.

G.114.2. Racks must have a 2 (two) bike capacity, and follow the specs noted below.

G.114.2.1. The bike rack must meet OSHA requirements for lifting by a single individual and be capable of being raised or lowered with one hand

G.114.2.2. The bike rack must accommodate all bicycles with wheels 16" (for example, the Dahon folding bicycle series) or larger diameter, excluding tandems and recumbent type bicycles. The rack must accommodate all bicycles 80" and longer.

G.114.2.3. The bike rack frame must be manufactured with 304 stainless steel tubing with a minimum wall thickness of 0.125 in., outside corners to be rounded, pinch joints minimized and welds smoothed.

G.114.2.4. All nuts, bolts and washers shall be either AISI Type 304 stainless steel or Grade 8 yellow zinc plated steel

G.114.2.5. The bike rack must be mounted to the front of the bus and accommodate two (2) bicycles. In the stowed position, folded up against the front of the bus, it shall protrude no more than 8" from the front bumper. The protrusion shall be no more than 36" when deployed.

G.114.2.6. The latching mechanism must automatically lock the bike rack in the stowed and deployed positions.

G.114.2.7. The bike rack, when stowed, shall not interfere with any access panels/doors, windshield wipers or driver vents.

- G.114.2.8.** The bike rack shall be designed for loading and unloading from the front, curbside, of the bus. The securement can only contact the bicycle's tires as to not do any damage to the bicycle's frame. The bike rack shall have a positive securement with a four (4) point locking system, contacting the wheel in such a way that greater than half the circumference of the wheel is captured. Straps, cords, and/or springs shall not be required to secure a bicycle.
- G.114.2.9.** The carrier shall not interfere with the ability of the driver to safely operate the vehicle. This includes, but is not limited to, the obstruction of the windshield view and the operation of the windshield wipers, turn signals, and headlights.
- G.114.2.10.** The carrier shall be compatible with automated bus washing systems and shall be capable of repeated use with automated washing equipment without sustaining damage to the carrier, vehicle, of the washing equipment. The carrier shall be designed as not to accumulate water internally.
- G.114.2.11.** The use of this rack shall not affect route scheduling. The bike rack shall have a design capability of being loaded or unloaded in 20 seconds or less.
- G.114.2.12.** The mounting bracket/ pivot plate assembly must be designed to fit all urban transit buses, both standard floor and low floor.
- G.114.2.13.** The bicycle rack shall be warranted against defects in materials and workmanship for a period of one (1) year from date of installation.
- G.114.2.14.** The bicycle rack manufacture is required to furnish all the complete parts and service (maintenance) books.
- G.114.2.15.** The bicycle rack should have a latching system in both positions, stowed and deployed; this will need to be explained in detail
- G.114.2.16.** The racks should be in a friendly design and a tire only mount.
- G.114.2.17.** The mounting brackets should be detailed at to what bus needs with brackets.

G.115. PRODUCT STANDARDS

- G.115.1.** Only first quality materials, workmanship and finish shall be acceptable.

All general materials and workmanship shall be guaranteed to be free of defects for a minimum of at least one (1) year from date of installation except as noted below. Any defects shall be rectified or replaced to meet specifications at the expense of the manufacturer, including freight, parts and labor.

Any exposed fasteners shall be colored to match the finish of the framework components.

G.116. SPARE PARTS

- G.116.1.** The contractor will provide pricing and the delivery time on the available spare parts for each bicycle rack and maintain adequate stock levels.

G.117. DELETE COPILOT DOOR, SEAT AND B PILLAR

- G.117.1.** This Moves the Passenger door from the coach Body to the chassis cab section. This delete's the Copilot door; seat and B pillar section of the cab. This will add 2 seats positions in Coach Body.

G.118. DELETE ALTRO CHROMA FLOORING

- G.118.1.** This delete's the Altro Chroma Floor covering to install the Gray RCA Rubber Transit-Flor. The step well, entrance area, and center aisle floor area shall be overlaid with ribbed, slip resistant, oil resistant commercial 3/16" step tread thickness. The 1/8" thickness flooring under the seats and in the wheelchair area shall be smooth, slip resistant, and oil resistant. The flooring shall extend up the sidewall and rear wall to the seat rail line and shall be coved at the floor/wall joint to form a smooth water-tight transition. Flooring adhesive shall be oil resistant.

G.119. DELETE YELLOW POWDER COAT ON HANDRAILS:

- G.119.1.** This delete's the yellow powder coating on the stainless steel handrails, grab handles and stanchions. They will be the natural brushed Stainless steel Color.

G.120. 100% NIDA-CORE[®] STRUCTURE OR APPROVED EQUAL

- G.120.1.** Resin Hardened Nida-Core[®] or approved equal Polypropylene Copolymer honeycomb (1" thickness, minimum) Throughout 100% of the entire body structure, walls, roof, front and rear caps must be used instead of Honeycomb Paper Vertical. This is to eliminate any possibility of rotting in any area of the body structure.

G.121. COMPOSITE FLOOR

- G.121.1.** Composite Space-age Synthetics Thermo-Lite Board-Tough Series or approved equal Floor that will not rot and is lighter than the standard marine grade plywood floor.

G.122. SIDE DOOR SLIDE OUT BATTERY TRAY

G.122.1. Must have an Extra Heavy Duty Stainless Steel slide out Battery Tray for all auxiliary batteries mounted under Bus. Battery Box must have OEM type battery hold down brackets to securely hold batteries in place. Cloth hold down straps is not ALLOWED. Battery box must be sealed to keep mud from getting on batteries.

G.123. DELETE 3 FOLDAWAY SEATS

G.123.1. This delete's the three foldaway seats for a total seating capacity of fourteen (14) passengers.

G.124. DIESEL ENGINE

G.124.1. Current Power plant for the make and model of chassis

G.125. REAR SPARE TIRE HOLDER

G.125.1. A rear spare tire holder that shall be affixed to the vehicle in a way to allow easy removal of spare tire.

G.126. ADJUSTABLE REAR SUPSENIOR SYSTEM

G.126.1. System shall be a MOR/ryde suspension system or equal shall be used with the following:

G.126.1.1. Installed as per the manufactures recommendations.

G.126.1.2. Fully adjusted for each bus installed on.

G.126.1.3. Warranty to be a 5 year 100,000 mile.

G.127. MEMO/PAMPHLET RACK

G.127.1. The memo/Pamphlet rack will be bolted to inside side wall of bus. (See Figure 6)

G.128. TDSS FOLD AWAY SEAT

G.128.1. Seat will be bolted to structural steel. (See Figure 7)

G.129. METAL BOX

G.129.1. Metal box should be bolted and placed between the passenger and driver's seat. (See Figure 8)

G.130. SEAT BELT EXTENSIONS

G.130.1. Extra Seat belt Extensions

SECTION "G"

26' 20 Passenger Composite Bus

RESPONSE SHEET

BASE VEHICLE COST PER UNIT

BASE VEHICLE	COST PER UNIT
TRANSIT BUS (GAS ENGINE)	\$

CHASSIS SPECIFICATIONS

SPECIFICATIONS	MINIMUM/MAXIMUM IN INCHES	SUPPLIER'S RESPONSE
OVERALL VEHICLE LENGTH	300" minimum	
OVERALL VEHICLE LENGTH	324" maximum	
WIDTH EXTERIOR	95" minimum	
WIDTH INTERIOR	91" minimum	
HEIGHT EXTERIOR	105" minimum	
HEIGHT EXTERIOR	124" maximum	
HEIGHT INTERIOR	75" minimum	
WHEELBASE	190" minimum	
WHEELBASE	202" maximum	

AIR CONDITIONING

Make and Model of Rear A/C Unit and Cooling Capacity of rear Unit BTU's/Hr. Include literature on unit being proposed.

MAKE/MODEL	
BTU/HR OF REAR UNIT ONLY	

HEATING

MAKE/MODEL	
BTU/HR OF REAR UNIT ONLY	

OPTIONAL ITEMS

OPTIONAL ITEMS	COST PER ITEM
CNG CONVERSION CHASSIS	
CNG BIFUEL CONVERSION CHASSIS	
PROPANE DEDICATED CONVERSION	
PROPANE DUEL FUEL CONVERSION	
BACK-UP MONITOR SYSTEM	
TWO-WAY RADIO (UHF)	

TWO-WAY RADIO (VHF)	
TWO-WAY RADIO (800 MZ)	
DRIVER'S SHIELD	
PAINTED LOWER SKIRTS	
OUTSIDE PASSENGER DOOR SWITCH	
BUS CAMERA SYSTEM	
FABRIC INSERT ON CEILING	
STREET SIDE EXHAUST	
INTEGRATED CHILD SEATS	
VINYL SEATS (PRICE DEDUCTION)	
PUBLIC ADDRESS SYSTEM	
PASSENGER SIGNAL SYSTEM PULL CORD	
PASSENGER STOP REQUEST SIGNS	
FARE COLLECTION BOX	
DESTINATION SIGNS	
BICYCLE RACKS	
DELETE ALTRO CHROMA FLOORING (PRICE DEDUCTION)	
DELETE YELLOW POWDER COATING ON HANDRAILS, GRAB RAILS, AND STANCHIONS (PRICE DEDUCTION)	
100% NIDA-CORE STRUCTURE	
COMPOSITE FLOOR	
SIDE DOOR SLIDE OUT BATTERY BOX	
DIESEL ENGINE	
REAR SPARE TIRE HOLDER	
ADJUSTABLE REAR SUSPENSION SYSTEM	
MEMO/PAMPHLET RACK (See Figure 6)	
FREEDMAN SEATING TDSS (OR EQUIVALENT) FOLD AWAY SEAT (See Figure 7)	
METAL BOX (See Figure 8)	
EXTRA SEAT BELT EXTENSIONS	

A LIST OF OPTIONAL EQUIPMENT AND/OR ACCESSORIES SHALL BE PROVIDED. THE LIST MUST CONTAIN:

- Item
- Description and functionality detail
- Cost of item installed in final delivery of vehicle
- Any changes to listed specifications as outlined above to accommodate options

PROPOSAL EXCEPTIONS

Supplier must list any exceptions here to be used as a part of the Proposal evaluation and analysis. Please list the roman numerical on the standard specs or the number for the options when listing any Proposal exceptions.

FIGURE 1

Figure 1

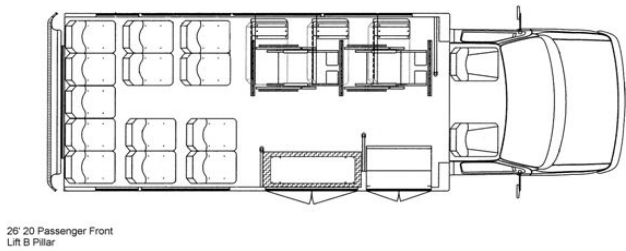


FIGURE 2



FIGURE 3

Figure 1

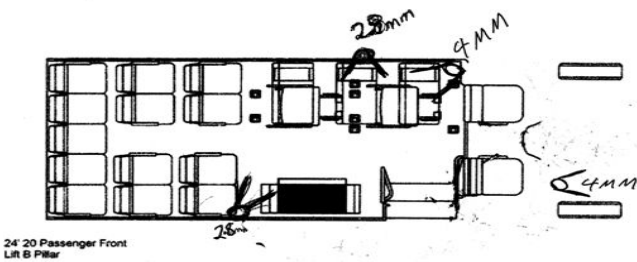


FIGURE 4



FIGURE 5



FIGURE 6



FIGURE 7

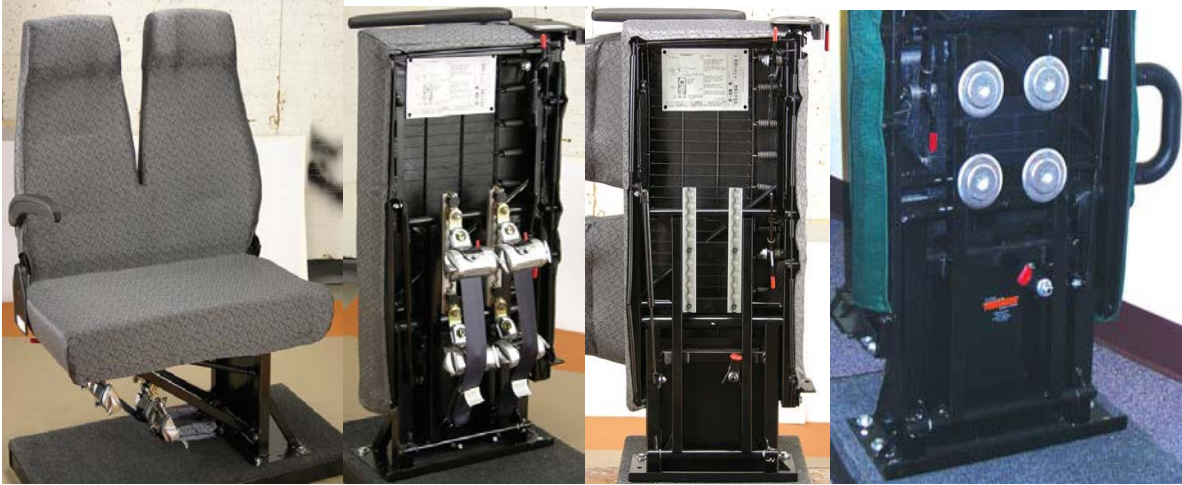


FIGURE 8



H. SOLICITATION SPECIFICATIONS FOR 45' CNG COMMUTER COACH

H.1. DELIVERY

- H.1.1.** Vehicle must be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following:
 - H.1.1.1.** The vehicle must have a full tank of fuel when delivered.
 - H.1.1.2.** Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
 - H.1.1.3.** All parts added, as part of the modification process shall be new.
 - H.1.1.4.** Headlights properly aligned
 - H.1.1.5.** Engine Tuned
 - H.1.1.6.** All accessories properly adjusted
 - H.1.1.7.** Electrical, braking and suspension systems inspected
 - H.1.1.8.** Both batteries Charged
 - H.1.1.9.** Front-end aligned, all wheels balanced, including spare
 - H.1.1.10.** All lubricants checked, and greased if needed
 - H.1.1.11.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
 - H.1.1.12.** Warranty papers and owner's guide
 - H.1.1.13.** Exterior and interior cleaned and washed.
 - H.1.1.14.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.
 - H.1.1.15.** Under no circumstances are tow vehicles to be attached to any buses.
 - H.1.1.16.** Each vehicle must be delivered to the agency submitting the P.O.

H.2. CERTIFICATE OF ORIGINS

- H.2.1.** Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order five business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery is not acceptable.

H.3. NOTIFICATION

- H.3.1.** Vendor shall notify buyer of vehicle delivery ten business days prior. NOTE: If these specifications contradict any listed in the Federal Regulations, they are superseded by those of the Federal Regulations.

H.4. CLASSES OF FAILURES

- H.4.1. Class 1: Physical Safety.** A failure that could lead directly to passenger or driver injury and represents a severe crash situation.
- H.4.2. Class 2: Road Call.** A failure resulting in an en route interruption of revenue service. Service is discontinued until the coach is replaced or repaired at the point of failure.
- H.4.3. Class 3:Coach Change.** A failure that requires removal of the coach from service during its assignments. The coach is operable to rendezvous point with a replacement coach.
- H.4.4. Class 4: Bad Order.** A failure that does not require removal of the coach from service during its assignments, but does degrade coach operation. The failure shall be reported by driver, inspector, or hostler.

H.5. LEGAL REQUIREMENTS

- H.5.1.** The coach shall meet all applicable Federal Motor Vehicle Safety Standards and regulations as established by the U.S. Department of Transportation.

- H.5.2.** The manufacturer shall comply with all applicable Federal and State regulations. In event of any conflict between the requirements of this Specification and any applicable legal requirement, then the legal requirement shall prevail.

H.6. OVERALL REQUIREMENTS

H.6.1. DIMENSIONS

H.6.2. PHYSICAL SIZE

- H.6.3.** With the exceptions of exterior mirrors, marker and signal lights, bumpers, flexible portions of the bumper, fender skirts, and rub rail, the coach shall have the following overall dimensions.

H.6.3.1. Length: 45 feet, 0 inches (+0 / -1 in.) (14 m – +0 / - 25.4 mm)

H.6.3.2. Width: 8 feet, 6 inches (+0 / -1 in.) (2.6 m – +0 / - 25.4 mm)

H.6.3.3. Height: 137 inches – maximum loaded or unloaded. (3.5 m)

H.6.3.4. First Step Height: 15.5 inches – Maximum (394 mm)

H.7. UNDERBODY CLEARANCES

- H.7.1.** The coach provided shall meet the following underbody clearances:

H.7.1.1. Approach Angle: 9.50°

H.7.1.2. Breakover Angle: 7.20° (*measured per SAE J689*)

H.7.1.3. Departure Angle: 6.20°

H.7.1.4. Ground Clearance: 10.00 inches (254 mm)

H.7.1.5. Axle Clearance (as measured): 6.50 inches (165 mm)

H.8. WEIGHT AND AXLE LOADING

- H.8.1.** Each vehicle, at a capacity load, shall not exceed the gross vehicle weights or maximum axle weights specified. In no case shall the axle weight exceed 22,500 pounds on any axle. In the interest of economy in construction and operation it shall be the goal to manufacture the coach as light as possible without degradation of structure, performance, appearance, comfort and reliability. Total vehicle weight shall not exceed the gross vehicle weight rating nor axle weight rating at ground as specified. GVWR shall not exceed 50,000 pounds for a 45-foot bus. Combined load capacity weight on the drive and tag axles shall not exceed 36,500 pounds.

H.9. CAPACITY

- H.9.1.** Rated passenger capacity of the coach shall be as outlined below. Provisions to secure two wheelchair passengers shall also be provided. The overall seating capacity may be reduced when the securement positions are being utilized.

H.9.1.1. 45 foot/102 inch (14 m/2.6 m) bus 57 seats

H.9.1.2. 45 foot/102 inch (14 m/2.6 m) bus w/optional lavatory 55 seats

H.10. SERVICE LIFE AND MAINTENANCE

H.10.1. SERVICE LIFE

- H.10.1.1.** The coach shall be designed to operate in commuter service for at least 12 years or 500,000 miles (804,672 km) of revenue service whichever comes first.

H.11. MAINTENANCE AND INSPECTION

- H.11.1.** Scheduled maintenance tasks shall be related and shall be grouped in maximum mileage intervals. Routine scheduled maintenance actions, such as filter replacement and adjustments, shall not be required at intervals of less than 6,000 miles (9,656 km), except for routine daily service performed during the fueling operations. Higher levels of scheduled maintenance tasks shall occur at even multiples of mileage for lower level tasks.

- H.11.2.** The manufacturer shall provide a preventive maintenance schedule covering all components upon delivery of the first production vehicle. Each schedule shall be complete and shall adhere to frequency intervals considered normal industry standards.

H.12. MEAN MILEAGE BETWEEN FAILURES

H.12.1. The following are design goals for mean mileage between failures by failure class, provided that all specified preventive maintenance procedures are followed:

H.12.1.1. Class 1: Physical Safety. Mean mileage shall be greater than 1,000,000 miles (1,609,344 km).

H.12.1.2. Class 2: Road Call. Mean mileage shall be greater than 20,000 miles (32,187 km).

H.12.1.3. Class 3: Coach Change. Mean mileage shall be greater than 16,000 miles (25,750 km).

H.12.1.4. Class 4: Bad Order. Mean mileage shall be greater than 10,000 miles (16,093 km).

H.13. ACCESSIBILITY

H.13.1. All systems or components serviced as part of periodic maintenance or whose failure may result in Class 1 or Class 2 failures shall be readily accessible for service and inspection. Removal or physical movement of components unrelated to the specific maintenance and/or repair tasks involved shall be minimized

H.14. INTERCHANGEABILITY

H.14.1. Components with identical functions shall be interchangeable with the exception of windows and baggage bay doors. Components with non-identical functions shall not be, or appear to be, interchangeable.

H.15. OPERATING ENVIRONMENT

H.15.1. The coach shall achieve normal operation in temperature ranges of -10 to 110 degrees F (-23° to 43° C), at relative humidity between 5 percent and 100 percent and at altitudes up to 5,000 feet (1,524 m) above sea level. Degradation of performance due to atmospheric conditions shall be minimized at temperatures below -10 degrees F (-23° C) and above 110 degrees F (+43° C) or at altitudes above 5,000 feet (1,524 m). Special equipment or procedures may be employed to start the coach after a 12 hour or more exposure to temperatures below +30 degrees F (-1° C) without the engine in operation.

H.15.2. Speed, gradability, and acceleration performance requirements shall be met at, or corrected to, 85 degrees F (29 C), 29.00 inches (737 mm) Hg, dry air. Performance degradation at conditions other than the test standard shall not exceed 1 % for each 3 degrees F/C and 4 % for 1,000 feet (305 m) of altitude above the standard.

H.16. MATERIALS AND CONSTRUCTION

H.16.1. For economy in maintenance, it is essential that parts and units be arranged so that rapid assembly and disassembly will be possible for the coach being provided. The dimensions of all parts, unless particularly specified, will be in accordance with current standards of the Society of Automotive Engineers, or the metric equivalents. All units or parts not specified shall be Manufacturer's standard units or parts and shall conform in material, design and workmanship to industry standards and shall meet or exceed all Federal and State motor vehicle safety standards. During the manufacturing of the coaches all parts shall be new and in no case will used, reconditioned or obsolete parts be accepted. No advantages shall be taken by the Manufacturer in the omission of any parts or details that make the coach complete and ready for service, even though such parts or details are not mentioned in these specifications.

H.16.2. Workmanship throughout shall conform to the high standard of commercially accepted practice for the class of work and shall result in a neat and finished appearance. All exposed surfaces and edges shall be smooth, free from burrs and other projections, and shall be neatly finished. Exposed metal surfaces, prior to paneling or covering shall be properly prepared and coated with protective material to insure against corrosion or deterioration.

H.16.3. All lubrication points, unless otherwise specified, shall be capable of accepting a high pressure grease gun operated on fittings that permit grease to travel into the lubrication point but does not permit the grease to escape and designed so that when the grease gun is withdrawn, there is a positive barrier preventing dirt from entering the fitting. These fittings shall be of one manufacture and shall be accessible for a grease gun while the vehicle is being serviced on either a lift or a pit.

H.17. BODY

H.17.1. DESIGN

H.17.1.1. The coach shall have a clean, smooth, simple design, primarily derived from coach performance requirements and passenger service criteria. Body construction shall not be of a body on chassis type. The exterior and body features, including grilles and louvers, shall be shaped to allow complete and easy cleaning by automatic bus washers without snagging washer brushes. The retention of water and dirt in or on any of the body features or the freezing or bleeding out of this dirt and water after leaving the washer shall be minimized. 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 coach.

Accumulation of spray and splash on any window of the coach generated by its wheels on a wet road shall be minimized. The undercarriage of the coach shall be sealed off to the maximum extent practicable to significantly reduce the intrusion of road spray.

H.18. MATERIALS

H.18.1. Body materials shall be selected and the body fabricated to reduce maintenance, extend durability, and provide consistency of appearance throughout the life of the coach. Detailing shall be kept simple; add-on devices and trim shall be minimized and, where necessary, integrated into the basic design.

H.19. FINISH AND COLOR

H.19.1. All exterior surfaces shall be smooth and free of wrinkles and dents. Exterior surfaces to be painted shall be properly cleaned and primed as appropriate for the paint used, prior to application of paint to assure a proper bond between the basic surface and successive coats of original paint for the service life of the coach.

H.19.2. Paint utilized shall be DuPont Imron Elite SS white N5793EA polyurethane enamel or approved equal, that exhibits excellent color and gloss retention, chip, abrasion, stain and mar resistance, chemical and solvent resistance and excellent cleaning characteristics per industrial standards. Paint shall be applied smoothly and evenly with the finished surface free of dirt, runs, sags, "orange peel" type pebbled surface, and other imperfections.

H.19.3. All exterior finished surfaces shall be impervious to diesel fuel, gasoline, and commercial cleaning agents such as soaps, detergents and degreasing compounds. Finished surfaces shall not be damaged by controlled applications of commonly used graffiti-removing chemicals.

H.20. NUMBERING AND SIGNING

H.20.1. Monograms, numbers and other signing shall be applied to the inside and outside of the coach as required. Signs shall be durable and fade, chip, and peel-resistant; they may be decals, or pressure-sensitive appliques. Emergency exit information shall be provided in both English and Spanish.

H.21. PEDESTRIAN SECURITY

H.21.1. Exterior protrusions greater than 0.250 inch (6.0 mm) and within 80 inches (203 cm) of the ground shall have a radius no less than the amount of the protrusion. The left and right side rear view mirrors, windshield washer nozzles and required lights and reflectors are exempt from the protrusion requirement. Grilles, doors, bumpers and other features on the sides and rear of the coach shall be designed to minimize the ability of unauthorized riders to secure footholds or handholds.

H.22. STRUCTURE

H.22.1. STRENGTH AND FATIGUE LIFE

H.22.1.1. The structure shall be of a sufficiently strong and efficient design to withstand the conditions of commuter service throughout the service life of the coach.

H.23. DISTORTION

H.23.1. The coach at GVWR and under static conditions, shall not exhibit deformation or deflection that impairs operation of doors, windows, or other mechanical elements. Static conditions include the vehicle at rest with any one wheel or dual set of wheels on a 6 inch (152 mm) curb or in a 6 inch (152 mm) deep hole.

H.24. RESONANCE

H.24.1. All structure, body, and panel-bending mode frequencies, including vertical, lateral, and torsion modes, shall be sufficiently removed from all primary excitation frequencies to minimize audible, visible, or sensible resonant vibrations during normal service.

H.25. MATERIAL

H.25.1. Reinforced fiberglass and plastic materials shall be excluded from structural body construction, except for replaceable panels or doors and for non-load bearing front and rear roof caps and the front lower panel below the windshield and the A-pillar covers and transom panels.

H.26. CORROSION

H.26.1. The coach shall resist corrosion from atmospheric conditions and road salts. It shall maintain structural integrity and nearly maintain original appearance throughout its service life, provided it is maintained in accordance with the procedures specified in the service manual. All exposed body panels above and below the floor line shall be aluminum or stainless steel except for the front end upper and lower panels, the rear end upper panels and the upper sidewall panel which are made of fiberglass or galvanized steel.

Materials exposed to the elements and all joints and connections of dissimilar metals shall be corrosion-resistant and shall be protected from galvanic corrosion. All frame members below the passenger floor that are subject to road splash and are less than 0.06 inch (1.5 mm) shall be stainless steel for maximum corrosion protection. All other frame members exposed to splash are to be High Strength Low Alloy steel and are to be 0.06 inch (1.5 mm) thick minimum and shall be coated with Tectyl undercoating or approved equal, on all surfaces exposed to road splash for maximum corrosion protection.

- H.26.2.** Floor supports in the passenger and drivers area, the sidewall structures and roof structures that are not exposed to road spray shall be High Strength Low Alloy and primed prior to incorporation into the coach assembly.
- H.26.3.** Outer sidewall panels above the passenger floor and below the windows shall be galvanized steel, pre-primed. The roof panels shall be pre-primed aluminum both sides and the front and rear roof caps fiberglass.
- H.26.4.** The upper rear engine door and louvers may be fiberglass panels mounted to stainless steel frames with powder coated aluminum screens. The upper side corner panels may be fiberglass with powder coated aluminum screens.
- H.26.5.** The upper wheelchair lift door may be made of an aluminum frame or other acceptable lightweight material and aluminum exterior panel.
- H.26.6.** Non-structural underbody panels used for baggage bay floors and to retain insulation in other areas, shall be Tectyl or approved equal undercoated aluminum or stainless steel for maximum corrosion protection. In the wheel well areas, non-structural closeout panels shall be stainless steel.
- H.26.7.** Before assembling, all metal body parts must be given a thorough anti-corrosion treatment. Joints between dissimilar metals shall be properly insulated with an inert plastic tape to avoid corrosion due to electrolytic action. All nuts, bolts, clips, washers, clamps, and like parts shall be zinc plated, phosphate coated, black oxide coated, stainless steel, or nylon to prevent corrosion. All exterior joints and seams must be sealed.
- H.26.8.** Dissimilar metals must be separated by a non-conductive barrier.
- H.26.9.** Non-Conductive Barriers may consist of one of the following:
 - H.26.9.1.** Black elastic compound tape
 - H.26.9.2.** Mylar tape
 - H.26.9.3.** Double-sided structural adhesive tape
- H.26.10.** Where tape barriers are not feasible an appropriate sealant shall be used to provide a protective barrier and a water tight seal. This sealer must be used on all panels and assemblies that are susceptible to water leaks.

H.27. TOWING

- H.27.1.** Towing devices shall be provided and be permanently mounted on the front and rear of the coach. The coach may be towed from the front only, but can be recovered from the rear. Recovery shall mean to move the bus into the clear so it can be hooked up and towed from the front. Lift and tow is not required.
- H.27.2.** Front towing device shall withstand, without permanent deformation, tension loads up to 1.2 times the curb weight of the coach within 20° of the longitudinal axis of the coach. Towing device shall accommodate a crane hook with a 1-inch throat. A minimum of two steel rear skid plates measuring approximately 15.2 x 3.3 inches (386 x 84 mm) shall be welded to the underside of the engine rails. Skid design shall be durable construction to adequately protect mechanical or other body components from damage due to the coach bottoming out.

H.28. JACKING & HOISTING

- H.28.1.** It shall be possible to safely jack up the bus, at curb weight, with an 8.5 inch (216 mm) high hydraulic hand jack or a 10-ton (9,072 kg) floor jack when a tire or dual set is completely flat and the bus is on a level hard surface. Jacking from a single point shall permit raising the bus sufficiently high enough to remove and reinstall any wheel and tire assembly. The bus shall be fitted with jacking pads for each tire/wheel locations and shall permit easy and safe jacking with the flat tire or dual set on a 3.5-inch (89 mm) high run-up block not wider than a single tire. The bus will withstand such jacking at any one or any combination of wheel locations without permanent deformation or damage. The bus axles or jacking plates shall accommodate the lifting pads of a post hoisting system. Jacking plates shall be approximately 2.00 inches (51 mm) square, with a turned-down flange not less than 0.5 inch (13 mm) deep on each side. Other pads shall be provided to support the bus on jack stands independent of the hoist.

H.29. FIRE SUPPRESSION

- H.29.1.** An Amerex or approved equal modular vehicle fire suppression and overheat warning system will be provided to detect and extinguish fires in the engine compartment. The system will be electrically controlled. A 25-lb. (11-kg) dry-chemical extinguisher cylinder will be installed in the #3 baggage compartment. Three thermostats and four extinguisher nozzles will be installed in the engine compartment in strategic locations. If the thermostats detect excessive heat, then the cylinder will discharge a dry chemical agent into the engine compartment. A button at the end of the left-hand console will trigger the extinguisher. A control panel above the driver will monitor the system. Normally a green LED indicating "System OK" will be illuminated on the front of the monitor. When a fire is detected a red LED and buzzer on the control panel will warn the driver. When the fire has been extinguished the green LED will light again.
- H.29.2.** The fire suppression system will be powered by the coach's electrical system, but an internal re-chargeable back-up battery will be provided in case the coach's electrical system is interrupted.

H.30. FIRE PROTECTION

- H.30.1.** The passenger and engine compartments shall be separated by a bulkhead(s) which shall, by utilization of fire resistant materials in its construction, be a firewall. This firewall shall preclude or retard propagation of an engine compartment fire into the passenger compartment. Only necessary openings shall be allowed in the firewall, and these shall be fire resistant. Any passageways for climate control system air flow shall be separated from the engine compartment by fire resistant material. Piping through the center tunnel bulkhead shall be copper, steel, nylon air brake tubing (for air and fuel), PVC (closed conduit) or brass and shall be sealed with fire-resistant material at the firewall. Wiring may pass through the bulkhead only if connectors or other means are provided to prevent or retard fire propagation through the firewall. The conduit and bulkhead connectors shall be sealed with fire resistant material at the firewall. Engine access panels in the firewall shall be fabricated of fire resistant material and secured with fire resistant fasteners. These panels, their fasteners, and the firewall shall be constructed and reinforced to minimize warping of the panels during a fire that will compromise the integrity of the firewall. The coach body shall be adequately sealed to prevent the intrusion of smoke, fuel, and fumes into the coach interior.

H.31. LEAK DETECTION SYSTEM

- H.31.1.** A mobile gas leak detection system manufactured by Amerex Corporation or approved equal shall be provided. Methane detection capability shall be provided in the follow areas:
- H.31.2.** Engine compartment one detector minimum. Fuel storage area - as required.
- H.31.3.** Detectors are to be designed to prevent vandalism or damage from external sources.
- H.31.4.** The AMGADS III system, or approval equal, shall detect and quantify airborne concentrations of methane from 0 % LEL to 100 % LEL and shall continue to give the indication of the presence of gas at concentrations above 100 % LEL.
- H.31.5.** The system shall be integrated with the engine stop override system to permit the operator more time, if required, to stop the vehicle. The system shall be powered through the battery insulation switch(es) and be in full time sampling mode any time the master control switch is in the "on" position. The system shall be self-restarting following power interruption or have backup batteries to prevent interruption of function.
- H.31.6.** The system shall be capable of operating normally without failure from -65 degrees F to +185 degrees F, and at relative humidity levels from 0% to 99 %. Components operating within the engine compartment shall operate in temperatures up to 250 degrees F. Any single failure of a detection device shall cause an indicator light on the control panel to illuminate.
- H.31.7.** The system shall operate at supply voltages from 9 to 30 VDC as produced by the coach electrical system, and be designed to withstand positive and negative voltages spikes of 500 VDC, and electrostatic discharge of 15000 volts without failure. Total current draw of the system under normal operating conditions shall not exceed 750 mA. System design shall comply with SAE J1211 criteria for automotive electronic equipment as a minimum.

H.32. ALARM LEVELS

- H.32.1.** The system shall generate audible and visual alarms at two non-adjustable concentration levels. The system shall also supply one user assignable auxiliary shift relay for such functions as alarms and signal light actuation, fuel valve shut off and ignition interruption. Alarms shall provide audible notification of detector activation inside the coach.

H.33. CALIBRATION REQUIREMENTS

H.33.1. The system shall register and report zero drift as a dangerous situation requiring attention. Drifts in calibration at other than the zero level shall either always be such as to produce a failsafe (false high) reading or shall give notification of a reading as a dangerous situation requiring attention (false low).

H.34. MONITOR PANEL

H.34.1. The system shall have a supervision monitoring panel located in the operator's area. The monitor panel shall indicate operational status of the sensors, harness, and calibration with visual indicators provided on the operators indicator panel.

H.35. EXTERIOR AND APPLIED PANELS

H.35.1. Roof Panels - Front roof cap and rear crown panels shall be nominal 0.13 inch (3.17 mm) thick fiberglass-reinforced, molded plastic incorporating molded indentations for the marker, clearance and identification lights. Main roof panels shall be 16 gauge, nominal 0.05 inch (1.29 mm), high tensile primed aluminum. Roof panels shall be bonded to the roof structure with adhesive.

H.35.2. Front Panels - The front body panel below the windshield shall be of one-piece molded fiberglass. A fiberglass trim fascia shall be provided under the windshield. It shall include molded housings for the headlamp, turn signal and clearance lamp assemblies.

H.36. STRENGTH AND INSTALLATION

H.36.1. Exterior panels above and below the rub rail may be structural components. Panels shall be secured to structural members and shall have a smooth finish with no sharp edges.

H.37. REPAIR AND REPLACEMENT

H.37.1. Exterior panels below the rub rail shall be divided into sections that are repairable or replaceable by a mechanic. Baggage doors shall be two part with the joint at or below the rub rail.

H.38. RAIN GUTTERS

H.38.1. Gutters shall be provided to minimize water flowing from the roof onto the side windows and passenger doors.

H.39. LICENSE PLATES

H.39.1. A recessed mounting area shall be provided to mount a standard size U.S. license plate on the rear of the coach. This provision shall recess the license plate so that automatic coach washing equipment brushes will not catch on the license plate. Four fasteners shall be utilized to retain the license plate. The license plate shall be mounted to the left of the coach center. Provision shall be made to illuminate the surface of the rear license plate.

H.40. RUBRAILS

H.40.1. Rub rails shall have a minimum height dimension of 2.50 inches (64 mm) and shall be composed of flexible, resilient material to protect both sides of the coach body from damage caused by minor sideswipe accidents. The rub rail may be discontinued at doorways and the condenser intake grille. A damaged portion of the rub rail shall be replaceable without requiring removal or replacement of the entire rub rail.

H.41. MOLDINGS

H.41.1. Sash Moldings – Painted aluminum sash moldings shall be installed along the bottom length of the passenger windows.

H.41.2. Belt Moldings – Painted aluminum belt moldings shall be installed along the left and right hand belt lines of the coach.

H.42. PARCEL RACKS

H.42.1. A minimum 10 module parcel rack without dividers and compartment doors shall be furnished over all two-passenger seating positions except in the wheelchair door area. Retention cords shall run the length of the rack housing except where air conditioning components are housed. These compartments will have dividers and locking doors. The parcel rack edge, running along the full length of the aisle, shall incorporate a handhold for use by standees. Passenger headroom measured from the rack end to the top of the seat headrest, shall be a minimum 17 Inches (432 mm). Interior window post caps shall be ABS, thermo formed plastic, off-white in color to provide a clean finished appearance. The interior of the rack shall be vinyl covered aluminum to complement the interior. Parcel racks shall be supported by polycarbonate glass filled hangers spaced approximately 40 inches (1,016 mm) apart. Total capacity shall be a minimum 109 ft.³ (3 m³) to allow for ample storage space for carry-on items.

H.42.2. Passenger service modules mounted on the underside of the parcel rack shall include individually controlled and adjustable LED passenger reading lights, and an exit signal push button, red in color and individual air distribution outlets receiving air from the parcel rack HVAC system. These outlets shall be adjustable from fully closed to full open position. A minimum of twenty-six speakers shall also be provided in the cluster panels for the driver controlled public address system. Speakers shall broadcast, in a clear tone, announcements that are clearly perceived from all seat positions at approximately the same volume level. Passengers utilizing the securement systems shall be provided identical amenities as provided for all other passengers except that the parcel rack shall be deleted in the area of the wheelchair lift door. Separate and independent notification will be provided on the dashboard indicator panel for stop request notification from securement positions.

H.43. UNDERFLOOR BAGGAGE COMPARTMENTS

H.43.1. Full width under floor baggage compartments shall be provided between the front and rear axles. Each compartment shall be separated by an aluminum panel except the front and rear bulkheads shall be stainless steel. The compartment doors shall be a two part with the joint at or below the rub rail, fully sealed vertical lift pantograph type. Each door shall include an aluminum or composite frame with an aluminum outer panel. Doors shall be spring counter balanced for ease of operation.

H.43.2. The no. 1 right hand, curbside baggage door shall have a key lock. All other baggage doors shall be equipped with air locks. Each baggage door shall have a 4.0 x 10 inch (102 x 254 mm) flush mounted breakaway type latch handle located with a center point approximately 38 inches (965 mm) off the ground.

H.43.3. Each under floor compartment shall be pressurized and illuminated with two LED lamps when the doors are opened. The lamp fixtures shall be sealed to preclude the intrusion of dust and moisture into the fixture. The floor of the baggage compartments shall be corrugated aluminum.

H.44. INTERIOR

H.44.1. HEADROOM

H.44.1.1. Headroom above the aisle shall be no less than 78 inches (1,981 mm). If an engine brake is to be provided, then a "hump" ahead of the rear cross seat will decrease headroom to approximately 74 Inches (1,880 mm).

H.45. DRIVER'S BARRIER

H.45.1. A barrier or bulkhead between the driver and street side front passenger seat shall be provided. The barrier shall eliminate glare and reflections from interior lighting in the windshield directly in front of the barrier during night operation.

H.45.2. The driver's barrier shall be constructed of opaque .472 inch (12 mm) thick acrylic glazing. The barrier shall be a shatter-proof acrylic sheet that meets AS standards AS-4 or AS-5. The glazing shall be indelibly marked with the manufacturer's name and type of material.

H.45.3. The drivers barrier shall extend from below the level of the passenger or driver seat cushion, whichever is lower, to above the level of the seated driver's head and shall fit within 1.5 inches (38 mm) from the coach side window/wall to prevent passengers from reaching the driver or his/her personal effects. The barrier design shall accommodate a minimum of 9.05 inch (230 mm) fore and aft travel of the specified operator's seat.

H.45.4. On the aisle side, the barrier shall be cut out from the vertical stanchions to permit passengers to use the stanchion as a handhold. Any panels above and below the glazing shall be complementary in color to the sidewall material.

H.45.5. All controls, including the driver's dimmer switch for first two rows of reading lights will be relocated to the LH Console and the RH. Console deleted.

H.46. MODESTY PANELS

H.46.1. Sturdy modesty panels constructed of durable, unpainted, corrosion-resistant material complementing the interior trim shall be provided at the rear of the step well. The modesty panel and its mounting shall withstand normal kicking, pushing, and pulling loads of 200-pound (91 kg) passengers without permanent visible deformation.

H.47. REAR BULKHEAD

H.47.1. The rear bulkhead paneling shall be contoured to fit the ceiling, side walls and seat.

H.48. CONSTRUCTION

H.48.1. Interior panels may be integral with, or applied to, the basic coach structure. They shall be decorated in accordance with and compliment the interior specified. Use of moldings and small pieces of trim shall be minimized, and all parts shall be functional. Panels shall be of backed melamine, vinyl-clad aluminum or vinyl-clad steel. Front and rear closures shall be fiberglass with color molded in, and there shall be no painted surfaces. The lower sidewall shall be Melamine covered panels or approved equal, sectionalized for ease of repair.

H.49. FASTENING

H.49.1. Interior panels shall be attached so that there are no exposed edges or rough surfaces. Panels and fasteners shall not be easily removable by passengers. Interior trim fasteners, where required, shall be rivets, Phillips, or tamper-proof screws.

H.50. FLOOR

H.50.1. STRENGTH

H.50.1.1. The floor deck may not be integral with the basic structure but shall be mounted on the structure securely to prevent chafing or horizontal movement. Sheet metal screws shall not be used to retain the floor. All floor fasteners shall be secured and protected from corrosion for the service life of the coach. 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 0.375 inches (10 mm) from the normal plane. The floor shall withstand the application of 3.0 times gross load weight without permanent detrimental deformation.

H.51. EDGES

H.51.1. The floor shall be essentially a continuous flat plane, except at the step well. Where the floor meets the walls of the coach, the surface edges shall be blended with a circular section of radius not less than .5 inch and a molding or cover shall prevent debris accumulation between the floor and wall. Interior flooring shall be flat throughout except for an 8 ft. (2.4 m) long welded ramp in the aisle section at the front which is sloped 5.35 degrees and has a 3 inch (76 mm) riser under the #1 RH and #1 LH passenger seats except for a "hump" in front of the rear cross seat (when engine brakes are provided). The floor is attached to the underframe with adhesive and rivets. Wheel housings may not extend above floor line.

H.51.2. Access openings in the floor shall be sealed to prevent entry of fumes and water into the coach interior. Flooring material shall be flush with the floor and shall be edge-bound with stainless steel to prevent the edges from coming loose. Access openings may be symmetrical if the fasteners are arranged to ensure alignment of the flooring. Fasteners shall be flush with the floor when secured.

H.51.3. Rubber flooring adhesion procedure includes butt cut type edges that are securely bonded to the plywood floor with a waterproof adhesive. Flooring areas which are edge-bound with stainless steel shall include the sidewall on each side, the ramp in the center aisle, the base of rear cross seat, the step up under the number 1 seat, the driver's modesty panel and the RH front passenger's modesty panel.

H.52. FLOOR PROTECTION

H.52.1. The floor, as assembled, including the sealer, attachments, and covering, shall be waterproof, non-hygroscopic, resistant to heat, dry rot, mold growth, and impervious to insects. Plywood shall be no less than one half-inch thick 5 ply water resistant Douglas Fir per CSA 0121-M1978 or PS1-95 (APA) and shall be installed with all edges sealed. The floor in the aisle shall be no less than an overall thickness of one half-inch water resistant Douglas Fir per CSA 0121-M1978 or PS1-95 (APA).

H.53. STEPS AND STEPWELL

H.53.1. STEPS

H.53.1.1. There shall be no more than 4 steps and no step shall be located between the vestibule and passenger compartment. A ramp shall be provided in this area with the rate of rise not to exceed 0.75 inch (19 mm) per foot with a maximum vertical rise of 9.0 inches (229 mm).

H.53.1.2. All step treads shall be of uniform depth no less than 11 inches (279 mm) and a uniform height of no less than 9.5 inches (241 mm). Except for the first step, the plane of the step treads shall be parallel to the plane of the floor. Treads shall be covered with RCA flooring or approved equal that shall remain effective in all weather conditions. Color of the tread covering shall match the vestibule flooring. The edge of the vestibule floor shall have no overhang at the step riser. The edge of the vestibule floor and the edge of each of the step treads shall have a bright, contrasting white band, 2 inches (51 mm) wide, the width of the step. This band shall be uniform in width across the entire step and vestibule edge.

H.54. STEPWELL CONSTRUCTION

H.54.1. Step well shall be constructed entirely of stainless steel. The steps shall simultaneously support 300 pound (136 kg) loads evenly distributed over the center half of each step tread without permanent deformation and with elastic deflection of no more than 0.0625 inches (1.6 mm). Each step tread shall support a load of 500 pounds (227 kg) evenly distributed over the center half of the tread without permanent deformation. A minimum 1.0 inch (25.4 mm) thick Tuf-Coat or approved equal, self-adhesive insulation shall be provided behind the step well area for added control of interior temperature variances and to minimize road noise.

H.55. WHEEL HOUSING

H.55.1. CONSTRUCTION

H.55.1.1. Wheel housings shall be constructed of stainless steel. Wheel housing, as installed and trimmed, shall withstand impacts of a 2-inch (51 mm) steel ball with at least 200 foot-pounds (271 Nm) of energy without penetration.

H.56. CLEARANCE

H.56.1. Sufficient clearance and air circulation shall be provided around the tires, wheels, and brakes to preclude overheating. Interference between the tires and any portion of the coach shall not be possible in maneuvers up to the limit of tire adhesion with weights from wet to GVWR.

H.57. FENDER SKIRTS

H.57.1. Front and rear wheel wells shall be fully skirted with rubber to minimize spray and splash. The fender skirts shall be damage resistant and easily replaceable. They shall be flexible if they extend beyond the allowable body width. Wheels and tires shall be removable without disturbing the fender skirts.

H.58. SPLASH APRONS

H.58.1. Splash aprons, composed of 0.25 inch (6 mm) minimum composition or rubberized fabric or 0.188 inch (5 mm) nylon reinforced rubber, shall be installed behind all wheels and shall extend downward. Apron widths shall be no less than tire widths. Splash aprons shall be bolted to plates which are welded to the coach understructure. The plates shall support the splash apron across its entire width. Splash aprons and their attachments shall be inherently weaker than the structure to which they are attached. Splash aprons and their attachments shall not be included in the road clearance measurements. Other splash aprons shall be installed where necessary to protect coach equipment.

H.59. PASSENGER ENTRANCE DOOR

H.59.1. An electrically controlled, air-operated, power bi-fold door with keyed lock, will be located forward of the right front wheel. The non-symmetrical door will have a clear opening width of 30 inches (762 mm) up to a height of 44 inches (1117 mm). The clear door opening height will be 84.5 inches (2,146.3 mm).

H.59.2. The door shall be of composite material construction with a stainless steel kick panel for the lower portion. A molded fiberglass-reinforced panel shall be on the interior of the door. Upper and lower hinge assemblies shall be cast, with a stainless steel lower hinge pin pivoting inside a spherical bearing.

H.59.3. An upper – primary and lower – secondary window shall be installed in the entrance door. The primary double-glazed window in the upper half of the door shall be of AS-2 laminated heat- absorbing safety glass. The secondary window, located in the lower section of the door, shall be of 0.5-inch (12.7 mm) acrylic.

H.59.4. Door control shall be provided by a momentary switch, located to the left of the steering wheel. An exterior remote external control switch shall also be located in a side-wall pocket by the entrance door,. The door shall have positive automatic air lock with overrule. The air lock will be automatically actuated by a micro switch when the door is in the closed position.

H.59.5. An entrance door key lock shall be provided on each coach along with two spare keys.

H.60. SERVICE COMPARTMENTS AND ACCESS DOORS

H.60.1. INTERIOR

H.60.1.1. Access for maintenance and replacement of equipment shall be provided by panels and doors that appear to be an integral part of the interior. Removal of fixtures or equipment unrelated to the repair task to gain access shall be minimized. Access doors, if hinged, shall be hinged with props, as necessary, to hold the doors up and out of the mechanic's way with the exception of the destination sign box door which hinges down and is held by straps in the open position. Panel fasteners shall be standardized so that only two tools are required to service all special fasteners within the coach. These fasteners shall be captive in the panel except for the engine

compartment and antenna access hatches. Access doors for the door actuator compartments shall be secured with hand screws or latches, and shall be sealed to prevent entry of mechanism lubricant into the coach interior. All hinges and props must be designed to preclude accidental closure when the panels are opened.

H.60.2. EXTERIOR

H.60.2.1. Vertically 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. The upper engine radiator/C.A.C. compartment door shall be vertically hinged with a locking latch located behind the engine compartment doors. Access to these compartments shall be from outside the coach. 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 be capable of withstanding severe abuse throughout the life of the coach. They shall close flush with the body surface. All service/maintenance doors, excluding baggage compartment 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 coach washing operations. Doors with top hinges shall have props stored behind the door or on the door frame. All access doors (except vertically hinged access doors) shall be sufficiently retained in the open position by props or counterbalancing, as with baggage compartment doors. Springs and hinges shall be corrosion-resistant and shall last throughout the service life of the coach. Latch handles shall be sized to provide an adequate grip for opening. Large access doors shall hinge up and out of the way or fold flat against the coach body and shall be easily operable by one person. These doors, when opened, shall not restrict access for servicing other components or systems. Retention devices utilized to hold the engine compartment access doors in the open position shall be heavy duty and designed to last the service life of the coach.

H.61. OPERATING COMPONENTS

H.61.1. DOORS

H.61.1.1. Operation of, and power to, the passenger door shall be completely controlled by a switch located in close proximity to the driver to the left of the steering wheel. A control or valve in the driver's compartment shall shut off the power to, and/or dump the air from the front door mechanism to permit manual operation of the front door with the coach shut down. A toggle switch on the exterior of the coach shall permit opening of the front door. The switch shall be concealed behind an unmarked flip up cover. The door switch cover shall be spring loaded so as to be held in the closed position and be located rearward of the entrance door.

H.62. ACTUATORS

H.62.1. The nominal door opening and closing speed shall be in the 3-5 second range. The maximum door opening and closing speeds will be regulated using fixed, maintenance free orifices and airline sizes. If required, door speeds can be decreased with the addition of a flow-restricting device. Actuators and the complete door mechanism shall be concealed from passengers, but shall be easily accessible for servicing.

H.63. MANUAL OPERATION

H.63.1. In the event of an emergency, it shall be possible to open the door manually from inside the coach after actuating an unlocking device. The nameplate for the entrance door air dump valve shall say: "Emergency Only – To manually open entrance door push knob." All references shall detail the "manual" operation of the door.

H.64. WINDSHIELD WIPERS AND WASHERS

H.64.1. WINDSHIELD WIPERS

H.64.1.1. The coach shall be equipped with three speed electric windshield wipers for each half of the windshield. Both wipers shall park along the center vertical edges of the windshield glass. Windshield wiper motors and mechanisms shall be easily accessible for repairs or service from outside the coach only and shall be removable as complete units. Mounting shall preclude cracking or damage to the windshield frame. Power supply to the wiper motors shall be provided through a dedicated circuit.

H.64.1.2. An intermittent operation feature for each wiper shall be provided with a variable time delay. After each pause, the wiper shall make one complete cycle across the windshield surface and return to the park position automatically.

H.65. WINDSHIELD WASHERS

- H.65.1.** The windshield washer system shall deposit washing fluid on the windshield and, when used with the wipers, shall evenly and completely wet the entire wiped area. Two separate washer pumps are to be provided.
- H.65.2.** The windshield washer system shall have a 3.9 gallon (15 liter) translucent reservoir, located for easy refilling. Reservoir pumps, lines and fittings shall be corrosion-resistant, and the reservoir itself shall be translucent for easy determination of fluid level. The windshield washer system shall be protected with an anti-freeze washer solution to -20°F (-29°C), regardless of season of delivery. The protected solution shall be tinted to provide easy visual indication that anti-freeze is present.

H.66. LIGHTING, CONTROLS, INSTRUMENTS

H.66.1. EXTERIOR LIGHTING

- H.66.1.1.** All exterior lighting systems shall be nominal 12V or 24V. The use of LED lamp assemblies shall be maximized to the extent practicable. All exterior lighting fixtures shall be sealed to prevent entry and accumulation of moisture or dust and each lamp shall be replaceable in less than 5 minutes by a mechanic. Lamps, lenses and fixtures shall be interchangeable to the extent practicable, and fixtures shall be corrosion resistant with sockets to be brass or stainless steel or plastic housings. Lamps at the rear of the coach, except the license plate lamp, shall be visible from behind when the engine service doors are opened. Sockets shall comply with SAE Standard J576C.
- H.66.1.2.** Visual and audible warnings shall inform following vehicles or pedestrians of reverse operation. Visual reverse operation warning shall conform to SAE Standard J593. Audible reverse operation warning shall conform to SAE Recommended Practice J994-Type C or D. Daytime running lights are to be provided.
- H.66.1.3.** Two light installation housings shall be located on each side of the coach front containing a single round halogen headlamp, a round LED daytime running light inboard of each headlight and an amber clearance/turn signal light located outboard of each headlight.
- H.66.1.4.** Amber colored turn signal lamps shall be provided on both the front and rear of the coach. All lighting shall meet Federal standards (including amended 49 CFR Part 571 effective December 26, 1984). The front right lamp shall be near the front wheel well, above the rub rail line and no higher than the wheel well. The front left side lamp shall be located at the same height and forward position as the right. The side signal lamps shall be of the armor protected type with unobstructed amber lens. The rear side signal lamps shall be generally located in the vicinity of the rear wheel well and shall have amber lenses.
- H.66.1.5.** LED roof marker lamps shall be provided at each end of the coach with amber front and red rear lens being provided. Intermediate LED marker lamps with amber lenses shall be provided on each side of the roof line at the center of coach.
- H.66.1.6.** Reflectors on the sides and rear of coach shall be provided. The front and center side reflectors shall be amber. The rear side and rear reflectors shall be red. The reflectors shall be permanently affixed to the coach; glue on or pressure sensitive mountings are not acceptable.

H.67. SERVICE AREA LIGHTING

- H.67.1.** Four lamps shall be provided in the engine compartment to generally illuminate the area for night emergency repairs or adjustments. The lamps shall be controlled by a switch located near the rear start controls in the engine compartment. These lamp assemblies shall be adequately sealed to prevent the intrusion of moisture or debris during coach operation or normal servicing operations such as steam cleaning. Necessary lights, also sealed, shall be located in other service compartments, and shall be provided with maintain contact switches on the light fixture or convenient to the light.

H.68. FLUSH MOUNTED CURB LIGHTS

- H.68.1.** Flush-mounted curb lights shall be installed on the right hand curbside of the coach. One light shall be installed in the no.1 baggage bay door, two shall be installed on the wheelchair lift door and one shall be mounted in the right hand rear engine service door.
- H.68.2.** The curb lights shall illuminate the curbside area the coach when the entrance door is opened, activated through the door control relay.
- H.68.3.** The lights shall extinguish automatically approximately 10 seconds after closing the entrance door. The curb light in the no. 1 baggage bay door shall extinguish when the baggage bay door is opened.

H.69. DRIVER'S LIGHTING

- H.69.1.** The driver's area shall have a lamp to provide general illumination of the driver's area and shall illuminate the half of the steering wheel nearest to the driver. This lamp shall be controlled by a switch that is conveniently located for access by the driver.

H.70. PASSENGER INTERIOR LIGHTING

- H.70.1.** Indirect interior illumination of the coach shall be provided by a minimum total of twenty-one (21) fluorescent tubes controlled by a switch on the driver's left hand control panel. Lighting intensity, measured at a vertical plane 24 inch (610 mm) above the seat cushion, shall be a minimum 15 foot-candles. LED lighting providing equivalent illumination may also be used.
- H.70.2.** All passenger seats except for center seat of rear cross seat shall have a flush mounted adjustable LED light. A minimum of 6 candlepower will be provided by each reading light cluster to insure adequate visibility with a button for passenger control. A switch to test the function of the reading lamps shall be provided and be labeled "Test." This switch shall be wired so as to override the function of all passengers reading lamp switches and illuminate all reading lamps when it is moved to the test position.
- H.70.3.** A minimum of six blue LED aisle lights shall be provided on the underside of the street side passenger seats. These lamps shall be mounted in such a manner so as to prevent passengers from damaging the light's when they are illuminated.
- H.70.4.** Additional general lighting required to illuminate the interior for passenger exits and shall be interlocked to activate only when the passenger door is opened.
- H.70.5.** A step well lighting system shall be wired to illuminate when the front door is opened. The system shall provide no less than 2 foot-candles of illumination of the step treads with the doors open. These lights shall not glare in the passengers' eyes. Lamp fixtures shall be totally enclosed, splash- proof, designed to provide ease of cleaning as well as lamp and housing removal, and shall not be easily removable by passengers. Step well lamps shall be protected from damage caused by passengers kicking lenses or fixtures and shall not be a hazard to passengers.
- H.70.6.** Three lamps shall be provided; a dome at the top of the step well, one on each side of the step well with the bottom one to also provide illumination of the ground area located inside and above the entrance door.

H.71. DRIVER CONTROLS

- H.71.1.** All switches and controls necessary for the operation of the coach shall be conveniently located in the driver's area and shall provide for ease of operation. Switches and controls shall be essentially within the hand reach envelope described in SAE Recommendation Practice, J287, Driver Hand
- H.71.2.** Control Reach. Controls shall be located so that boarding passengers may not easily tamper with control settings.
- H.71.3.** The door control, kneel control, windshield wiper/washer controls, and run switch shall be in the most convenient driver locations. They shall be identifiable by shape, touch, and markings. The passenger entrance door shall be operated by a single control, conveniently located by the driver's left hand on the control console. The location of this control shall be easily determined by position and touch.
- H.71.4.** All switches and controls shall be marked with easily read identifiers. All panel-mounted switches and controls shall be replaceable, and the wiring at these controls shall be serviceable from the vestibule or the driver's seat.
- H.71.5.** A momentary engine overrule switch shall be provided on the driver control console to permit the driver to move the coach off the road. All labeling of controls shall be permanent.

H.72. LEFT HAND CONTROL CONSOLE

- H.72.1.** A control console shall be located immediately to the driver's left and directly under the driver's window. The console shall house the rotary master/run control switch, outside mirror touchpad controls, engine override switch, auxiliary heater switch, hazard light switch, entrance door switch, kneeling switch, engine brake switch, passenger chime switch, and hazard switch. All switches shall be multiplexed and LED back-lit wherever possible.

H.73. TRANSMISSION SHIFT SELECTOR CONTROL

- H.73.1.** The Allison Transmission Gen IV shift selector control shall be located on the left hand control console. Shifting is totally automatic using the touch pad on the shift selector control module. Fault codes are also displayed on the shift selector to identify potential problems detected by the transmission's built-in diagnostics.

H.74. ACCELERATOR, BRAKE PEDALS AND ENGINE CONTROLS

H.74.1. These controls shall be designed for ankle motion. Foot surfaces of the pedals shall be faced with wear-resistant, nonskid, replaceable material that is either slipped or glued for grip. Controls for engine operation shall be closely grouped within the driver's compartment.

H.75. INSTRUMENTATION

H.75.1. The speedometer, air pressure gauge(s), and certain indicator lights shall be located on the front dash panel immediately ahead of the steering wheel. The steering wheel spokes or rim shall not obstruct the driver's vision of the instruments when the steering wheel is in the straight-ahead position. Instrument panel gauges and switches shall be illuminated when the exterior marker lamps are turned on. Glare or reflection in the windshield, side window, or front door windows from the instruments, indicators, or other controls shall be minimized. Instruments and indicators shall be easily readable in direct sunlight.

H.75.2. Indicators/telltale immediately in front of the driver shall at a minimum include:

H.75.2.1. Headlamp High Beam

H.75.2.2. Right Turn

H.75.2.3. Left Turn

H.75.2.4. Hazard Warning

H.75.2.5. Parking Brake applied

H.75.2.6. Service Brakes applied (*may be common with parking brake indicator – Tell Tale labeled “Stop Lights.”*)

H.75.3. The instrument panel shall include a speedometer indicating no less than 80 mph (130 kph) and calibrated in maximum increments of 5 mph (5 kph). The speedometer shall be a rotating point type, with a dial deflection of 240° to 120° and 45 mph (73 kph) near the top of the dial. The speedometer shall be sized and accurate in accordance with SAE Recommended Practice J678. A programmable electronic speedometer, or approved equal with odometer indicating vehicle speed in miles per hour, between 0 mph and 80 mph, shall be supplied. Speedometer speed and odometer mileage readings must be accurate within limits of plus nothing to minus 2% when coaches are equipped with new tires. The speedometer shall be equipped with an odometer with a capacity reading no less than 999,999 miles or kilometers.

H.75.4. The instrument panel shall also include air brake reservoir pressure gauge(s) with indicators for front and rear air tanks and voltmeter(s) to indicate the operating voltage across the coach batteries. The instrument panel and wiring shall be easily accessible for service from the driver's seat or top of the panel. Wiring shall have sufficient length and be routed to permit service without stretching or chafing the wires.

H.76. VISUAL AND AUDIBLE WARNING DISPLAY

H.76.1. Critical systems or components shall be monitored with a built-in diagnostic system. This diagnostic system shall have visual and audible indicators. The diagnostic indicator lamp panel shall be located in clear sight of the driver and shall incorporate LED telltale lights. The intensity of indicator lamps shall permit easy determination of on/off status in bright sunlight but shall not cause a distraction or visibility problem at night. An audible alarm shall sound when certain malfunctions are detected by the diagnostic system. The audible alarm shall be loud enough for the driver to be aware of its operation. Malfunction warnings and other indicators listed in Figure 2 shall also be supplied on the coach. Space shall be provided in the telltale clusters for future additions of no less than 4 indicators as the capability of onboard diagnostic systems improves.

H.76.2. All diagnostic indicators shall be simultaneously tested by the activation of master switch.

H.76.3. FIGURE 2: Operator's Status Panel Indicators

VISIBLE INDICATOR

TYPE of ALARM

<i>BACK-UP INDICATOR (A)</i>	<i>Back-Up Alarm</i>
<i>CHECK ENGINE INDICATOR</i>	<i>None</i>
<i>CHECK TRANSMISSION INDICATOR</i>	<i>None</i>
<i>ANTILOCK CONDITION LAMP</i>	<i>None</i>
<i>NOT GENERATING</i>	<i>None</i>
<i>HAZARD INDICATOR</i>	<i>Click</i>
<i>HEADLIGHT HIGH BEAM INDICATOR</i>	<i>None</i>
<i>HOT ENGINE INDICATOR (B)</i>	<i>Buzzer</i>
<i>KNEEL INDICATOR</i>	<i>Sonalert</i>
<i>LEFT TURN SIGNAL INDICATOR</i>	<i>Click</i>
<i>LOW AIR INDICATOR</i>	<i>Buzzer</i>
<i>LOW OIL PRESSURE INDICATOR (B)</i>	<i>Buzzer</i>
<i>LOW COOLANT INDICATOR (B)</i>	<i>None</i>
<i>PARKING BRAKE INDICATOR</i>	<i>None</i>
<i>RIGHT TURN SIGNAL INDICATOR</i>	<i>Click</i>
<i>STOP ENGINE INDICATOR</i>	<i>None</i>
<i>STOP REQUEST INDICATOR</i>	<i>Chime</i>
<i>WHEELCHAIR LIFT INDICATOR</i>	<i>Buzzer / Alarm</i>
<i>WHEELCHAIR STOP REQUEST INDICATOR</i>	<i>Chime</i>
<i>REAR RISE INDICATOR</i>	<i>Sonalert</i>

NOTE: (A) This indicator may be located on the transmission control panel
(B) These indicators may be combined with the CHECK ENGINE indicator provided by engine manufacturer.

H.77. INTERIOR TRIM

H.77.1. GENERAL REQUIREMENTS

H.77.1.1. The interior trim shall be generally pleasing, simple, modern, and free from superficial design motifs. It shall have no sharp depressions or inaccessible areas and shall be easy to clean and maintain. To the extent practicable, all interior surfaces more than 10 inches (254 mm) 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. Handholds, lamps, air vents, armrests, and other interior fittings shall appear to be part of the coach interior design. There shall be no sharp, abrasive edges and surfaces and no unnecessary hazardous protuberances. All plastic and synthetic materials used inside the coach shall be fire-resistant.

H.77.1.2. Materials shall be selected on the basis of maintenance, durability, appearance, flammability, and tactile qualities. Trim and attachment details shall be kept simple and unobtrusive. Materials shall be strong enough to resist everyday abuse and vandalism; they shall be resistant to scratches and markings. Interior trim shall be secured to avoid resonant vibrations under normal operational conditions.

H.78. TRIM PANELS

H.78.1. Interior side trim panels and driver's barrier shall be textured stainless steel, anodized aluminum, plastic, melamine type material, vinyl-clad aluminum or fiberglass reinforced plastic. The material shall permit easy removal of paint, greasy fingerprints, and ink from felt tip pens. Panels shall be easily replaceable and tamper resistant. They shall be reinforced, as necessary, to resist vandalism and other rigors of commuter coach service. Interior mullion trim, molding, and trim strips shall be textured stainless steel, vinyl-clad aluminum, anodized aluminum or vacuum formed plastic.

H.78.2. The lower sidewall interior trim shall be fabric covered aluminum panels or approved equal, with fabric patterns running horizontally. Panels shall be sectionalized for ease of repair and joined by aluminum extrusion. Ceiling panels shall be vinyl-clad aluminum or approved equal.

H.79. HEADLINING

H.79.1. 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 frame members. Molding and trim strips, as required to make the edges tamper-proof, shall be stainless steel, aluminum, or plastic, colored to compliment the ceiling material. The access panel for the antenna base does not require to be hinged but shall be mounted with tamper-proof screws. Materials for the headlining shall typically be vinyl clad aluminum; the front interior cap shall be gray fiberglass or ABS.

H.80. FRONT END

H.80.1. The entire front end of the coach shall be sealed to prevent debris accumulation behind the dash and to prevent the driver from kicking or fouling wiring and other equipment with his feet. The front end shall be free of protrusions that are hazardous to passengers standing or walking in the front of the coach during rapid decelerations. Formed metal dash panels shall be painted and finished to exterior quality or may be ABS, fiberglass or vinyl-clad. All parts forward of the driver's barrier shall be finished with a dull matte surface. Colors shall match or coordinate with the balance of the coach interior.

H.81. REAR END

H.81.1. The rear bulkhead and rear interior surfaces shall be paneled with fiberglass reinforced plastic, trimmed with stainless steel, aluminum, vinyl-clad aluminum, or approved equal.

H.82. PASSENGER SEATS

H.82.1. ARRANGEMENTS

H.82.1.1. Passenger seats shall be arranged in a transverse, forward facing configuration. Ambulatory passenger capacity shall accommodate 57 seats. An option for a lavatory shall be provided, the lavatory should not displace more than 2 passenger seats. Both configurations will need an attached floor plan.

H.82.1.2. No more than twelve seated positions shall be lost on any bus configuration to accommodate two wheelchair passengers occupying the securement positions.

H.82.1.3. Each transverse, forward facing seat, except the rear seats, shall accommodate two adult passengers. Floor seat tracks shall be stainless steel and shall be welded to the coach frame and be nearly flush with the finished floor. The wall tracks shall be stainless steel or aluminum and shall be bolted or riveted to the sidewall.

H.83. STRUCTURE AND DESIGN

- H.83.1.** Seats shall be American Seating Model W2005SQ reclining seats or approved equal. Seat frames shall be constructed of high strength, fatigue resistant, welded steel with a durable powder coated, corrosion resistant colored finish which complements the coach interior. The seat frame shall be wall mounted with heavy gauge steel brackets and shall be attached to the coach floor with a heavy duty stainless steel T pedestal. The seat back shall recline five (5) inches (127 mm) maximum with an infinite number of stops. The reclining seat backs shall be provided with a dress up feature to facilitate coach cleaning. Seat width shall be nominal 40.50 inches (1,029 mm). Aisle shall not be less than 14 inches (356 mm) wide.
- H.83.2.** Seat cushions shall be supported by steel serpentine springs. Seat covering shall be Holdsworth, Lantal, or similar high quality wool fabric. Typical seat covering weight shall be 24 ounces (680 g)/square yard. Overall composition shall typically be 54% wool, 9% nylon and 37% cotton. Pile composition shall typically be 85% wool and 15% nylon. Backing composition shall typically be 100% cotton. Abrasion from a 28 ounce (794 g) loading shall not affect appearance with 60,000 rubs. The front face of the seat upright and side boxing of cushions shall be covered with Holdsworth, Lantal or other similar wool fabric to compliment the seat cushion. Backrest fabric shall be rugged carpet material. Seat armrest shall be dark gray in color.
- H.83.3.** Seat foam padding shall be polyurethane. Seat upholstery shall utilize zippers or Velcro which allows them be removed from the seat cushions for cleaning/replacement purposes.

H.84. DRIVER'S SEAT

H.84.1. DIMENSIONS

- H.84.1.1.** The driver's seat shall be a Recaro Ergo Metro or approved equal. The driver's seat shall be adjustable and shall have up to 9.05 inches (230 mm) of fore and aft adjustment. The seat back and cushion shall be adjustable. The seat shall have cushion depth adjustment, height adjustment (5.5 inches (140 mm) maximum), seat back adjustment, rear cushion adjustment and lumbar adjustment so that operators ranging in size from the 98th percentile male to the 5th percentile female may operate the coach. The suspension control shall be ergonomically designed so that the operator can adjust the seat without looking. The suspension height adjustment and lumbar switches shall be operated with a rocker switch, no rotating knobs are acceptable. The seat suspension shall be capable of dampening varying frequencies that are transmitted through the vehicle caused by varying road conditions. The seat shall be cushioned by a dual shock absorber design. One shock shall be adjustable to allow the operator to control the ride settings. A rubber bumper is required to prevent bottoming out of the seat.
- H.84.1.2.** A rubber boot shall be provided to cover the suspension to eliminate the potential for pinching. All air lines are to be 0.25 inch (6 mm) diameter and have a quick disconnect at the back of the seat.
- H.84.1.3.** The suspension shall have a minimum of 15 degrees of seat cushion tilt (rake adjustment). The rake adjustment shall be dual-sided and be accomplished without leaving the seat. The seat cushion shall adjust from 18-20 inches (457 – 508 mm) for varying size drivers. Double locking seat tracks with stainless steel bearings shall be provided. The seat tracks shall be located below the seat cushion and above the pneumatic suspension to enhance track durability and improve rearward travel. The seat shall come equipped with an air track release and a manual center release. All controls are to be on the right-hand side of the seat.
- H.84.1.4.** The seat shall be equipped with manual dual recliner gears. The seat back shall be adjustable with dual sided hand controls and include a 24.5 degree recline stop. Recline stop is to prevent the seat from interfering with the driver's barrier. The seat back shall be infinitely adjustable from 90 to 114.5 degrees. The seat back shall come with a full protective plastic back shell.
- H.84.1.5.** The back structure shall be constructed of steel and include a one piece stamped steel shell. The seat back shall be ergonomically designed and adjustable to provide exactly the right support to match the S-shaped curve of the operators back. The seat back foam shall be fully supported, no wires or spring support is to be provided. Solid steel bolster adjustment supports are required to provide strong lateral supports. Lateral supports will help hold the driver in place and reduce muscle fatigue while driving.
- H.84.1.6.** The seat cushion shall be adjustable in length and rake to accommodate operators of various heights. The seat cushion shall have a two inch extension for taller operators. To accommodate shorter operators, the front of the seat cushion shall rake down and retract.
- H.84.1.7.** A three cell air lumbar with right hand controls shall be provided for lower back support. Each air bag shall be individually controlled. Switch design and layout shall be positioned so that the operator can adjust without looking. A four way adjustable headrest with six position vertical adjustment shall be provided. The seat shall be provided with a two point 72 inch 72 inch (1.8 m) seat belt that is stored in plastic anti-cinch automatic retractors mounted on the left side of the seat. The seat belt buckle shall be located on the right hand side of the seat for easy access.

H.85. STRUCTURE AND DESIGN

- H.85.1.** The driver's seat cushion shall be made of polyurethane foam. The foam shall be constructed to provide lateral support to provide better operator stability in curves and turns. All exposed metal on the driver's seat, including

the pedestal, shall be unpainted aluminum or stainless steel. Required seat belts shall be fastened to the seat so that the seat may be adjusted by the driver without resetting the seat belt. Seat belts shall be stored in automatic, inertia locking type retractors that do not tighten up during operation. The retractor shall be located to the left of the driver; the latch mechanism shall be located on the right. The seat belt shall be designed to allow the operator to "set" the tension on the belt. The belt shall be designed to not creep, making the belt tighter or loose. The seat belt shall be long enough to secure a 98% male driver.

- H.85.2.** Driver's seat covering weight shall be 24 ounces/square yard. Overall composition shall be 54% wool, 9% nylon and 37% cotton. Pile composition shall be 85% wool and 15% nylon. Back composition shall be 100% cotton. Seat cushions shall withstand 100,000 randomly positioned 3.50 inch (89 mm) drops of a squirming, 150 pound (68 kg), smooth surfaced, buttocks-shaped striker with only minimal wear on the seat covering.

H.86. FLOOR COVERING

H.86.1. VESTIBULE

- H.86.1.1.** The floor in the vestibule shall be covered with RCA flooring or approved equal. The floor covering shall remain effective in all weather conditions for a minimum of seven years. The floor covering as well as transitions of floor material to the main floor and to the step well area, shall be smooth and present no tripping hazards. The standee line shall be white and 2.0 inches (51 mm) wide and shall extend across the coach ramp aisle in line with the driver's barrier. The width of this line shall be uniform in width across its entire length. This line shall be white, same color as the edge of the steps. Color shall be consistent throughout the floor covering.

H.87. DRIVER'S COMPARTMENT

The floor in the driver's compartment shall be easily cleaned and shall be arranged to prevent debris accumul

H.88. PASSENGER AREA

- H.88.1.** The floor covering in the passenger area shall be the same material, dimensions and color specified for the vestibule. Flooring shall be installed to minimize the quantity of seams. A one-piece aisle center strip shall extend from the rear cross seat running between the rows of transverse seats to the edge of the center ramp. The ramp will include a separate piece of flooring with a standee line imbedded next to the driver's modesty panel. The floor under the seats shall closely fit to the sidewall panels.

H.89. WINDOWS

H.89.1. WINDSHIELD

- H.89.1.1.** The windshield shall be designed and installed to minimize external glare as well as reflections from inside the coach. When the coach is operated at night with the passenger interior lighting on, essentially no reflections shall be visible in the windshield immediately forward of the driver's barrier. Reflections in the remainder of the windshield shall be minimized, and no reflection of any part of the coach interior behind the driver's barrier shall be visible in the windshield.

- H.89.1.2.** The windshield shall be easily replaceable by removing zip-locks from the windshield retaining moldings. Bonded windshields shall not be used. The glazing material shall have single density tint.

H.90. DRIVER'S SIDE WINDOW

- H.90.1.** The driver's side window section shall be divided vertically and the rearward section shall slide fore and aft in tracks or channels designed to last the service life of the coach. The driver's side window shall not be bonded in place and shall be easily replaceable. The glazing material shall be nominal 0.25 inch (6 mm) laminated, tempered glass with single density tint, the same as the windshield. The side window shall be rated AS-2.

H.91. PASSENGER SIDE WINDOWS

- H.91.1.** Eight large rectangular passenger side windows shall be provided on each side of the 45 foot coaches. The glazed panel outside dimension size will be 36.125 x 57.625 inch (918 x 1466.5 mm) x .188-inch (4.76-mm) thick. The windows will have a nominal 32 x 52-inch (813- x 1,321-mm) clear opening within the inner support frame structure. The side passenger windows will be single-glazed construction, hermetically sealed, AS-3 laminated float, 76% heat-absorbing laminated safety glass with light and solar transmittance of 24%. A painted aluminum sash molding will be installed along the bottom length of the passenger side windows.
- H.91.2.** All windows shall be top hinged with push out at the bottom, with the exception of the wheelchair lift door and lavatory windows which do not open. All top-hinged windows shall be emergency escape type and include a single motion release bar running the entire width of the window at the lower edge to permit emergency egress. Emergency operating instructions printed on metal plates shall be provided at each seat position for operating the push-out window.

H.92. INSULATION

H.92.1. MATERIAL

H.92.2. PROPERTIES

H.92.3. The insulating materials may be of differing thicknesses and materials to achieve thermal insulating properties and low interior noise levels. These are described following:

H.92.3.1. Roof: 2.0 inch (51 mm) thick, compressed at installation, resin coated, medium density non bagged fiberglass

H.92.3.2. Sidewall: Rigid molded polyurethane foam of varying thickness.

H.92.3.3. Driver's area: Minimum 0.50 inch (13 mm), high-density fiberglass under the floor in the driver's area.

H.92.3.4. Step well area: 1-inch thick urethane foam insulation with stretched polyester film to minimize interior temperature variances during severe external climatic conditions and for sound deadening.

H.92.3.5. Below windshield: 2.0 inch (51 mm) thick, high density fiberglass

H.92.3.6. Complete rear lounge seat area shall be heavily insulated with fiberglass blankets and sound-dampened panels for both noise and heat protection as follows:

H.92.3.7. Behind the rear cross-seat riser and rear cross seat back and cushion are a minimum total of 1.50 inch (38 mm) thick high-density fiberglass blankets.

H.92.3.8. An additional 0.625 inch (16 mm) fiberglass blanket is added behind the rear cross seat back to further impede engine noise propagation to coach interior.

H.92.3.9. Sound barrier with 0.250 inch (6 mm) urethane foam layered on either side of a 0.125 inch (3 mm) urethane elastomer loaded with barium sulfate.

H.92.3.10. Cover panel behind rear cross-seat is 1.0 inch (25.4 mm) thick foamed polyurethane with stretched polyester film facing.

H.92.3.11. Area behind and below this rear area is 2.0 inch (51 mm) medium density fiberglass with a 0.75 inch (19 mm) thick heavy density fiberglass batting cemented to the inner face of the fiberglass rear panel.

H.93. THERMAL INSULATION

H.93.1. The combination of inner and outer panels on the sides, roof, and ends of the coach, and insulating materials shall provide a thermal insulation sufficient to meet the interior temperature requirements. The coach body shall be thoroughly sealed so that drafts cannot be felt by the driver or passengers during normal operations with the passenger doors closed.

H.94. SOUND INSULATION

H.94.1. 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 coach shall have a sound level of 60 dBA or less at any point inside the coach. These conditions shall prevail with all openings, including doors and windows, closed and with the engine and accessories switched off.

H.94.2. Bus generated noise level experienced by a passenger at any seat location in the coach shall not exceed 80 dBA and the driver shall not experience a noise level of more than 70 dBA under the following test conditions. The coach shall be empty except for test personnel, not to exceed 4 persons, and the test equipment. All openings shall be closed and all accessories shall be operating during the test. The coach shall accelerate at full throttle from a standstill to 35 mph on level commercial asphalt or concrete pavement in an area free of large reflecting surfaces within 50 feet of the coach path. During the test, the ambient noise level in the test area shall be at least 10 dB lower than the coach under test. Instrumentation and other general requirements shall conform to SAE Standard J366. If the noise contains an audible discrete frequency, a penalty of 5 dBA shall be added to the sound level measured.

H.95. REAR SEAT INSULATION

H.95.1. Special design consideration shall be given to insulation in the area above the engine compartment. Fiberglass or other suitable material shall be applied, together with adequate ventilation, to provide temperatures consistent with the remainder of the coach.

H.95.2. Seat cushions and seat backs shall be suitably insulated to prevent elevated temperature of the seat itself and no cushion or back shall be measurably hotter as compared to any other seat in the coach.

H.96. ANCILLARY FEATURES

H.96.1. DRIVER'S AREA

H.96.2. VISORS

H.96.2.1. Three roller type sunscreens shall be provided at the right and left hand windshield and at the driver's side window. Guide rods shall be located at each end of each screen to allow for infinite positioning. The sunscreens shall be shaped to minimize light leakage between the sunshades and windshield pillars. The sunscreens shall not obstruct air flow from the climate control system or obstruct the operation of other equipment such as the radio handset or the destination sign control. Sunscreen adjustments shall be made easily by hand.

H.97. STOP REQUEST SIGN

H.97.1. A passenger chime signal audible to the driver and to passengers anywhere inside the coach shall be provided. The chime shall be a push button convenient to seated passengers. A driver-controlled switch shall deactivate the chime system. A stop request sign shall be located in the front center of the coach and fastened to the coach ceiling to permit viewing by all passengers. The sign shall be illuminated when the passenger chime sounds and go off when the entrance door is opened. The passenger chime shall sound once when the sign's light comes on but will not sound again until after the system has been reset by the opening of the entrance door. A passenger chime circuit ON / OFF switch shall be provided in the drivers area.

H.98. DRIVERS STORAGE

H.98.1. A hook shall be provided for the drivers' coat in the driver's area.

H.99. MIRRORS

H.99.1. OUTSIDE MIRRORS

H.99.1.1. The coach shall be equipped with corrosion resistant, heated remote controlled outside rear view mirrors, on each side of the coach. The mirrors shall be mounted so as to permit the driver to view the highway along both sides of the coach, including the rear wheels. Mirrors shall be firmly attached to the coach to prevent vibration and loss of adjustment, but not so firmly attached that the coach or its structure is damaged when the mirror is struck in an accident. Outboard maximum overall mirror width dimension shall not exceed 122 inches while providing maximum visibility to the operator.

H.99.1.2. The roadside mirror shall be a corrosion-resistant, remote outside rear view mirror, adjustable from the driver's seat. Mirrors shall be split view flat and convex glass integrated in the same housing, overall measurement 10 inches by 13 inches (254 x 330 mm). Mirrors shall permit operator view of road surface as well as the rear wheels. Connections on mirror harness shall be Cannon Sure Seal all weather connectors or approved equal. Mirror head shall be attached to arm with ball/collet adjustment, for positive head location. Mirror arm shall be made to breakaway if struck in an accident or to eliminate damage in bus wash. Mirror arm shall be hollow aluminum for concealing wire.

H.99.1.3. The curbside mirror shall be a corrosion-resistant remote outside rear view mirror. Mirrors shall be integral flat and convex with overall measurements of 10 inches by 13 inches (254 x 330 mm) and permit driver view of roadway as well as coach rear wheels. Mirror arm shall be spring loaded to break away, should impact occur. Mirror arm shall be made to break away if struck in an accident or to eliminate damage in bus wash. Mirror arm shall be hollow aluminum for concealing wire. A mechanical stop shall be provided which prevents contact between the mirror arm and the entrance door. Mirror arm shall also have a five inch convex spot mounted on it to provide a clear view of the front of the coach.

H.99.1.4. Both mirrors in both housings shall be heated. A switch shall be provided. The switch shall control both mirrors and be provided with pigtail connectors to interface with the wiring harnesses of both remote mirrors. The switch shall be installed in a location that is within easy reach of the operator.

H.100. INSIDE MIRRORS

H.100.1. A mirror shall be provided for the operator to observe passengers throughout the coach without leaving his seat and without shoulder movement. With a full standee-load, including standees in the vestibule, the operator shall be able to observe passengers in the rear of the coach and anywhere in the aisle. Inside mirror shall be 6.0 inches x 10.50 inches mounted just below the destination sign box and above the driver's line of sight.

H.101. PASSENGER ASSISTS

H.101.1. GENERAL REQUIREMENTS

H.101.1.1. Passenger assists in the form of full grip, vertical stanchions or handholds shall be provided for the support and stability 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 coach, a horizontal assist shall be provided at the aisle side of the luggage rack that runs the full length of the luggage rack so that a 5th-percentile female passenger may easily move the length of the aisle using one hand and then the other without losing support. Excluding those mounted on the luggage racks, the assists shall be between 1.25 and 1.50 inches (32 x 38 mm) in diameter or width with radii no less than 0.25 inches (6 mm). All passenger

assists except for the luggage rack nosing shall permit full hand grip with no less than 1.50 inches of knuckle clearance around the assist.

H.102. FRONT DOORWAY

H.102.1. Front doors, or the entry area, shall be fitted with assists no less than 0.75 inches (19 mm) in width. Assists shall be as far outward as practicable, but shall be no further than 6 inches (152 mm) from the outside edge of lower step tread 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 on the front modesty panel.

H.103. VESTIBULE

H.103.1. The aisle of the driver's barrier panel shall be fitted with vertical passenger assists that are functionally continuous with the overhead assists that extend to within 36 inches (91 cm) of the floor. These assists shall have sufficient clearance from the barrier to prevent inadvertent wedging of a passenger's arm and shall be in complete compliance with ADA requirements.

H.103.2. A horizontal passenger assist shall be located in the front of the coach adjacent to the driver's area. The horizontal passenger assist maximum will be no more than 35 inches (89 cm).

H.103.3. The assists at the front of the coach shall be arranged to permit a 5th percentile female passenger to easily reach from the front door assist to the horizontal assist, then to the vertical assist.

H.104. PASSENGER INFORMATION SYSTEMS

H.104.1. DESTINATION SIGNS

H.104.2. The displays shall consist of Full Colored LED's. All Full Color LED's used for the destination signs shall be rated for a 50,000-hours. The entire display area of all signs shall be clearly visible and readable both in direct sunlight and at night with a viewing angle of at least 140 degrees. The characters formed by the LED's shall meet the requirements of the Americans with Disabilities ACT (ADA) of 1990 Reference 49 CFR Section 38.39. The software will give the end user the capability to select from a vast selection of custom fonts, pre-programmed fonts and the Microsoft TrueType Directory fonts for display on the LED Signs for the most customization possible to the desire of the end user's riding public.

H.104.3. All destination signs shall be supplied with an ambient light detection sensor that controls the LED intensity according to the exterior light conditions. This adjustment shall be continuously linear, not stepped, from 10-100% output.

H.105. FRONT DESTINATION SIGN

H.105.1. 160 Columns by 17 rows, Front Sign shall consist of a matrix of 160 Columns by 17 Rows and should have no less than 2720 LED's, with a maximum display height of not less than 8.75" and at least 64.75" wide. The outer housing should fit within an envelope of no more than 66 x 10.75 x 2". The sign should be readable from at least 250' with a viewing angle of not less than 140'.

H.106. CURB SIDE DESTINATION SIGN

H.106.1. Not required

H.107. SYSTEM CONTROL AND PROGRAMMING

H.107.1. All system control and drive PC boards shall be enclosed in either the sign housings or in the System Control Console. The various destination signs can be programmed to display either one common message or each sign can display an independent message. The System Control Console shall incorporate a flexible keypad with no moving parts.

H.107.2. The system control console shall be used to view display messages and contain the destination sign database. The driver console shall utilize a tactile membrane keypad. The system control console shall be equipped with an LCD display.

H.107.3. Sign system shall be capable of sequentially displaying a minimum of one pre-selected destination message and one public relations message. The operator shall be able to quickly change between pre-selected destination messages without re-entering a message code. Public relations messages shall be capable of being displayed alternately with the regular destination.

H.107.4. The Master Coach Run Switch shall control power to the sign system. The signs shall operate in all positions of this switch except off. The signs shall be internally protected against voltage transients and RFI interference to ensure proper operation in a bus environment.

H.107.5. The system control console shall be used to view and update display messages. The system control console shall utilize a multiple function keyboard with tactile feel, designed especially for the harsh transit environment. The system control console shall contain an LCD display. The system control console shall continuously display the

complete message associated with the selected destination code. Diagnostics and/or maintenance and test features that indicate any sign defects shall be included.

- H.107.6.** The system shall be capable of integrating to on-board computer devices for message listing program via anyone of several possible protocols, including but not limited to J1708, RS485, RS232, RS422 or IBIS. The sign system shall be capable of wireless upload capability for receiving the messaging database. The sign system shall be reprogrammable through the system control console by either a standard USB Thumb Drive or via a 9-pin "D" type keyfob memory device.

H.108. EMERGENCY MESSAGE DISPLAY

- H.108.1.** A pre-programmed emergency message may be activated using a customer-selected switch located in the driver area. This message shall be displayed on signs facing outside the vehicle, while signs inside the vehicle, including the driver console, remain unchanged. Removing the emergency signal or entering a new destination shall cancel this message.

H.109. SYSTEM LEVEL DIAGNOSTICS

- H.109.1.** The system control console shall provide, at a minimum, visual indication of system level errors with the destination signs. This shall include detection of communication failure, power supply failure on a particular sign and display board failure on a particular sign.

H.110. PROGRAMMING

- H.110.1.** A PC-based software package will be furnished for creating the destination sign messages. The character shape and size shall be programmable and the software should allow the creation of personalized fonts. These may vary in pixel height and comprise single, double and triple stroke typeface. The program will allow an unlimited amount of special characters, logos or fonts to be displayed.
- H.110.2.** A programming software package shall be furnished to generate message lists for the destination sign system. It shall be a Windows compatible software package, using drop down menus and help screens. The software shall not require a standalone computer or a computer of a specific make or model. The software will allow, at a minimum, individual font selection, shape and choice of fonts, font creation and import, destination display management (right or left route numbers, pre-defined text fields, alternating screens and scrolling), as well as full system previews are available for all signs. The software shall also offer utilization of the TrueType font directory for programming. Graphic capabilities are available to allow personal logo creation as well as selection from pre-programmed pictograms.
- H.110.3.** The programming software shall use techniques that require minimal operator training and are intended for use by operators that are not trained in complex computer operations.

H.111. WARRANTY & SPARES

- H.111.1.** All full color signs and components of the sign system shall be covered by a 5-year warranty. Free spare parts, (whole components), shall be provided to the end user free of charge for storage and use at the end users selected facility. The number of spares to be provided will be commensurate with the number of original systems purchased and shall be agreed to by all parties at the execution of a contract.

H.112. LIFT

- H.112.1.** A Braun model number NUVL855RM24 dedicated access extended travel lift, or approved equal with two forward facing mobility device securement areas to accommodate a maximum 30.0 inches (762 mm) wide mobility device shall be provided. The lift assembly shall comply with all current ADA and FMVSS 403 and 404 requirements. The lift shall be installed below the floor line at the number 2 right-hand luggage bay on the curbside of the coach.
- H.112.2.** The lift shall be controlled by a dash mounted toggle switch and a rear lift area toggle switch, and operated by up/down switches on a pendant mounted to the lift support bracket inside the number 2 baggage bay. The lift Restraint Belt must be buckled before the lift can be raised or lowered. The safety interlock circuit can be energized to operate the lift only if: the transmission is in neutral, the park brake is applied, engine Fast Idle is ON, the dash-mounted Master Switch is ON, the lift Secondary Switch is ON and the lift restraint belt is buckled.
- H.112.3.** The wheelchair loading system shall provide safe, comfortable and rapid ingress and egress for applicable passengers from the street level or a curb. When not in use, the lift shall stow in the luggage bay. The lift mechanism shall include a Threshold Warning device to provide "passenger on platform" information and prevent stowing the lift platform when a passenger is sensed. The outer barrier shall be automatically controlled and shall be such that it cannot be overridden by the loading system operator. A dash mounted indicator light shall be provided and shall be illuminated when the loading system is activated. The interlock shall apply, the bus shall not move and the engine throttle shall be disabled whenever the wheelchair loading system is activated. If the lift door is open or ajar, the interlock shall remain engaged. Brackets, clamps, screw heads and other fasteners used on the passenger assists shall be anodized aluminum or stainless steel and shall be flush with the surface and free of rough edges.

H.112.4. The lift control mounted on the lift structure shall have push button Up / Down switches. The toggle electrical supply switch shall be located in close proximity to the controller. This toggle switch must be turned "ON" prior to the lift operation. All lift control switches shall be permanently labeled. Decals shall not be permitted. The stow guard switch shall be red in color and the Stow / Deploy switch shall be black in color. These switches shall be incorporated in a hand held pendant

H.112.5. The Braun NUVL855RM24 or approved equal lift shall include the following specifications:

H.112.5.1. Lifting capacity (main platform) -700 pounds (317 kg)

H.112.5.2. Vertical travel - 63" (1,600 mm) maximum

H.112.5.3. Platform width (chair capacity) -30" (762 mm) minimum

H.112.5.4. Platform depth (chair capacity) - 48" (1,219.2 mm) minimum

H.112.5.5. Platform side height - 1.50" (38 mm)

H.112.5.6. Handrail height - two (2) - 30" (762 mm) minimum

H.112.5.7. Cassette stowed dimension (depth) - 72.25" (1835 mm) total

H.112.5.8. Cassette Width & Height - 43.5" x 8.375" (1105 x 213 mm)

H.112.5.9. Operating controls - 3 pushbutton

H.112.5.10. Power Source - Electro- hydraulic

H.112.5.11. Voltage -24 volts

H.112.5.12. DC Back up system - Emergency hand pump

H.112.5.13. Construction - Steel and aluminum

H.112.5.14. Stow level to ground cycle time - 12 seconds at 70 degrees (21° C)no load

H.112.5.15. Ground to floor level cycle time - 12 seconds at 70 degrees (21° C) – no load

H.112.5.16. Hydraulic system fluid capacity - 1.0 quart (1 liter)

H.112.5.17. Hydraulic system operating pressure - 2500 psi (17,238 kPa) minimum

H.113. DEPARTMENT OF TRANSPORTATION REGULATIONS 49 CFR 38.

H.113.1. The lift shall include a hinged platform to bridge the coach floor to the lift platform. Bridge shall be hinged and locked in an upward position to act as a barrier when the lift is in use. Bridge shall also allow the lift passenger to ingress/egress easily from the platform. Lift travel speeds and lift operation shall be adjusted to the lift manufacturer's specifications upon completion of the lift installation into each coach and before coach delivery. The individual handrails shall incorporate a visual aid to insure that they are folded in the proper order.

H.113.2. The lift shall include an emergency system in case of driver operation malfunction. Should an emergency situation occur, the lift operator shall release the pushbutton switch on the controller to immediately stop the lift operation. Loss of electrical power shall also stop the lift operation regardless of switch position. An emergency auxiliary hydraulic hand pump shall be used to complete the lift cycle. The emergency hand pump handles and pump shall be located in an enclosed box at the rear wall of the number 1 right-hand baggage bay to prevent the accumulation of dust and dirt. The pump shall be easily accessible through baggage bay door. The handle shall be stored adjacent to the pump to allow immediate usage.

H.114. LIFT DOOR

H.114.1. The lift door shall be a single leaf design that operates in a sliding track mounted both above and below the door leaf. The door shall open by sliding to the rear of the coach and shall remain on a horizontal plane throughout the opening and closing process. No pin hinged doors shall be provided. The transmission must be in neutral and the parking brake activated for the lift to operate. The accelerator shall be automatically disabled and the fast idle system activated when either the lift master switch is turned "ON" or the lift door is open in order to provide maximum safety and security. These features shall be wired to the lift master switch to allow activation only when the transmission is in neutral. The coach directional (Hazard) lights will also flash on/off. After the lift operation is completed, the lift shall be properly stored and secured, with the access door closed and the lift master switch at the dash in the "OFF" position in order to move the coach.

H.114.2. The lift door shall have a window in line with the other passenger windows and shall not detract from the appearance of the coach. The door latch mechanism shall be located in the lower section of the door so that operators in the 5th percentile female range can operate the lift door.

H.114.3. The lift storage door shall not block the visual observation of the lift assembly while utilizing the manual override mode of the lift. A lift door design consisting of a horizontally hinged lift platform egress door mounted within a vertical motion pantograph baggage door is a preferred design.

H.115. LIFT INSTALLATION

- H.115.1.** The installation of the lift to the coach structure as well as the installation of the lift door into the sidewall of the coach shall not affect the structural integrity of the coach.
- H.115.2.** The parcel rack module above the wheelchair lift platform area shall be permanently removed to provide additional headroom. The modified rack shall be professionally finished at all ends.
- H.115.3.** A Threshold Warning module with a red warning light and acoustic sensor shall be mounted in the ceiling structure above the wheelchair lift entrance doorway.
- H.115.4.** The heating and air ducts shall be rerouted around the lift area to ensure proper interior air conditioning/heating airflow and distribution.
- H.115.5.** A passenger chime tape switch shall be mounted on the sidewall at the two (2) wheelchair securement positions.
- H.115.6.** Each coach shall have adequate information decals installed which details the proper lift operation in both the normal and manual modes of operation.

H.116. LIGHTING REQUIREMENTS

- H.116.1.** Lighting for the lift areas shall be designed to exceed ADA and FMVSS 404 standards. Lighting shall be provided to effectively illuminate the lift area. Light shall be wired through the lift master toggle switch on the driver's dash and shall automatically illuminate when this switch is in the "ON" position. The lighting design shall minimize the effect of glare on passengers entering the bus through the wheelchair lift door. During lift operation, the street surface shall be illuminated to a minimum of six candlepower a distance of 3 feet (.91 cm) beyond the external dimensions of the lift platform once deployed and lowered. Additional lighting shall be provided to insure illumination of the instruction placard and the manual override pump when it is in use.

H.117. SECUREMENT SYSTEM

- H.117.1.** The vehicle interior shall permit the securement of two (2) forward facing wheelchair passengers in which the primary position shall be on the street side of coach directly across from lift. Securement areas shall be a minimum 30 x 48 inches (762 x 1,219 mm) as required by ADA. Securement devices shall be QRT Deluxe Slide and Click or approved equivalent.
- H.117.2.** A separate three-point belt securement shall be provided to effectively secure wheelchair passengers.
- H.117.3.** To further secure the passenger during the lift operation, a retractable seat belt strap shall be provided at the ingress / egress area of the lift platform. This seat belt strap must be buckled to disengage the lift electrical interlocks to allow lift operation. A minimum 10.5 inches (267mm) high barrier shall also be provided at the rear of lift area for additional passenger protection.

H.118. ROOF VENTILATORS/ESCAPE HATCHES

- H.118.1.** Two roof ventilators shall be provided and designed to perform as escape hatches. One ventilator/escape hatch shall be located in the roof at the front of the coach, another in the roof at the rear of the coach.

H.119. CHASSIS

H.119.1. PROPULSION SYSTEM

H.119.2. VEHICLE PERFORMANCE

H.119.3. POWER REQUIREMENTS

- H.119.3.1.** The propulsion system and drive train shall provide power to enable the coach to meet the defined acceleration, top speed, and gradability requirements. Sufficient excess power shall be available to operate all accessories without jeopardizing coach performance or safety parameters.

H.120. TOP SPEED

- H.120.1.** The coach shall be governed at 72 mph (116 kph) road speed, for emergency and passing maneuvers, on a straight, level road at SLW.

H.121. GRADABILITY

- H.121.1.** Gradability requirements shall be met on grades with a surface friction coefficient of 0.3 and above at SLW with all accessories operating. The standard configuration power plant shall enable the coach to maintain a speed of 44 mph (71 kph) on a 2-percent grade and 7 mph (11 kph) on a 16- percent grade.

H.122. ACCELERATION

- H.122.1.** Vehicle shall accelerate from 0 to 20 mph (0 – 32 kph) in nine seconds, with the coach at S.L.W.

H.123. OPERATING RANGE

H.123.1. The operating range of the coach run on the design operating profile shall be at least 400 miles (644 km) on a single fill-up of compressed natural gas fuel.

H.124. OPERATING PERFORMANCE

H.124.1. Speed, gradability, and acceleration performance requirements shall be met at, or corrected to, 85 degrees F (29° C), 29.00 inches (74 cm) Hg, dry air. Performance degradation at conditions other than the test standard shall not exceed 1 % for each 3 degrees F/C and 4 % for 1,000 feet (305 m) of altitude above the standard.

H.125. POWERPLANT MOUNTING AND ACCESSORIES

H.125.1. MOUNTING

H.125.1.1. The power plant shall be mounted in a compartment in the rear of the coach. All power plant mountings shall be mechanically isolated to minimize transfer of vibration to the body structure. Clamps required for securing or supporting lines shall be rubber or plastic coated and properly sized for the line being clamped.

H.126. SERVICE

H.126.1. The power plant shall be arranged so that accessibility for all routine maintenance is assured. No special tools, other than dollies and hoists shall be required to remove the power plant. The power plant shall be mounted on a cradle which can be slid into and out of the coach. Two mechanics shall be able to remove, replace and prepare the engine and transmission assembly for service in less than 25 total combined man-hours.

H.126.2. The muffler, exhaust system, air cleaner, air compressor, starter, turbocharger, alternator, radiator, including charge air circuit, all accessories, and any other components requiring service or replacement shall be installed in or above the engine compartment.

H.126.3. The turbocharger, alternator, air compressor, and starter shall be replaceable without dismounting or removing other coach parts and without gaining access through the coach interior.

H.126.4. The cooling system filler caps shall be removable from the filler neck and be held closed with spring pressure or positive locks. The transmission filler tube shall employ a combination dipstick and cap and shall be the minimum length permissible to make fluid checking easier. All fluid fill locations shall be properly labeled to help ensure correct fluid is added and all shall be easily accessible with standard funnels, pour spouts, and automatic dispensing equipment. All lubricant sumps shall be fitted with drain plugs of a standard size except for the transmission which uses a recessed square socket type plug. The power plant shall be equipped with digital, computerized diagnostic capability using laptop or PC-based available diagnostic software for displaying engine and transmission data.

H.126.5. The engine and transmission shall be equipped with sufficient heavy-duty fluid filters for efficient operation and to protect the engine and transmission between scheduled filter changes. To the extent practicable, the filters shall be of the spin-on, disposable type. All filters shall be easily accessible and the filter bases shall be plumbed in a manner so as to assure correct reinstallation.

H.126.6. CNG fuel lines within the engine compartment shall be rigidly supported and shall be composed of stainless steel tubing where practicable. Flexible fluid lines shall be kept at a minimum and shall be as short as required. CNG fuel lines shall be routed or shielded so that failure of a line shall not allow CNG fuel to be released, spray, or drain onto any component operable above the auto-ignition temperature of natural gas.

H.126.7. Flexible lines shall be individually supported and shall not touch one another or any part of the coach.

H.127. AIR CLEANER

H.127.1. The air cleaner shall be a dry type, horizontally mounted. Airflow through the filter element shall be from the outside in. To service the filter shall take less than 5 minutes, disconnecting an engine air intake duct, air compressor intake duct, or filter housing shall not be necessary. The access cover of the air filter assembly shall be retained to the filter housing with a single wing nut. A Filter Minder air filter restriction indicator, part number 135501-00920, manufactured by Engineered Products Co. or approved equal, shall be provided and calibrated to 20 inches (51 cm) of water/vacuum.

H.128. ACCESSORIES

H.128.1. Powertrain accessories shall be unit mounted for quick removal and repair. These accessories shall be driven at speeds sufficient to assure adequate system performance during extended periods of operation. The power steering pump and air compressor shall be flange mounted and gear driven from engine. The power steering reservoir shall be remotely mounted to the bus chassis and shall not be mounted on the drivetrain. Alternators shall be Leece Neville or approved equal. Only the 24 volt alternators, A/C compressor and cooling system fans

may employ belt drives. Tension on the belt driven A/C compressor shall be maintained by an automatic tensioner. The alternator and the fan drive shall be automatically tensioned as well.

H.129. HYDRAULIC DRIVE

- H.129.1.** Hydraulic system service tasks shall be minimized and scheduled not more frequently than scheduled tasks for other major coach systems. All elements of the hydraulic system shall be easily accessible for service or unit replacement. All lines shall be compatible with the hydraulic fluid and maximum pressures of the system. Flexible lines shall be minimized in quantity and length. Lines of the same size and with the same fittings as those on other piping systems of the coach, but not interchangeable, shall be tagged or marked for use on the hydraulic system only. Hydraulic lines shall be individually and rigidly supported to prevent chafing damage, fatigue failures, and tension strain on the lines and fitting. Hydraulically driven radiator and charge air cooler fan drive systems are not acceptable.
- H.129.2.** The hydraulic system shall be configured and/or shielded so that failure of any flexible line shall not allow hydraulic fluid to spray or drain onto any component operable above fluid auto-ignition temperature.

H.130. POWERPLANT

H.130.1. CUMMINS ISX12 G ENGINE

- H.130.1.1.** The Cummins ISX12 G 11.9 Liter (726.2 cu. In.) engine or approved equal will be four cycle, spark – ignited, inline 6-cylinder, turbocharged, CAC with an operating range of 1200 rpm to 2100 rpm. The engine power rating will be 400 HP (298 kW) with a Maximum Torque Curve of 1400 lb-ft (1966 Nm) at 1300 rpm. The engine will have a cylinder bore of 5.11 in (130 mm), a piston stroke of 5.91 in (150 mm). The air induction system will be air-to-air charge cooled for maximum efficiency and power. The ISX12 G engine meets the current EPA emission requirements.
- H.130.1.2.** The engine shall have Idle Control that manages idling time and improves fuel economy. The engine shall also have a starter Lockout system that provides additional engine/starter protection by preventing the starter to engage when the engine is running.
- H.130.1.3.** The engine will have built-in diagnostics to ensure that all components are operating properly. If a system component fails, the operator will be alerted to the condition via a dashboard mounted “Check Engine” and/or “Stop Engine” light. The Engine Protection system shall regulate engine rpm to reduce the risk of progressive damage when a severe fault code is logged.
- H.130.1.4.** The electronic hardware and software on the engine shall use a common architecture with all the latest diagnostics, maintenance monitoring and engine protection features with customer selectable shutdown.
- H.130.1.5.** The entire system shall be capable of communicating with the electronically controlled transmission. The primary objective of the system is to provide the capability for the electronic engine controls to reduce power by command of the transmission in the event of transmission malfunction (low oil level/pressure; coolant temperature; etc.).
- H.130.1.6.** The engine electronic control module shall be constructed as a weatherproof enclosure on the engine that is protected from the environment. Engine mounted components (excluding wiring connectors) may be exposed to steam cleaning and pressure washing.
- H.130.1.7.** The engine shall be outfitted with the Probalyzer, or approved equal, brass Mini-gauge plug to permit oil analysis sampling. The plug shall withstand 2200 psi (105 kPa) and contain triple seals to eliminate potential leakage. Each plug shall be tested individually for control against leakage. Location shall be accessible through the rear engine compartment access door, and be installed on a main or bypass filter oil line ahead of the filter.
- H.130.1.8.** The engine shall be equipped with fast idle (950 RPM) and be driver controlled. The devices shall activate only with the transmission is in neutral and parking brake applied. This device may be used to help meet the requirements of coach air conditioning cool down. The engine starter shall be protected by an interlock that prevents its engagement when the engine is running. The starter shall be prevented from engaging when the transmission selector is in any position other than neutral.

H.131. COOLING SYSTEM

- H.131.1.** The cooling system shall be sized to maintain fluids at safe, continuous operating temperatures during the most severe operations possible with the coach loaded to GVWR and with ambient temperatures up to 110 degrees F (43 C). Sufficient reserve capacity shall be provided by the cooling system to provide efficient cooling for the coolant and engine charge air in a degraded condition. Radiator(s) shall be Modine, or approved equal. Radiator(s), complete with charge air cooling circuit shall be provided, mounted above the engine compartment. The charge air cooler and the radiator shall be mounted at least 60 inches (1.50 m) above the road surface. The physical size and heat rejection capacity of the radiator along with the charge air cooling capacity shall be tested and approved by the engine manufacturer for this application. The radiator system shall be easily serviced

through the rear doors. The radiator and charge air cooler shall not be stacked in front of one another. Door shall include hinges which hold the doors in the open position.

- H.131.2.** The charge air cooler (CAC) / radiator assembly shall be primarily of durable corrosion-resistant aluminum construction. Heat exchanger fin spacing shall not exceed 14 fins per inch. Necessary hoses shall be premium, silicone rubber type that are impervious to all coach fluids. All coolant hoses shall be secured with constant tension hose clamps. Fan speed shall be regulated to minimize fan noise. No heat producing components or climate control system components shall be mounted between the engine cooling air intake aperture and the heat exchangers. All cooling system fittings are to be cast iron, brass or copper.
- H.131.3.** A single fan, belt driven from the engine shall pull outside air through an exterior panel and across the radiator / charge air cooler at a minimum rate approved by the engine manufacturer for maximum cooling efficiency. Belt tension shall be maintained by an automatic belt tensioner to minimize belt slippage and ensure longer belt life. A Linnig fan clutch or approved equal shall control fan operation.
- H.131.4.** Radiator surge tank shall be made of heavy-duty steel. A sight glass to determine satisfactory engine coolant level shall be provided and shall be accessible by opening the radiator access doors. A spring-loaded radiator cap shall also be provided to safely release pressure or vacuum in the cooling system. An engine alarm system will be included in the engine electronic control. Cooling fan logic shall be controlled electronically through the engine control system. An automatic coolant recovery system will also be provided.
- H.131.5.** Engine thermostats shall be easily accessible for replacement. The engine cooling system shall be equipped with a properly sized or approved equal cooling system filter with a spin-on, disposable element. The engine coolant shall be extended life Power Cool Plus using Organic Acid Technology (OAT) or approved equal. Shutoff valves shall be provided on the coolant filter base which allows filter replacement without coolant loss. Quarter turn valves shall also be provided and installed in the entire cooling system which permits complete shutoff of both lines for the heating and defroster units.
- H.131.6.** All low points in the water-based cooling system shall be equipped with drain cocks. Air vent lines shall be fitted at high points in the cooling system. Oil and water temperature gauges will be provided in the engine compartment.

H.132. TRANSMISSION

- H.132.1.** The transmission shall be an Allison B500 six speed transmission, equipped with Allison Transmission Electronic Controls (Gen. IV) or approved equal. Maximum input horsepower shall be 550 horsepower. Maximum input torque capability shall be 1650 pound feet of torque. The transmission shall have a one stage, three element, polyphase torque converter and a lock up clutch with a torsional damper. The transmission shall be fully automatic with six forward gear ratios. Shift calibration shall be set so that shifts shall be smooth under all operating conditions. The transmission shall only have one maintenance dipstick, and no other secondary service lane dipsticks. The transmission will also include a Probalyzer, or approved equal, brass Mini-gauge plug to permit transmission fluid analysis sampling.
- H.132.2.** If an Allison B500 Gen IV transmission is equipped it shall be filled with synthetic transmission fluids that meet Allison TES-295 specification and have a TES-295 approval number and the Allison approval logo. Mobil Delvac Synthetic Automatic Transmission Fluid can be used or Allison TES-295 approved equals such as Castrol Transynd. Allison Transmission extended warranty plans require synthetic transmission fluids meeting the TES-295 specification with an approval number and the Allison approval logo to be used.
- H.132.3.** The gearing shall be of the constant mesh, helical, planetary type with the following ratios:
- | | |
|---------------------------|--------|
| H.132.3.1. RANGE | RATIO |
| H.132.3.2. First | 3.51:1 |
| H.132.3.3. Second | 1.91:1 |
| H.132.3.4. Third | 1.43:1 |
| H.132.3.5. Fourth | 1.00:1 |
| H.132.3.6. Fifth | 0.74:1 |
| H.132.3.7. Sixth | 0.64:1 |
| H.132.3.8. Reverse | 4.80:1 |
- H.132.4.** A function of the electronic controls shall be provided to prevent premature engagement and operation of the automatic transmission reverse gear.
- H.132.5.** The transmission shall be governed by electronic controls, which contain a programmable read-only memory (PROM) that will provide basic transmission control functions. All cabling and electronic devices utilized by the electronic transmission control system shall be adequately shielded against interference.
- H.132.6.** The transmission electronic module shall be capable of communicating with the engine electronic module to maintain maximum efficiency. The control module shall be equipped with a self- diagnostic system. A failure shall

be retained by the control module for evaluation by garage personnel using a Allison DOC software and J1939 / RS232 translation device or approved equal.

H.132.7. Modified diagnostics shall provide timely information on transmission oil and filter change requirements and transmission rebuild timeframes.

H.132.8. The electronic controls shall be completely sealed from the environment. The transmission electronic control unit shall be located in a weatherproof box that is protected from environment or potential damage from under floor baggage.

H.133. ELECTRIC STARTER

H.133.1. A Mitsubishi 105P70 24 volt starter motor, or approved equal shall be provided as a basic installation. Planetary gear reduction drive technology produces greater starting torque, rotating the armature at a higher rpm. The starter will have "Soft Start" positive pinion gear meshing technology, which will engage the pinion gear into the ring-gear before the starter begins to turn. The starting system shall be inoperable whenever the master control is in the OFF position, and whenever the emergency shut-off switch is activated or the engine is running. A starter interlock shall be provided that shall prevent the starter motor from engaging the flywheel after the engine is started.

H.134. ALTERNATOR

H.134.1. A 24-volt, 270 amp, brushless, oil-cooled, self-rectifying alternator will be mounted on the engine at the curbside of the coach. The alternator will be belt-driven off an engine-mounted accessory drive pulley. An automatic tensioner will maintain the required belt tension adjustment.

H.134.2. Alternator output at various engine speeds will be: idle (700 rpm) - 210 amperes, fast idle (950 rpm) - 240 amperes, full speed (2,100 rpm) - 270 amperes.

H.135. BOOST PUMP

H.135.1. A MP Boost Pump, or approved equal shall be provided as the basic coolant boost pump for coach heating requirements. The pump motor shall be a magnetic drive coupled pump operating at 24 volts DC. Coolant flow rate shall be a minimum of eight (8) gallons (30 liters) per minute. The pump operates on demand according to the driver's heat control valve.

H.136. EMISSIONS

H.136.1. MOTOR VEHICLE POLLUTION REQUIREMENTS

H.136.2. The manufacturer shall provide in writing that:

H.136.2.1. The engine being provided complies with the Clean Air Act when operated on diesel fuel.

H.136.2.2. The horsepower of the vehicle is adequate for the speed, range and terrain in which it will be required to operate, and also to meet the demands of all auxiliary power equipment.

H.137. EXHAUST SYSTEM

H.137.1. A stainless steel exhaust system shall be provided. The system shall be located at the left hand (roadside) rear corner of the coach under structure and shall be accessed through the left rear service door. Exhaust piping shall not restrict underbody clearances. The muffler tailpipe shall direct exhaust gasses downward, toward the road surface and not up through a stack in the body of the coach.

H.137.2. The exhaust system shall include a DPF (Diesel Particulate Filter), designed to reduce particulate emissions. The DPF accumulates soot and residual engine oil, which are the product of combustion. A telltale light shall illuminate when the DPF needs cleaning. A "Regen" (Regeneration) switch located in the right rear corner service bay, accessed through the right rear corner service door, shall activate an internal element within the DPF that burns off the trapped soot and engine oil ash.

H.138. FINAL DRIVE

H.138.1. GENERAL REQUIREMENTS

H.138.1.1. The two rear axles shall have a load rating sufficient for the coach loaded to GVWR. Transfer of gear noise to the coach interior shall be minimized.

H.139. DRIVE AXLE

H.139.1. The drive axle shall be a Meritor World Axle or approved equal rated at 22,500 lbs (10,206 kg). The bearing journals on each spindle shall be induction hardened for greater durability. Ring gear shall be bolted to case. The drive axle hub end wheel bearings shall be oil lubricated. Default rear axle ratio shall be 3.73:1.

H.140. TAG AXLE

H.140.1. A tag axle shall be located behind the drive axle. The tag axle will be a solid beam type with fixed steering. The tag axle shall have single tires the same size as the tires on the front and drive axles. Tag axle weight shall not exceed 14,000 pounds. With full passenger seating capacity, load on any axle shall not exceed 22,400 pounds. Combined load capacity weight on the drive and tag axles shall not exceed 36,500 pounds.

H.140.2. A tag axle unloading feature will allow full or partial unloading, or dumping of air from the tag axle air spring bellows. This feature enables weight to shift to the drive axle for more traction. Manual unloading valves are located inside the RH rear curbside service door.

H.141. HUBS

H.141.1. The front and tag axle hubs shall feature unitized wheel ends (UWE) complete with factory pre-load bearing/hub assemblies, lubricant and seals.

H.141.2. The drive axle shall have nodular cast iron hub assemblies incorporating Pre-Set tapered roller bearings lubricated by differential oil at each axle end.

H.142. DRIVE SHAFT

H.142.1. The drive shaft shall be a minimum 3 inches (76 mm) outside diameter, heavy-duty type Meritor 1810 series or approved equal. The drive shaft shall be guarded to prevent it from striking the floor of the coach or the ground in the event of a tube or universal joint failure. U-joint end cap retaining bolts shall be retained by metal locking plates. Both half-round yoke ends shall be attached using self-locking bolts.

H.143. SUSPENSION

H.143.1. GENERAL REQUIREMENTS

H.143.1.1. The front and rear axle suspension shall be pneumatic and equipped with straight side lobe air suspension bellows. Four suspension bellows shall be provided on the drive axle and two suspension bellows on the front axle. The tag axle shall be equipped with two straight side lobe type air springs, 9.5 inch (241 mm) nominal in diameter. Pressure in the tag axle suspension shall be automatically adjusted as required by the load-sharing system. Manual air dump valves for unloading the tag axle air suspension bellows shall also be provided in the engine compartment.

H.143.1.2. The basic suspension system exclusive of bellows, height control valves, bushings and shock absorbers, shall last the life of the coach without major overhaul or replacement. Four (4) heavy-duty rubber bushed silent block sleeve type radius rods shall be provided at both the front and rear drive axles to control lateral, longitudinal, and torsional movement. Radius rod bushings shall be Clevis or approved equal. One transverse stabilizing rod shall be provided on front axle for additional support during coach lane changing or turning of corners. The coach shall be equipped with a sway bar designed to reduce body lean and increase bushing life. Items such as bushings and air springs shall be easily and quickly replaceable. Adjustment points shall be minimized and shall not be subject to a loss of adjustment in service. Necessary adjustments shall be easily accomplished without removing or disconnecting the components.

H.144. SPRINGS AND SHOCK ABSORBERS

H.144.1. TRAVEL

H.144.1.1. The suspension system shall permit a minimum wheel travel of 3.5 inches (89 mm) in jounce and 3 inches (76 mm) in rebound. 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.

H.145. KNEELING

H.145.1. A driver-actuated kneeling device shall lower the coach floor 3.0 to 6.0 inches during loading or unloading operations regardless of load to a floor height of 42 inches (1.07 m) measured at the longitudinal centerline of the front door. The park brake shall prevent movement when the coach is kneeled. The coach shall kneel and rise at a maximum rate of 1.5 inches per second at essentially a constant rate. A flashing indicator visible to the driver shall be illuminated until the coach is raised to a height adequate for safe street travel. An audible warning device that operates with the kneeling system shall be provided. A visual indicator meeting ADA requirements shall be provided on the curbside of the coach and shall activate during the kneeling operation. This indicator shall be appropriately marked and visible to the boarding passenger.

H.146. DAMPING

H.146.1. 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 4 cycles or less after hitting road perturbations. Shock absorbers shall maintain their effectiveness for at least 50,000 miles (80,467 km) in normal service. The coach shall be equipped with four shock

absorbers on the drive axle and two on each side of the front axle and one on each end of the tag. Shock absorbers shall be interchangeable on each axle, side to side.

H.147. LUBRICATION

H.147.1. All elements of steering, suspension, and drive systems requiring scheduled lubrication shall be provided with grease fittings conforming to SAE Standard J534. These fittings shall be located for ease of inspection, and shall be accessible with a standard grease gun without flexible hose end from a pit or with the coach on a hoist. Each element requiring lubrication shall have its own grease fitting with a relief path. Lubricant specified shall be standard for all elements on the coach serviced by standard fittings. All fittings shall be standard pipe thread.

H.148. UNDERCOATING

H.148.1. Tectyl undercoating, or approved equal, shall be applied to the underside of the body, frame, and wheel wells. Undercoating overspray on the exterior of the coach shall be removed prior to delivery. Underbody components such as air suspension bellows and height control valves, shock absorbers, lubrication fittings, air brake system valves, brake lining, muffler and exhaust system components, drive shaft, and engine and transmission sumps shall be protected from undercoating overspray.

H.149. STEERING

H.149.1. STRENGTH

H.149.1.1. Fatigue life of all steering components shall exceed 1,000,000 miles (1,609,344 km). No element of the steering system shall fail before suspension system components when one of the tires strikes a severe road hazard. Inadvertent alternations of steering as a result of striking road hazards are steering failures. The steering column shall be manufactured by TRW or approved equal and shall provide both tilt and telescope features. The steering wheel shall be a wrapped, molded polypropylene. Finger grips shall be provided on the wheel, down and away from the driver. Steering systems that utilize an intermediate shaft to connect the main axle mounted steering box to the steering column shall utilize intermediate steering shafts manufactured by Dana Corporation or approved equal.

H.149.1.2. The front axle shall be rated at 16,000 pounds (7,257 kg) and shall be equipped with disc brakes and brake chambers with a load rating sufficient for the coach loaded to GVWR. Front axle shall be a standard, drop center type. Kingpins shall be the low friction, "Easy Steer" type for longer maintenance intervals.

H.150. TURNING EFFORT

H.150.1. The steering wheel shall be not less than 18 inches (457 mm) in diameter and shall be shaped for firm grip with comfort for long periods of time and shall not be padded. The steering wheel shall be removable with a standard or universal puller. Hydraulically assisted power steering shall be provided. The steering gear shall be an integral type with flexible lines eliminated or the number and length minimized. Steering torque applied by the driver shall not exceed 10-foot-pounds (13.6 Nm) with the front wheels straight ahead to turned 10 degrees. Steering torque may increase to 70-foot-pounds (95 Nm) when the wheels are approaching the steering stops. Steering effort shall be measured with the coach at SLW, stopped with the brakes released and the engine at normal idling speed on clean, dry, level, commercial asphalt pavement and the tires inflated to recommended pressure. Power steering failure shall not result in loss of steering control. With the coach in operation, the steering effort shall not exceed 55 pounds (25 kg) at the steering wheel rim and perceived free play in the steering system shall not materially increase as a result of power assist failure.

H.150.2. 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.

H.151. BRAKES

H.151.1. SERVICE BRAKE

H.151.2. ACTUATION

H.151.2.1. Service brakes shall be controlled and actuated by an air system. Force to activate the brake pedal control shall be an essentially linear function of the coach deceleration rate. The angle of the pedal shall be ergonomically designed to minimize fatigue. At least 6.0 inches (152 mm) of slack in the airlines shall be available to allow for change out of the brake treadle valve and pedal assembly. The brake pedal shall be slightly higher than the accelerator. Provisions at the front shall be made to activate the brakes from the towing vehicle. Release of the emergency/parking brake shall require one full application of the service brake once the emergency/parking brake release valve is depressed.

H.152. FRICTION MATERIAL

H.152.1. Brake pads shall be non-asbestos, and must be designed and approved for use on the vehicle being proposed. Brake pads must provide optimum performance with the brake system being used and shall minimize brake noise under all weather conditions.

H.153. ANTILOCK BRAKE SYSTEM

- H.153.1.** The coach shall be equipped with a Meritor Wabco or approved equal antilock brake system or approved equal electronic controller assembly that will provide full vehicle wheel control braking for the coach. The system shall utilize an antilock brake system with disc brakes. The design of the digital electronics shall provide a high degree of protection from radio and electromagnetic interference.
- H.153.2.** The antilock brake system shall provide individual wheel control by using a wheel speed sensor and modulator at the front axle, drive axle and tag axle. The drive axle brakes shall be controlled completely independent of each other and therefore brake application pressure at an individual wheel shall be adjusted solely on the basis of its behavior on the road surface on which it is traveling. Wheel speed sensors shall be provided on the drive axle and will simultaneously control the wheels on the tag axle. A single modulator shall be provided that controls both rear curbside wheels and another modulator shall control the rear roadside wheels.
- H.153.3.** Inputs to the electronic control unit (ECU) equal shall be generated from a tone ring (exciter) by wheel sensors, which generate a signal, which varies in voltage and frequency as the speed of the wheel increases or decreases. The wheel sensor shall provide wheel speed information at the rate of 100 pulses per wheel revolution. The unit shall simultaneously receive, and individually interpret speed signals from four wheel sensors.
- H.153.4.** Outputs from the unit shall be provided to Meritor Wabco or approved equal brake modulator. The modulator shall be capable of receiving signals from the ECU and shall be designed to modify operator applied air pressure to the service brakes. The modulator shall be located near the service actuator(s) it controls and shall be the last air valve through which air passes on its way to the brake actuator. A wiring harness shall connect each modulator to the ECU. Solenoid valves contained in the modulator shall provide the electrical interface between the controller electronics and the air brake system. The ECU shall be capable of simultaneously and independently controlling four individual modulator assemblies.
- H.153.5.** The antilock brake system logic shall be designed to respond to component equipment failure using a conservative fail safe philosophy. Any single electrical failure of a component devoted to antilock braking shall result in simultaneous illumination of the antilock condition lamp on the dash, a disabling of all or part of the antilock system, and reversion to standard braking on wheels no longer under the control of antilock. The ECU is divided into two separate parts, each equally controlling a pair of diagonal brakes. When a failure or damage occurs to one half of the ECU, ABS braking function shall be maintained in the wheels that are controlled by the working part of the ECU.
- H.153.6.** The wires that carry information and power into and out of the controller shall be terminated with a weatherproof connector with the wiring sealed to the connector with the exception of the ECU connectors. The wire gauge used shall be sized specifically for the task which it is designed to perform. A dashboard mounted antilock condition lamp shall be provided which shall be controlled by the ECU via the multiplex system and shall serve as a means of providing the operator with the operating condition of the antilock brake system. All electrical connections on the antilock system shall be Meritor molded connectors, or approved equal. The ECU shall utilize 4 amp "JUNIOR-POWER-TIMER" series connectors, or approved equal.
- H.153.7.** The Data Link function shall be provided which enables the ECU to report its operating condition to an external source. The controller data link configuration shall conform to SAE standard J1708 and the coded language used shall conform to SAE J1587. Two connections in the controller shall be provided.

H.154. ELECTRONIC STABILITY CONTROL (ESC)

- H.154.1.** ESC (Electronic Stability Control) shall be integrated with the ABS braking system to provide improved vehicle stability. Sensors within the brake system monitor coach sideways movement and rotation, steering angle and brake application pressure to maintain coach directional stability.
- H.154.2.** The Electronic Control Unit (ECU) containing directional sensors shall be located in baggage compartment #3. A steering angle sensor shall be located in the steering column. These systems feed information that interacts with the ABS system providing directional and braking control.
- H.154.3.** The ESC/ATC telltale shall be located in the driver's instrumentation and control center in the right hand telltale cluster. This telltale, along with the ABS telltale, monitors Electronic Stability Control (ESC) and Automatic Traction control (ATC) functions.
- H.154.4.** Automatic Traction Control (ATC) shall be integrated with the ESC (Electronic Stability Control) to improve traction on slippery surfaces by reducing drive wheel over-spin. ATC shall automatically switch ON and OFF as required by road conditions. If drive wheels spin during acceleration, the ATC telltale will come on, indicating ATC is active. It will go out when the drive wheels stop spinning and traction control is regained.

H.155. ATC MUD/SNOW FEATURE

- H.155.1.** ATC shall include a deep snow and mud feature. This function increases available traction on extra soft surfaces like snow, mud, or gravel by slightly increasing the permissible wheel spin.

H.155.2. The deep snow and mud feature is not automatic. A switch shall turn this function ON and OFF. While this feature is selected, the ESC/ ATC telltale blinks continuously. Once the feature is no longer required, the switch shall turn the deep snow and mud feature off and the telltale will extinguish.

H.156. AIR SYSTEM

H.156.1. The coach air system shall operate all accessories and the braking system with reserve capacity. The engine drive Wabco SS636 37.4 cfm air compressor, or approved equal shall be sized to charge the air system brake reservoir from 0 psi. to the governor cutoff pressure of 125 psi.±2psi (862 kPa ± 14 kPa) in less than 3 minutes while not exceeding the engines rated speed. The air compressor shall be set to cut in at 105 psi (724 kPa).

H.156.2. Regardless of the systems air pressure, idle up to the rated engine speed shall be available to the driver with the transmission in neutral and the parking brake applied.

H.156.3. With the air system fully charged and the engine shut off, the reservoir capacity shall be sufficient to permit four full brake applications to maintain 60 psig (414 kPa). The pressure relief valve shall be mounted in the compressor cylinder head. The muffler or ping tank shall be mounted in the engine compartment relative to the air compressor discharge port. A drain mounted on the muffler or ping tank shall be directed or piped so as to discharge below the engine cradle or bulkhead level.

H.156.4. Air lines, except necessary flexible lines, shall conform to the installation and material requirements of SAE Standard J844-Type 1 or ASTM B-75 for copper tubing with standard, brass, flared or ball sleeve fittings, or SAE Standard J844-Type 3B for nylon tubing or ASTM

H.156.5. D-1248, Type 1, Class C Grade E5 for polyethylene tubing if not subject to temperatures over 200⁰

H.156.6. F. Accessory and other noncritical lines may use Type 3A tubing. Nylon tubing shall be installed in accordance with the following color coding standards:

H.156.6.1. HOSE COLOR AIR SYSTEM INSTALLATION

H.156.6.2. *Green*: Indicates primary brakes and supply

H.156.6.3. *Red*: Indicates secondary brakes

H.156.6.4. *Brown*: Indicates parking brake

H.156.6.5. *Yellow*: Indicates compressor governor signal

H.156.6.6. *Black*: Indicates accessories

H.156.6.7. *Blue*: Indicates suspension

H.156.7. Line supports shall prevent movement, flexing, tension strain, and vibration. Copper lines shall be supported by looms, grommets, or insulated clamps to prevent the lines from touching one another or any component of the coach. 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 consistent with standard automotive practice. Nylon lines may be grouped and shall be continuously supported.

H.156.8. The compressor discharge line between power plant and body mounted equipment shall be flexible extruded PTFE tube with stainless steel wire braid, Aeroquip 2807, or approved equal. Other lines necessary to maintain system reliability shall be flexible hose with a braided stainless steel jacket. End fittings shall be standard SAE or JIC brass or steel, flanged, reusable, 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 coach except for the supporting grommets. Flexible lines shall be supported at 2 foot intervals or less. Airlines shall be installed to minimize air leaks. Each coach shall not leak down more than 1.5 psi as indicated on the instrument panel mounted air gauges, within 15 minutes from the point of governor cut-off.

H.156.9. All reservoir supply and delivery airlines shall be sloped toward reservoirs and routed to prevent water traps. Grommets shall protect the airlines at all points where they pass through understructure components. Provision shall be made to apply shop air to a convenient location in the engine compartment and at the front of the coach and shall include a standard bore valve. The engine compartment valve shall be located ahead of a quarter turn valve. Air for the compressor shall be filtered through the main engine air cleaner system. All air reservoirs shall meet the requirements of SAE Standard J10 and shall be equipped with clean-out plugs and quarter-turn drain valves. These valves shall be protected from road hazards by major structural members. The air system shall be protected by a pressure relief valve set at 200 psi (1,379 kPa) at the air dryer and 150 psi (1,034 kPa) at the compressor. The air system shall also be equipped with check valves and pressure protection valves to assure partial operation in case of line failures.

H.156.10. The main airline check valve located between the air compressor and the first reservoir must be accessible for maintenance. Means shall be provided to establish the check valve to be in working order.

- H.156.11.** A Wabco SS1200 Plus or approved equal air dryer shall be provided and installed according to component manufacturer recommendations.

H.157. GENERAL CHASSIS

H.157.1. WHEELS AND TIRES

H.157.2. WHEELS

- H.157.2.1.** Hub-piloted 9" aluminum Alcoa or approved equal wheels shall be provided. All wheels shall be interchangeable and shall be removable without a puller. Wheels shall be compatible with tires in size and load-carrying capacity. All wheels and tires shall be balanced as an assembly. One spare wheel, complete with mounted tire shall be provided.
- H.157.2.2.** The wheel nuts shall meet all physical property requirements defined in ASTM A 194-2H, ISO and SAE standards. The nut shall be coated for corrosion resistance. The bench testing requirements for the lug nuts shall satisfy MIL-STD 1312 vibration test 7 and the Junkers dynamic test. Front and tag axle lugnuts shall be standard Meritor or approved equal components.

H.158. TIRES

- H.158.1.** The tires shall be supplied by the vehicle manufacturer. Tires, including spare, shall be Firestone FS-400, 315/80R-22.5, 20 ply, load range L or approved equal. Tires shall be suitable for the conditions of commuter service and sustained operation at the maximum speed capability of the coach. Load on any tire at GVWR shall not exceed tire supplier's rating. Tires shall provide the ride, noise, and handling characteristics associated with the demands of commuter service.

H.159. COMPRESSED NATURAL GAS FUEL SYSTEM

- H.159.1.** A compressed natural gas fuel system consisting of fuel cylinders, filler provisions, fuel lines, pressure reduction, and auxiliary equipment necessary to safely operate under all operating conditions to meet the performance requirements of this specification, shall be provided. The system shall be capable of refueling from 0 to 125 % of working pressure in a maximum of five minutes. Fitting used in the fuel system shall be Swagelok, or approved equal. The fuel system shall be compliant with NFPA-52 "Compressed Natural Gas Vehicular Fuel Systems" most recent edition, including amendments and all U.S. title 13 requirements applicable to CNG fueled vehicles.

H.160. PRESSURE REGULATORS

- H.160.1.** A primary fuel pressure regulator shall be supplied and mounted in an accessible location for servicing. Coolant lines shall be routed in a manner to prevent trapping air or draining coolant when the regulator is removed for service.

H.161. FUEL CYLINDERS

- H.161.1.** The fuel cylinders shall have a capacity to operate the bus for minimum range of 400 miles per fill- up when operated on FTA ADB duty cycle operating at 3600 psi working pressure. The fuel cylinders shall be mounted in such manner that replacement of one cylinder shall not require removal of additional cylinders. Fuel lines shall be routed to permit replacement of individual lines and fittings.

H.162. FUEL CYLINDER CONSTRUCTION

- H.162.1.** Fuel cylinder construction shall be in accordance with DOT Standard 304, ANSI NGV-2 design and test criteria. Cylinder shall be designed for lightest weight possible which does not require a hydrostatic requalification. Tanks shall be certified for refueling pressures to 125 percent of working pressure during temperature compensating fueling. A manual or electric solenoid shut off valve shall be installed on each individual fuel cylinder. Ends of the fuel cylinders shall have a protective shield surrounding the fittings and the valves.

H.163. SERVICE VALVES

- H.163.1.** A quarter turn valve shall be accessible through the fuel door which shall isolate the high pressure manifold and fuel storage system from the rest of the engine fuel system. The valve function and open and closed positions shall be clearly marked. An additional ½" valve shall be provided for draining the high pressure manifold and any fuel cylinder (s) through a service port. All fuel system service valves shall be accessible from the curbside of the coach.

H.164. FUEL PRESSURE GAGE

- H.164.1.** An oil filled gauge shall be located in the high pressure manifold which shall indicate fuel system pressure. The fuel gauge shall have minimum 100 psi increments with 0-5000 psi range and shall be visible during fueling operations. A pressure transducer shall be incorporated into the high pressure fuel manifold which shall provide the operators low fuel light indicator with an accurate fuel quantity reading. The low fuel warning light shall be at approximately 500 psi.

H.165. FUEL FILLER ASSEMBLY

H.165.1. A single fuel filler receptacle shall be located on the right side of the bus, 15-20 feet behind the center line of the front door and 35 to 45 inches from the street surface. The filler receptacle shall be mounted so that its center line is between 5 and 25 degrees from horizontal (face of the receptacle pointing slightly up). The fill receptacle shall accept a Sherex CT-5000 nozzle or approved equal and shall incorporate a dust cap permanently affixed to the receptacle. The fuel fill access door shall incorporate a magnetic switch that will deactivate the engine starting system if the fuel door is open.

H.166. CNG DEFULING SYSTEM

H.166.1. The coach shall be capable of being defueled. The defueling system shall have the following characteristics as a minimum:

H.166.1.1. Receptacle compatible with a "SHEREX CT 5000 series" nozzle.

H.166.1.2. Receptacle dust cap tethered to prevent loss.

H.166.1.3. Access shall be located on the curb side of the coach through the fuel access door.

H.166.1.4. Explosion-proof interlock switch to prevent engine starting when access door is open.

H.166.1.5. Decal on exterior of access door: CNG DEFULING RECEPTACLE Decal on interior of access door:
CNG DEFULING RECEPTACLE BE SURE VEHICLE IS GROUNDED BEFORE DEFULING

H.166.2. A PRD vent line, manufactured from stainless steel and adequately sized to accommodate the total on board fuel capacity shall be installed and shall vent any natural gas release to the rear of the coach at the roof line.

H.167. BUMPERS

H.167.1. LOCATION

H.167.1.1. Bumpers shall provide impact protection for the front and rear of the coach up to 26 inches above the ground. The bumpers shall wrap around the coach to the extent practicable without exceeding allowable coach width.

H.168. FRONT AND REAR BUMPERS

H.168.1. The front bumper assembly, nominally 20 inches (508 mm) high, shall consist of three energy absorbing modules that are self-restoring black urethane with minimum 1700 psi (11,721 kPa) tensile strength, 250 % elongation, and 350 psi (2,413 kPa) tear strength. The hollow ribbed black urethane cover will have excellent resistance to tears, abrasion, salt, hydro-carbons, detergents, sunlight, and will be repairable. An inner support structure constructed of aluminum or high strength steel shall provide a single, full length structural support for bumper the modules. The bumper assembly shall be hinged at the bottom for access to the spare tire, with the bumper release lever located at the top of the front roadside service compartment.

H.168.2. The rear bumper will be nominally 11 inches high (279 mm) consisting of a rigid steel and aluminum inner support structure with a repairable hollow ribbed black urethane cover. The bumper shall be shaped to wrap around the coach rear corners to protect the engine compartment doors and will also incorporate an anti-ride, or pinning feature to prevent unauthorized riders.

H.168.3. The complete assembly will be self-contained, self-restoring and maintenance-free.

H.169. ELECTRICAL SYSTEM

H.169.1. GENERAL REQUIREMENTS

H.169.1.1. The basic coach electrical system shall utilize multiplexed Power Management Modules (PMMs) from Actia, or approved equal. Versatility and future expansion of the system shall be provided for by expandable system architecture. The system shall be SAE J1939 compatible. A gateway used to interface between different communications protocols shall be built directly into the PMMs.

H.169.1.2. The system components shall be capable of reliable operation in an environment of between minus 30C to plus 80C while encountering mobile shock and vibration. Each module shall be adequately shielded to prevent interference by EMI. The multiplex power source shall be isolated, thereby minimizing any ground signal noise. A built in self-test system shall be utilized to check for module communication failures or output feedback problems within the system, and shall display faults on the LCD Diagnostic Interface

H.169.1.3. The components of the multiplex system shall be of modular design thereby providing for ease of replacement by field maintenance personnel. Power management modules will have the ability be re-programmed from existing PMMs on the coach. Four PMMs shall be distributed throughout the coach

(one under the front junction box, one in baggage bay #1, and two in baggage bay #3). Each module shall have 29 programmable inputs and 44 programmable outputs.

- H.169.1.4.** An optional 7" diagonal color LCD touch screen with 800 x 480 screen resolution shall be incorporated to provide system status and diagnostics.
- H.169.1.5.** Two Leece Neville 24 volt 140 amp alternators, or approved equal shall be provided. All circuits shall be protected by circuit breakers, fuses or solid state devices. Only the bus body and framing shall be used to attach ground studs. Grounds shall not be carried through hinges, bolted joints (except those specifically designed as electrical connectors), or power plant mountings. Wiring and electrical equipment necessarily located under the coach shall be insulated from water, heat, corrosion, and mechanical damage.

H.170. MODULAR DESIGN

- H.170.1.** Design of the electrical system shall be modular so that each major component, apparatus panel, or wiring bundle is easily separable with standard hand tools or by means of connectors. Each module, except the main body wiring harness, shall be removable and replaceable in less than 30 minutes by a mechanic. Power plant wiring shall be an independent wiring module. Replacement of the engine compartment wiring module(s) shall not require pulling wires through any bulkhead or removing any terminals from the wires.

H.171. JUNCTION BOXES

- H.171.1.** All relays, controllers, and other electrical components shall be mounted in easily accessible junction boxes. The boxes shall be sealed to prevent moisture from normal sources, including engine compartment cleaning, from reaching the electrical components and shall prevent fire that may occur inside the box from propagating outside the box. A rear start and run control box shall be mounted in an accessible location in the engine compartment. No electrical controls shall be located where spillover from the surge tank can wash over the electrical controls or enter junction boxes.
- H.171.2.** Care shall be taken to route electrical harnesses from junction boxes to facilitate troubleshooting and to reduce defects. Terminal strips not blocks shall be used to make connections. Wiring under the coach floor in the baggage area shall be routed in an enclosed trough.

H.172. WIRING AND TERMINALS

- H.172.1.** All wiring between major electrical components and terminations, except battery wiring, shall be waterproof, and shall meet specification requirements of SAE Recommended Practice J555 and J1128 Type GXL or TXL. All wiring harnesses manufactured for buses purchased under this contract shall be designed and manufactured for the operation of all sub components installed on the buses. Harnesses shall be properly designed and sized to the bus. Battery wiring shall conform to specification requirements of SAE Standard J1127-Type SGX, SGT or SGR and SAE Recommended Practice J541.
- H.172.2.** All wiring shall be properly grouped, numbered, and color-coded full length. Numbering shall be stamped at least every two (2.0) inches (50.8 mm). Installation shall permit ease of replacement. All wiring harnesses over 5-feet (1.50 meters) long and containing at least five (5) wires shall include at least 2 or 10 percent excess wires whichever is greater for spares, excluding the battery cables. In addition, twelve (12) spare wires (excluding battery cables) shall be provided between the front and rear junction boxes. Wiring harnesses shall not contain wires of different voltages unless all wires within the harness are sized to carry the current and insulated for the highest voltage wire in the harness.
- H.172.3.** Wire insulation shall be maintained as close to the terminals as practicable. The requirements for double insulation shall be met by wrapping harnesses with plastic electrical tape or by sheathing all wires and harnesses with nonconductive, rigid or flexible conduit. Grommets of elastomeric materials shall be provided at points where wiring penetrates the metal structure. Wiring supports shall be nonconductive. Precautions shall be taken to avoid damage from heat, water, solvents, or chafing. Wiring length shall allow replacement of end terminals twice without pulling, stretching, or replacing the wire.
- H.172.4.** Except for those on large wires such as battery cables, terminals shall be crimped to the wiring. Terminals shall be full ring type or interlocking and corrosion-resistant. T-splices may be used when it is less than 25,000 circular mills of copper in cross-section: a mechanical clamp is used in addition to solder on the splice; the wire supports no mechanical load in the area of the splice; and the wire is supported to prevent flexing.

H.173. ELECTRICAL COMPONENTS

H.173.1. GENERAL REQUIREMENTS

- H.173.1.1.** All electrical components, including switches, relays, and circuit breakers, shall be heavy-duty designs. To the extent practicable, these components shall be designed to last the service life of the coach and shall be replaceable in less than twenty five (25) minutes by a mechanic. Sockets of plug-in components shall be polarized where required for proper function and the components shall be positively retained. Any manual reset circuit breakers critical to the operation of the coach shall be mounted in a location best

suiting to the application with visible indication of open circuits. The electric motor shall be heavy-duty either wound field type or permanent magnet, as listed below. Electric motors shall be located for easy replacement and except for the cranking motor the brushes shall be replaceable in less than fifteen (15) minutes without removing the motor. Provision shall be made to ensure that the lubrication line for alternator bearing is secured to prevent lubricant leaks.

H.173.1.2. SYSTEM MOTOR TYPE Main Evaporator..... Brushless DC

H.173.1.3. Condenser Motors..... Brushless DC

H.173.1.4. Driver's Heater and Defroster..... Permanent Magnet

H.173.1.5. Windshield Wiper Motor..... Permanent Magnet

H.173.1.6. Windshield Washer Motor..... Permanent Magnet

H.173.2. Dual electric horns shall be provided. Horns shall be positioned to be protected from road hazards and the elements. The horn trumpets shall be down turned to assure drainage of any moisture that may have entered.

H.174. BATTERIES

H.174.1. Batteries shall be easily accessible for inspection and serviceable only from outside the coach. Batteries shall be of premium construction and shall be fitted with threaded stud terminals. Batteries shall be 8D with 1350 cold cranking amp capacity with 450 CCA reserve minimum. Positive and negative terminals shall have different size studs, and the battery terminals and cables shall be arranged to prevent incorrect installation. Battery terminals shall be located for access in less than thirty (30) seconds with jumper cables. No less than two conventional lead-acid batteries conforming to SAE Standard J537-Type 20T8 shall be provided. Battery cables shall be flexible and sufficiently long to reach the batteries in extended positions without stretching or pulling on any connection and shall not lie on top of the batteries. Battery cables are black with red heat shrink on the end for 24V (+), blue heat shrink for 12V (+) and white heat shrink for ground (-). A slave connection to the batteries shall provide a direct connection to the batteries for jump starting.

H.175. MASTER BATTERY SWITCHES

H.175.1. A master battery switch shall be provided near the batteries to provide complete, simultaneous disconnecting of the batteries from all bus 12 & 24 volt electrical systems. The master switch shall be a "rotary" style switch. The master switch shall be located behind a dedicated access door and shall be accessible in less than ten (10) seconds for operation. The master switch shall be capable of carrying and interrupting the total circuit load. Opening the master switch with the engine operating shall not damage any component of the electrical system.

H.176. RADIO NOISE SUPPRESSION

H.176.1. Proper suppression equipment shall be provided in the electrical system to eliminate interference with radio and television transmission and reception. This equipment shall not cause interference with any electronic system on the coach. Suppression shall be in accordance with SAE Practice J1708 and FCC standards.

H.177. INTERIOR CLIMATE CONTROL

H.177.1. CAPACITY AND PERFORMANCE

H.177.1.1. The climate control system shall be highly reliable since most failures are Class 2. Manually controlled shut-off valves shall be installed in the refrigerant lines before and after the filter dryer to allow isolation of the dryer for service. Manually controlled shut-off valves in the refrigerant lines shall allow isolation of the receiver and compressor for service. Self-sealing couplings or manual shut-off valves shall be used to break and seal the refrigerant lines during removal of major components such as the refrigerant compressor or condenser. Condenser and evaporator fans shall have a protective guard to prevent contact between mechanics and rotating fan blades. The appropriate safety warning labels shall be permanently affixed at this location.

H.177.1.2. Interior climate control system shall be provided and operate on refrigerant 134a. It shall maintain the interior of the coach at a level suitable for climate conditions found in the continental United States. The heating, ventilating, and cooling systems shall maintain an average passenger compartment temperature between 60°F (16° C) and 80°F (27° C) with a relative humidity of 50 percent or less. The system shall maintain these conditions in a ambient temperature range of 10°F to 100°F (12° C to 38° C), with a ambient humidity range of 5 to 100 percent while the coach is running. In ambient temperatures of 95°F to 115°F (35° C to 46° C) with relative humidity greater than 50 percent, the system shall maintain a temperature gradient of 20°F (7° C) while the coach is running. In ambient temperatures of 10°F to -10°F (12° C to -23° C), the average interior temperature shall not fall below 55°F (13° C) when the coach is running with no passengers.

H.177.1.3. The air conditioning (AC) compressor shall be a four cylinder, short stroke – 1.65 inch, 2.76 inch bore, 39.4 cubic inch (.65 liter) displacement with a 500 – 3500 RPM range MCI 003 (Bitzer 4NFC), or approved equal. The compressor head and body shall be of rust proof aluminum construction, providing a

light weight, compact and efficient unit. The connecting rods shall be of one piece construction for easy, long-life maintenance. Exchangeable cylinder liners shall be used in the cylinder bores for long service life and easy and efficient maintenance. The compressor shall be belt driven through a bi-directional & maintenance free magnetic clutch. Modern, environmentally friendly chlorine free refrigerants can be used with the compressor.

- H.177.1.4.** Compressor drive belts shall be manufactured from Kevlar[®] material to provide longer service life.
- H.177.1.5.** A manually adjustable belt tensioning device shall be provided to maintain proper belt tension.
- H.177.1.6.** The main air conditioning system capacity shall be at least 90,000 Btu's/hr. (26,376 W) with R134a.
- H.177.1.7.** Driver's A/C capacity shall be at least 10,800 Btu's/hr. (3,165 W).
- H.177.1.8.** The condenser fan motors with shrouded axial fans shall be brushless type with totally enclosed grease lubricated bearings. Motor shall be 24 volt, minimum 2 horsepower (1.5 kw) and operate only when the A/C is on for maximum efficiency. The condenser core shall be located to the rear of the number 2 baggage bay and include copper tubes and e-coated aluminum fins and have approximately 1,200 in² (7,742 cm²) of condensing surface. The receiver tank shall be equipped with a refrigerant sight gauge to be viewed through a window in the left-hand number 3 baggage compartment.
- H.177.1.9.** The evaporator shall be mounted under floor in the same compartment as the heater core for
- H.177.1.10.** "Reheat Cycle" and humidity control and shall include copper tubes and aluminum fins.
- H.177.1.11.** A separate control shall be provided for the front dash heating and air conditioning, as well as for the main under floor unit. A HVAC system control panel is required for the main under floor system. Control shall be within easy reach of the operator. The system shall allow the driver to set a specific interior coach temperature between the range of 60° F (16°C) and 80° F (27°C). The outside temperature can be displayed by switching between interior and exterior on the control panel. The HVAC controller shall monitor the temperature so that the interior temperature selected is maintained consistently. Where practicable, all controls shall be of a solid state design.
- H.177.1.12.** The system shall be designed with return air ducts at both front and rear of coach for balanced airflow. The system shall introduce a minimum of 10% fresh outside air when the fresh air intake is open.
- H.177.1.13.** Heat shall be applied to the front step tread to prevent accumulation of snow, ice, or slush. Step well heat shall be supplied and controlled by the driver's heater and defroster system. The manufacturer shall provide and install two valves with caps near the air conditioning compressor.
- H.177.1.14.** All electric motors which are part of the climate control system shall be permanent magnet type, except the Condenser and Main Evaporator motors, which shall be brushless type. Motors shall have double sealed, pre-lubricated anti-friction, replaceable ball bearings with moisture resistant grease. 3/8 inch (10 mm) and 5/16 inch (8 mm) diameter zinc terminal studs with bonded internal motor leads and anti-rotation insulators shall be used except driver's evaporator and parcel rack evaporators.

H.178. CONTROLS

- H.178.1.** The heating, cooling, ventilating and off operational modes of the interior climate control system shall be controlled by switches or displays conveniently located to the driver. In the heating and cooling modes, the system shall be governed by an electronic control that regulates the amount of cooling and heating capacity available to the passenger area. The temperature will be adjustable between 60°F (16°C) and 80°F (27°C). The temperature sensors used must be suitable for transit service and accurate to +/- 1°F.

H.179. AIR FLOW

H.179.1. PASSENGER AREA

- H.179.1.1.** The cooling mode of the interior climate control system shall introduce air into the coach up along the sidewall at a minimum rate of 25 cubic feet (0.71³ m) per minute per passenger based on the standard configuration coach with full standee load. This air shall be composed of no less than 10 percent outside air. Airflow shall be evenly distributed throughout the coach with air velocity not exceeding 60 feet (0.305 meters) per minute on any passenger.
- H.179.1.2.** Airflow may be reduced to 15 cubic feet (0.43³ m) per minute per passenger when operating in the heating mode with full standee load. Heated air introduced into the coach shall contain no less than 10 percent outside air. In the heating mode, the fans will activate immediately to assure an air outlet temperature of 70 degrees F (21° C). Outside airflow may be cut off during initial warm up/cool down, provided that manual adjustment is not required.

H.180. DRIVER'S AREA

H.180.1. The coach interior climate control system shall deliver at least 200 cubic feet (6.0³ m) per minute of air to the driver's area when operating in the ventilating and cooling modes. Adjustable nozzles shall permit variable distribution or shut down of the airflow. A separate heater or windshield defroster unit shall be capable of diverting heated air to the driver's feet and legs. The defroster motor shall be a permanent magnet type motor. The defroster or interior climate control system shall maintain visibility through the driver's side window. A separate evaporator, fan and control shall supply conditioned air to the driver's area.

H.181. AIR INTAKE

H.181.1. Outside openings for air intake shall be located to ensure cleanliness of air entering the climate control system, particularly with respect to exhaust emissions from the coach and adjacent traffic. All intake openings shall be baffled to prevent entry of snow, sleet, or water. Outside air shall be filtered before discharge into the passenger compartment. More efficient air filtration may be provided to maintain efficient heater and/or evaporator operation. The air filter shall be easily removed for service. Moisture drains from air intake openings shall be located so that they will not be subjected to clogging from road dirt, but shall be accessible for cleaning and inspection.

H.182. RADIO AND PUBLIC ADDRESS

H.182.1. MOBILE RADIO SYSTEM

H.182.1.1. A radio compartment, antenna, conduit, electrical and other requirements shall be provided to support a mobile radio system as and if required by the end user. The location, materials, and installation of all items installed on the coach in support of the mobile radio equipment is subject to approval by the end user. Any special tools required such as, but not limited to, security screwdrivers and latch handles shall be supplied.

H.183. PUBLIC ADDRESS SYSTEM

H.183.1. A public address system shall be installed that enables the driver to address passengers either inside or outside the coach. A total of at least 20 interior speakers shall broadcast, in a clear tone, announcements that are clearly perceived from all seat positions at approximately the same volume level. Speaker shall be provided outside above the entrance door so that announcements can be clearly heard by passengers standing near the door(s). A driver controlled switch shall select inside or outside announcements. The system shall be muted when not in use. The microphone shall not interfere with the operation of the mobile radio system.

H.184. EMERGENCY EQUIPMENT

H.184.1. On board emergency equipment, per Federal Motor Carrier Safety Regulations Part 393, shall be provided with each coach. The equipment shall be mounted out of the way of passengers but shall be readily accessible:

H.184.2. *Fire Extinguisher* - 5 pound (2.3 kg) capacity, Underwriter's Laboratories rating of A, B, C or more, marked as such with charge indicator, mounted in a cradled bracket.

H.184.3. *Emergency Warning Triangles* – Three bi-directional emergency reflective triangles conforming to the FMVSS 125 in a case and mounted in the battery compartment.

SECTION “H” **45’ CNG Commuter Coach** **RESPONSE SHEET**

BASE VEHICLE COST PER UNIT

BASE VEHICLE	COST PER UNIT
TRANSIT BUS (GAS ENGINE)	\$

LIST OPTIONAL ITEMS COST

OPTIONAL ITEMS	COST PER ITEM
CNG CONVERSION CHASSIS	
CNG BIFUEL CONVERSION CHASSIS	
PROPANE DEDICATED CONVERSION	
PROPANE DUEL FUEL CONVERSION	
BACK-UP MONITOR SYSTEM	
TWO-WAY RADIO (UHF)	
TWO-WAY RADIO (VHF)	
TWO-WAY RADIO (800 MZ)	
DRIVER’S SHIELD	
PAINTED LOWER SKIRTS	
OUTSIDE PASSENGER DOOR SWITCH	
BUS CAMERA SYSTEM	
FABRIC INSERT ON CEILING	
STREET SIDE EXHAUST	
INTEGRATED CHILD SEATS	
VINYL SEATS (PRICE DEDUCTION)	
PUBLIC ADDRESS SYSTEM	
PASSENGER SIGNAL SYSTEM PULL CORD	
PASSENGER STOP REQUEST SIGNS	
FARE COLLECTION BOX	
DESTINATION SIGNS	
BICYCLE RACKS	
DELETE ALTRO CHROMA FLOORING (PRICE DEDUCTION)	
DELETE YELLOW POWDER COATING ON HANDRAILS, GRAB RAILS, AND STANCHIONS (PRICE DEDUCTION)	
100% NIDA-CORE STRUCTURE	
COMPOSITE FLOOR	
SIDE DOOR SLIDE OUT BATTERY BOX	
DIESEL ENGINE	
REAR SPARE TIRE HOLDER	

ADJUSTABLE REAR SUSPENSION SYSTEM	
MEMO/PAMPHLET RACK (See Figure 6)	
FREEDMAN SEATING TDSS (OR EQUIVALENT) FOLD AWAY SEAT (See Figure 7)	
METAL BOX (See Figure 8)	
EXTRA SEAT BELT EXTENSIONS	

A LIST OF OPTIONAL EQUIPMENT AND/OR ACCESSORIES SHALL BE PROVIDED. THE LIST MUST CONTAIN:

- Item
- Description and functionality detail
- Cost of item installed in final delivery of vehicle
- Any changes to listed specifications as outlined above to accommodate options

PROPOSAL EXCEPTIONS

Supplier must list any exceptions here to be used as a part of the Proposal evaluation and analysis. Please list the roman numerical on the standard specs or the number for the options when listing any Proposal exceptions.

I. SPECIFICATIONS FOR ADA SIDE RAMP ACCESSIBLE MINIVAN

I.1. DELIVERY

- I.1.1.** The bidder agrees, if their proposal is awarded, they guarantee that the design materials and workmanship throughout the vehicle will conform to the highest standards of the vehicle bid according to the standard factory warranty.
- I.1.2.** Unless otherwise specified, all items listed below as OEM parts or equipment means that those items were made by the chassis manufacturer, not the conversion company.

I.2. ACCESSORIES

- I.2.1.** All safety items and air pollution controls required by statute or regulation in effect at the time the vehicle is produced, dual sunshades, horn, prismatic type day/night mirror, power point, parking brake with warning light, factory standard electronic AM/FM/CD stereo with clock, undercoating, factory tinted glass in all windows, jack and tire tool, full size spare tire, and all other accessories or optional items which may be shown in the proposal shall be installed in each vehicle. In addition three sets of keys shall be provided with the vehicle.

I.3. AIR BAGS

- I.3.1.** Driver side and passenger side shall be equipped with Generation II air bags.

I.4. AIR CONDITIONER

- I.4.1.** The air conditioning system shall be factory installed and shall be designed to adequately cool the interior of the vehicle with a full load of passengers.
 - I.4.1.1.** The system shall consist of two evaporators, one installed in the front area with integral dash outlets and the second installed in the rear with outlets designed to direct the air throughout the vehicle.
 - I.4.1.2.** Both evaporators shall be equipped with multi-speed fans. On/Off switches and fan controls shall be within easy reach of the driver.
 - I.4.1.3.** Air conditioning efficiency is of paramount concern to the purchaser.
 - I.4.1.4.** The vehicle's electrical system shall be designed so that an ample electrical supply will be provided to maintain optimum air conditioning performance without battery discharge.
 - I.4.1.5.** All lines and hoses shall be sufficiently fastened, protected, and insulated to ensure against wear from friction the elements.
 - I.4.1.6.** The lines must be mechanically attached, with OEM clamps, to the vehicle structure at no greater than 18 inch intervals and must be routed so as not to be exposed to wheel spray and not pass within 2 inches of any part of the exhaust system.
 - I.4.1.7.** Conversion shall not impede access to front and rear air conditioning components.

I.5. ALTERNATOR

- I.5.1.** 12 Volt, 90 Amps (minimum), or maximum allowed by manufacturer.

I.6. BACK-UP WARNING DEVICE

- I.6.1.** The vehicle shall be equipped with an audible warning device that is activated when the vehicle transmission is engaged in reverse and continues as the vehicle is being backed.
 - I.6.1.1.** This should be located behind the rear axle of the vehicle and all wires should be enclosed and secured.

I.7. BATTERY

- I.7.1.** A heavy duty, minimum 600 CCA, 12 Volt, maintenance free or OEM maximum.
 - I.7.1.1.** The location and installation of the battery shall ensure easy access for replacement and maintenance.
 - I.7.1.2.** In case, a battery is installed under the chassis or body, a roll out tray shall be provided to allow battery to be rolled out beyond the chassis so that it is accessible for maintenance.

I.8. BRAKES

- I.8.1.** 4 wheel anti-lock brake system (ABS) with disc brakes
 - I.8.1.1.** The converted vehicle must have been tested to comply with FMVSS 105. You cannot shift the automatic trans-axle out of Park unless brake pedal is depressed
 - I.8.1.2.** Brake warning light and ABS malfunction warning light shall be supplied.

I.9. BUMPERS

I.9.1. Front and rear bumper height shall provide proper ground clearance

I.10. CRUISE CONTROL

I.10.1. Must have OEM cruise control.

I.11. DRIVER/FRONT PASSENGER DOOR

I.11.1. Standard factory equipment.

I.12. SLIDING PASSENGER DOORS

I.12.1. The vehicle shall be equipped with manually operated single, left and right-side mounted (behind left and right-side front passenger doors) doors.

I.12.1.1. Doors must maintain OEM fit, finish and seal to prevent the entrance of air, water and other elements.

I.12.1.2. Doors must have a minimum opening of 31.5" and a minimum door clearance height of 56".

I.12.1.3. There must be no modification to the OEM roofline to achieve the 56" entry height.

I.12.1.4. The door shall be equipped with an interlock system so that the door cannot be opened from the inside or outside when the fuel door is open.

I.12.1.5. Both doors shall also have a mechanism to securely hold doors in the open position when opened on an incline.

I.12.1.6. The door must be capable of being opened from the inside of the vehicle and the opening handle shall not be impeded by the ramp when it is folded to the inside of the vehicle.

I.12.1.7. Passenger doors must be aligned correctly and able to open and close smoothly.

I.13. SLIDING PASSENGER DOOR TRACKS

I.13.1. Sliding doors must have reinforced glides with an added stop brace to prevent doors from sliding off track.

I.13.1.1. Door tracks shall be reinforced or strengthened beyond OEM standards as needed in all areas of contact with sliding arms.

I.13.1.2. Door tracks must have a stopping device to prevent falling off.

I.14. SLIDING PASSENGER DOOR ARM BRACKETS

I.14.1. Reinforcement of the sliding door components shall at a minimum be adequate to support the excess weight created by the door extensions.

I.14.1.1. These arms if extensions are needed must be constructed of stainless steel.

I.14.1.2. Under normal closure conditions, there should be no evidence of door track flexing or wobbling.

I.15. DOORS AND WINDOWS

I.15.1. Fit and finish standards must include that the doors and interior panels shall be painted or otherwise finished with a non-glare finish in order to match the other interior panels.

I.16. STEPS

I.16.1. Vehicle must have a step for the driver and passenger front seats. Extra Heavy-duty running boards/Steps that are bolted to the frame for added strength.

I.16.2. Steps must be able to hold over 400 pounds. This will assist driver and front passenger to enter and exit the vehicle.

I.17. EMERGENCY EQUIPMENT:

I.17.1. All miscellaneous equipment must be secured to the vehicle and easily accessible.

I.17.1.1. First aid kit: (24M – National Standard School Bus Metal

I.17.1.1.1. Must be Certified Safety Mfg. Model S203-045 or equivalent.

I.17.1.2. Fire extinguisher – Multi-purpose Stored Pressure Dry Chemical Extinguisher.

I.17.1.2.1. Must be a 5 lb. type 3A:40B: C Pro Line, Kiddie Model # FXBND9 or equivalent.

I.17.1.2.2. Must have a gauge to indicate state of charge and mounted to vehicle using a bracket and having a heavy duty vinyl cover.

I.17.1.3. Triangle warning devices (3), with storage container.

I.17.1.3.1. must meet FMVSSP # 125

I.17.1.4. Bloodborne Pathogens infection control kit.

I.17.1.4.1. Must be Certified Safety Mfg. Model #FK200-931, or equivalent.

I.17.1.5. Seat belt cutter

I.18. ENGINE

I.18.1.1. Minimum 3.8 liter V6 gasoline engine with electronic fuel injection and shall include: oil filter, air cleaner and heavy duty radiator capable of providing sufficient cooling capacity for the operation of all air conditioning equipment.

I.18.1.1.1. Engines that are E-85 flexible fuel capable are preferred if available at no additional cost.

I.18.1.1.2. Engine cooling system shall be protected with permanent type antifreeze to minus 20 degrees Fahrenheit.

I.18.1.1.3. The Coolant used shall meet or exceed the engine manufacture's specification.

I.18.1.1.4. A permanent label listing protection level shall be supplied and riveted or screwed to the close proximity to the radiator.

I.18.1.1.5. Engine warning system with light indicated oil pressure below 6 psi and with a light to indicate water temperature above 210 degrees Fahrenheit.

I.18.1.1.6. Engine shall meet the latest applicable emission control standards.

I.19. ENTRANCE RAMP LIGHTING

I.19.1. Must meet all ADA requirements as stated in the Federal Register, Part IV, Department of Transportation, 49 CFR Parts 27, 37 and 38, Transportation for Individuals with Disabilities; Final Rule, published Friday, September 6, 1991.

I.19.1.1. Ramp area lighting shall illuminate automatically when door is opened.

I.19.1.2. Overhead and step well lights shall be activated when the passenger doors are open.

I.19.1.3. Adequate interior lighting shall be installed throughout which provides a minimum of two foot-candles at a seated level.

I.19.1.4. Interior lighting fixtures shall be reasonably flush with the interior walls and ceiling to prevent a hazard to passengers.

I.20. FLOOR ASSEMBLY

I.20.1. Floor assembly shall be at minimum the following.

I.20.1.1. Floor drop shall be from the front firewall back to just forward of the rear axle, run the full width of the vehicle, and measure thirteen (13) inches maximum and allow ground clearance of at least 5 inches including exhaust.

I.20.1.2. Floor should be constructed of stainless steel, and shall be 'ramped' or 'notched' where necessary to provide adequate clearance for underbody components, such as to allow for full suspension travel.

I.20.1.3. All modifications to the OEM floor plan shall be of the highest quality of construction.

I.20.1.4. These modifications to the vehicle floor and frame must provide reinforcement to ensure that the structural integrity of the OEM vehicle is not compromised.

I.20.1.5. All modifications must be properly sealed to prevent the entrance of exhaust fumes, moisture and dust into the vehicle.

I.20.1.6. The exhaust pipes should have the necessary heat shields.

I.20.1.7. Rust inhibitors other than undercoating shall be applied to all conversion materials.

I.21. SUB FLOOR

I.21.1. The interior floor shall be insulated with 3/8" (minimum) marine grade plywood to provide a smooth surface for flooring attachment and to minimize interior noise.

I.21.1.1. The proper insulation should be used to prevent the exhaust from making the floor so hot that it would be uncomfortable for the passengers.

I.22. FLOOR COVERING MATERIAL

I.22.1. Shall be at minimum 3/16" thick continuous piece of fire retardant, nonskid transit-type flooring.

I.22.1.1. The floor covering shall be butt jointed and cemented to the floor with a waterproof adhesive in order to prevent bubbles and blisters which could create a safety hazard.

I.22.1.2. Mobility air restraint tracks and seat locks shall be beveled, with no sharp edges and will protrude no more than ¼" above floor surface.

I.23. FRONT AXLE

I.23.1. Minimum 2400 lbs. capacity or OEM maximum.

I.24. FUEL TANK

I.24.1. Largest available, but no less than 20 U.S. gallons.

I.24.1.1. Tank, fuel lines, and hardware must meet all current FMVSS, including FMVSS 301, as well as all current CARB and EPA requirements.

I.24.1.2. Tank shall be calibrated with the OEM dash fuel gauge.

I.25. GUAGES

I.25.1. Fuel, water-temperature, oil pressure light, alternator light, speedometer, and odometer.

I.26. HORN

I.26.1. Dual, electric

I.27. HEATER

I.27.1. Both a deluxe front heater and a heavy-duty auxiliary rear heater are required.

I.27.1.1. Front and rear coils shall be factory installed hot water type, of sufficient capacity to warm cabin area and clear windows of snow, ice and fog.

I.27.1.2. The water lines for the rear heater coil may be housed within the conduit used for the air conditioning refrigerant lines.

I.27.1.3. All lines and hoses shall be sufficiently fastened, protected, and insulated to ensure against wear from friction and the elements.

I.27.1.4. The lines must be mechanically attached, with OEM clamps, to the vehicle structure at no greater than 18 inch intervals and must be routed so as not to be exposed to wheel spray and not pass within 2 inches of any part of the exhaust system.

I.27.1.5. Conversion shall not impede access to front and rear heater components.

I.28. INTERIOR INSULATION

I.28.1. All side walls and areas around the windows shall be insulated and finished with matching trim and color.

I.28.1.1. Entire ceiling shall be insulated.(Batt is not acceptable)

I.28.1.2. Insulation shall consist of a polystyrene composite and shall be nontoxic.

I.28.1.3. A polyurethane foam or honeycomb resin in also acceptable.

I.29. INTERIOR HEIGHT (AT CENTER)

I.29.1. Minimum 57 ½"

I.30. INTERIOR LENGTH

I.30.1. Length measured from back of driver's seat to back window of vehicle at seated shoulder height.

I.30.2. Shall be a minimum of 90".

I.31. INTERIOR TRIM

I.31.1. Shall match factory original material.

I.31.1.1. All interior panels shall be OEM material or equal. Material and treatments shall be flame retardant to meet FMVSS 571.302 and be surface treated for efficient cleaning.

I.31.1.2. Panel fastening devices shall match the color of the panels with smooth finishes without any unprotected sharp edges.

I.32. LAMPS

I.32.1. Automatic daytime running lamps, if available.

I.33. EXTERIOR MIRRORS

I.33.1. Dual folding power

I.33.1.1. Heated factory installed

I.33.1.2. Low mount

I.34. INTERIOR MIRROR

I.34.1. 10" automatic day/night rear view mirror.

I.35. MUD FLAPS

I.35.1. Front and rear, securely mounted, standard.

I.36. FLOOR MATS

I.36.1. Must have front OEM floor mats.

I.37. KEYS

I.37.1. Must have 3 sets of keys

I.38. OVERALL HEIGHT

I.38.1. Measured from front to highest point of vehicle.

I.38.1.1. Minimum 66", Maximum 83".

I.39. OVERALL LENGTH

I.39.1. Minimum of 195 inches.

I.40. OVERALL WIDTH-EXTERIOR

I.40.1. Maximum 72".

I.41. OVERALL WIDTH-INTERIO

I.41.1. Minimum 55"

I.42. PRIORITY SEATING SIGNS

I.42.1. Each vehicle shall contain sign(s) which indicate that the seats in the front of the vehicle are priority seats for persons with disabilities, and that other passengers should make such seats available to those who wish to use them.

I.43. RADIATOR

I.44. Heavy-duty, with factory installed coolant recovery system.

I.44.1.1. Vehicle's cooling system must be winterized with ethylene glycol for temperature to 20 degrees F below zero.

I.45. REAR WINDOW

I.45.1. Defogger/defroster.

I.46. ROOF GUTTERS

I.46.1. Shall be installed over all windows and doors. OEM rain channel is fine if not obstructed during conversion.

I.47. DRIVER'S SEAT

I.47.1. Must be a power seat with power lumbar and be high backed with multi-positional fore and aft adjustment, reclining seatback, etc.

I.48. FLOOR MATS

I.48.1. Must have front OEM floor mats

I.49. KEYS

I.49.1. Must have 3 sets of keys

I.50. OVERALL HEIGHT

I.50.1. Measured from front to highest point of vehicle.

I.50.1.1. Minimum 66", Maximum 83".

I.51. OVERALL LENGTH

I.51.1. Minimum of 195 inches.

I.52. OVERALL WIDTH-EXTERIOR

I.52.1. Maximum 72".

I.53. OVERALL WIDTH-INTERIOR

I.53.1. Minimum 55".

I.54. PRIORITY SEATING SIGNS

I.54.1. Each vehicle shall contain sign(s) which indicate that the seats in the front of the vehicle are priority seats for persons with disabilities, and that other passengers should make such seats available to those who wish to use them.

I.55. RADIATOR

I.55.1. Heavy-duty, with factory installed coolant recovery system.

I.55.1.1. Vehicle's cooling system must be winterized with ethylene glycol for temperature to 20 degrees F below zero.

I.56. REAR WINDOW

I.56.1. Defogger/defroster

I.57. ROOF GUTTERS

I.57.1. Shall be installed over all windows and doors. OEM rain channel is fine if not obstructed during conversion.

I.58. DRIVER'S SEAT

I.58.1. Must be a power seat with power lumbar and be high backed with multi-positional fore and aft adjustment, reclining seatback, etc.

I.59. TRANSMISSION

I.59.1. 6 speed minimum automatic including overdrive.

I.59.1.1. Transmission shall be capable of transmitting the torque and horsepower listed on the engine.

I.60. UNDERCOATING

I.60.1. All exposed floor seams shall be sealed with an industrial grade butyl sealant or equivalent that conforms to ASTM C920.

I.60.1.1. The entire surface of exterior lowered floor shall have a rust inhibiting coating, such as an epoxy primer base, applied to cover all welded areas, and then a fresh application of undercoating over the entire surface.

I.60.1.2. Undercoating shall comply with current Federal and State flammability standards.

I.60.1.3. The entire body-frame understructure of each vehicle is to be fully undercoated with high quality anti-rust protection material.

I.61. VEHICLE COLORS

I.61.1. Body: Vendor shall supply available colors and prices.

I.61.2. Interior/Seats: Bidder shall include interior color options for review.

I.61.2.1. Successful vendor shall coordinate with the agency issuing the purchase order in the selection of interior and seat color.

I.62. WARNING LIGHT

I.62.1. A warning light shall be in the driver's area, for the rear door, indicating "door ajar".

I.63. WARRANTY

I.63.1. Warranty must be as follows

I.63.1.1. A Bumper-to-Bumper Warranty 36,000 miles or three (3) years on body construction, modification, and add-on components. (This includes any and all conversion made to OEM vehicle).

I.63.1.2. Vehicle shall have a 60 months or 100,000 mile manufacture power train warranty.

- I.63.1.3. These warranties shall begin on the date that vehicle delivery is accepted by the agency issuing the purchase order.

I.64. WHEEL BASE

- I.64.1. Minimum of 119 inches.

I.65. WHEELS AND TIRES

- I.65.1. Tire size must be compatible with each vehicle and must meet 5,357 lb. GVWR minimum.
- I.65.2. Tires shall be steel-belted radial all season type tires.
 - I.65.2.1. The rims need to be OEM aluminum or comparable.
 - I.65.2.2. Wheel covers will not be acceptable.
 - I.65.2.3. Spare wheel and tire shall be of the same size as all the other wheels and mounted at an accessible location.

I.66. WHEELCHAIR ACCESSIBILITY SYMBOL

- I.66.1. The international wheelchair accessibility symbol depicted on sign D9-6 in the "Manual of Uniform Traffic Control Devices" published by the federal Highway Administration shall be affixed to the outside of each vehicle on all four sides.
 - I.66.1.1. No vendor/dealer advertisements shall be on the symbols.
 - I.66.1.2. Symbols shall be between 3" and 4" in overall height.

I.67. WHEELCHAIR POSITIONS

- I.67.1. 2 Wheelchair positions shall be provided as standard equipment: a center behind driver placement (straight in from the ramp entrance), and a right front passenger placement.
 - I.67.1.1. Tie-downs shall be located in these right front passenger positions and the center left and center right passenger positions.
 - I.67.1.2. The right front passenger placement should be located as far forward as possible.
 - I.67.1.3. This multiple tie-down configuration allows for up to two (2) wheelchair passengers and three (3) ambulatory passengers. Wheelchair positions must be forward facing.

I.68. WHEELCHAIR RAMP

- I.68.1. Vehicle will be equipped with a manually deployed ramp.
 - I.68.1.1. The fold and unfold motion of the ramp must be counter balanced so that the force exerted by the operator does not exceed 15 lbs.
 - I.68.1.2. The ramp shall have a minimum usable width of 30" and slope meeting the requirements of ADA, 49 CFR.
 - I.68.1.3. The ramp shall be designed to swing-away when in the upright position to allow access for non-wheelchair passengers.
 - I.68.1.4. When in the upright position, the ramp must not interfere with the front passenger seat. If this occurs, there must be something added to protect the back and side of the seat, and must be of quality material and look as OEM as possible.
 - I.68.1.5. The ramp must fold up completely below the window line for unobstructed visibility.
 - I.68.1.6. The ramp surface shall be continuous, with the surface being either expanded or solid metal. If solid metal, it shall be covered with (Armstrong Crosswalk, or equivalent) slip-retardant flooring.
 - I.68.1.7. The surfaces of the boarding edge of the ramp and door threshold shall have a bright yellow finish running the full surface, in order to contrast with the finish on the rest of the ramp.
 - I.68.1.8. Vinyl tape is not acceptable.
 - I.68.1.9. Ramp shall have a rated capacity of 600 lbs. with a safety factor of at least three (3) based on the ultimate strength of the material.
 - I.68.1.10. Each side of the ramp shall have protective barriers at least two (2) inches high to prevent mobility aids from rolling off of the ramp edge and must have yellow tape on them.
 - I.68.1.11. Ramp must meet all ADA requirements as set out in the Federal Register, Part IV Department of Transportation, 49 CFR Parts 27, 37 and 38, Transportation for Individuals with Disabilities; Final Rule, published Friday, September 6, 1991.

I.69. WHEELCHAIR SECUREMENTS SYSTEM

- I.69.1.** The securement system shall be, Q'Straint QRT MAX Automatic Retractor System Q-8309-L with L-Track anchorage system and J-Hooks, or equivalent.
 - I.69.1.1.** They must be fully assembled and ready to use.
 - I.69.1.2.** Shall include securement pouches store wheelchair securement tie-downs.
 - I.69.1.3.** Shall include four (4) Q5-7580 Webbing Loops for Securing Scooters. Belt system shall be of sufficient length to accommodate a motorized wheelchair.
 - I.69.1.4.** A minimum of two tracks, (pads), each of sufficient length for proper attachment and positioning of the belts, shall be placed parallel to each other and perpendicular to the direction in which the wheelchair faces.
 - I.69.1.5.** The anchors must be bolted to structural steel.
 - I.69.1.6.** Bolting to plywood floor without bolting into structural steel under floor is NOT ALLOWED.
 - I.69.1.7.** The tracks shall be securely mounted to the vehicle, flush from the floor and ramps, to insure that the track will not pull away from the van floor or shift position under anticipated loads.
 - I.69.1.8.** Any tracks overlapping the access path must be recessed into the floor to prevent passengers from tripping.
 - I.69.1.9.** All attachment hardware and anchorages shall meet or exceed the 30 mph/20 Impact Test criteria per SAE J2249, 36 CFR Part 1192 and CFR Part 38, and all applicable Federal Motor Vehicle Safety Standards, as amended.

I.70. WHEELCHAIR OCCUPANT RESTRAINT

- I.70.1.** The wheelchair occupant restraint system shall be Q'Straint Q8-6325
 - I.70.1.1.** A shall have a standard manual lap/shoulder belt combo or equivalent to.
 - I.70.1.2.** That meets SAE J2249 and ADA requirements.
 - I.70.1.3.** The L tracks must be bolted to structural steel. Bolting to plywood floor without bolting into structural steel under floor is NOT ALLOWED.
 - I.70.1.4.** Each wheelchair securement location shall have a sign designating it as such. Lettering size and type on these signs shall comply with the Americans with Disabilities Act regulations.
 - I.70.1.5.** Price bid should be for 2 sets of wheelchair restraints (which would cover both wheelchair placements).
 - I.70.1.6.** Vendor will supply written or video instructions on the use of the restraint system.

I.71. WINDOWS

- I.71.1.** Factory tinted safety glass all around, (1) window on each side capable of being opened.
 - I.71.1.1.** Shall be at least 30% smoked glass windows throughout passenger area that is be factory installed.
 - I.71.1.2.** After market add on films is not acceptable.
 - I.71.1.3.** All windows and emergency exits shall meet the performance and operational requirements as outlined in the Federal Motor Vehicle Safety Standards and Procedures.

I.72. WINDSHIELD

- I.72.1.** Tinted safety glass

I.73. WINDSHIELD WASHER

- I.73.1.** Windshield washer must be protected with winter-strength solution.

I.74. WIPERS

- I.74.1.** Must have a dual intermittent wiper system

I.75. WIRING

- I.75.1.** Schematic of non-OEM wiring shall be included with the vehicle at the time of delivery.
 - I.75.1.1.** Each vehicle shall have a 12-volt electrical charging system as supplied from the OEM.
 - I.75.1.2.** All electrical wiring shall be automotive stranded copper, of sufficient gauge to handle the load, color-coded to match the OEM.

- I.75.1.3.** All harnesses that are modified or added to the vehicle will be secured to the frame/body at a maximum of two feet intervals with insulated clamps.
- I.75.1.4.** All exposed terminals and wiring shall be protected from the elements using sealed terminals or heat shrink where necessary. Exposed wires will be wrapped or loomed in corrosion/moisture-resistant material.
- I.75.1.5.** Must be continuous wiring with OEM type pin connectors at harness connections, butt connectors are not allowed.

I.76. MISCELLANEOUS TECHNICAL SPECIFICATIONS

- I.76.1.** There shall be no sharp corners on the unit. All corners shall be slightly rounded and filed smooth.
- I.76.2.** All weld joints shall have been cleaned, primed, be free of slag intrusions, undercut, roll, blow holes, craters and porosity.
 - I.76.2.1.** Welds shall be properly fused, of ample penetration and smoothly finished on exposed surfaces.
 - I.76.2.2.** Sheet metal fit-up must be properly executed and concealed by a finish-coat of paint.
 - I.76.2.3.** Finish and all glass must be free of any defects due to welding, welding slag, heat, war page, or assembly damage.
- I.76.3.** All materials installed shall be new and free of rust.
- I.76.4.** No wires shall be visible on the exterior or interior of the unit.

I.77. DELIVERY

- I.77.1.** Vehicle must be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following:
 - I.77.1.1.** The vehicle must have a full tank of fuel when delivered.
 - I.77.1.2.** Each vehicle shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
 - I.77.1.3.** All parts added, as part of the modification process shall be new.
 - I.77.1.4.** Headlights properly aligned
 - I.77.1.5.** Engine Tuned
 - I.77.1.6.** All accessories properly adjusted
 - I.77.1.7.** Electrical, braking and suspension systems inspected
 - I.77.1.8.** Both batteries Charged
 - I.77.1.9.** Front-end alignment must be done after body is put on chassis. Chamber, caster and toe must be adjusted to the center of OEM specs. Ford chassis buses must have adjustable caster, camber bushings installed. Standard OEM bushings will not be accepted. Each bus must come with documentation stating before and after actual alignment readings of bus.
 - I.77.1.10.** All wheels balanced, including spare
 - I.77.1.11.** All lubricants checked, and greased if needed
 - I.77.1.12.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
 - I.77.1.13.** Warranty papers and owner's guide
 - I.77.1.14.** Exterior and interior cleaned and washed.
 - I.77.1.15.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.
 - I.77.1.16.** Under no circumstances are tow vehicles to be attached to any buses.
 - I.77.1.17.** Each vehicle must be delivered to the agency submitting the P.O.
 - I.77.1.18.** Copies of the all Certificate of Origins and signed invoices must be sent to the organization named on the purchase order before delivery is made and must be delivered with the vehicle: receipt of these after delivery is not acceptable.

I.78. ALTOONA TESTING

I.78.1. Bid must include a copy of Altoona Test Report for this vehicle.

I.79. VEHICLE TESTING

I.79.1. Certification shall be provided that in accordance with 49 CFR part 665, Bus Testing, the vehicle either does not need to be tested (with justification specified for exemption) or has been tested at the bus testing facility and a test report is included.

I.79.2. Information to be furnished with each vehicle

I.80. MANUALS

I.80.1. Must include OEM Repair service manuals and wiring diagram manual for the chassis. And as built wiring diagram and parts manual for body and for all auxiliary equipment.

I.80.1.1. Maintenance and inspection schedule incorporating the required maintenance and inspection of the basic vehicle and its sub-systems.

I.80.1.2. Operator's manual for vehicle and all add-on equipment.

I.80.1.3. Warranty papers for chassis, body, and additional equipment.

I.80.1.4.

I.81. PRE-AWARD AUDIT

I.81.1. A Pre-Award Audit shall be conducted to determine if the bid proposal specifications. The bidder shall submit documents, which include certification of the manufacturer's compliance with the Federal Transit Administration (FTA) Pre-Award Buy America Audit Requirements. The document submitted shall include the following information for each major component used on vehicle bid

I.81.1.1. Name and address of each supplier.

I.81.1.2. Cost of each major component and subcomponent. In order to protect proprietary information, the document may reflect the percentage of total cost each item represents instead of the actual cost.

I.81.1.3. Country of origin of each major component and subcomponent.

I.81.1.4. Name and address of company where final assembly occurs.

I.81.1.5. Cost of final assembly

I.81.1.6. Signature of authorized representative of vehicle manufacturer.

I.81.1.7. Once the preceding steps have been completed, the contract shall be awarded.

I.82. POST- DELIVERY AUDIT

I.82.1. A Post Delivery Audit of the vehicle(s) shall be conducted at the purchaser's facility, to determine that the completed vehicle(s) meets specifications. Once this process has been satisfactorily completed, the vehicle(s) shall be considered acceptable.

I.83. ACCESSIBILITY REQUIREMENTS

I.83.1. When submitting a bid for an accessible vehicle for the disabled, the vendor shall provide a list of the vehicle related equipment illustrating the component cost and related installation charges. The purpose of this list is to reflect an accurate cost for those vehicle related items, which are required to make the vehicle accessible to the disabled.

I.84. OPTIONAL ITEMS

I.84.1. Must be installed by vendor or factory before delivery

I.84.2. The following options shall receive separate pricing as part of the bid submission

I.84.2.1. CNG CONVERSION BI-FUEL

I.84.2.2. OEM engine shall be converted to operate on CNG and Gasoline. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional module will be accepted. System shall be capable of switching between CNG and Gasoline. The Gasoline fuel tank will be installed as per OEM specifications. The system must comply with the following

I.84.2.2.1. Closed-loop fuel control

I.84.2.2.2. Sequential fuel injection (SFI)

I.84.2.2.3. Optimized ignition timing

- I.84.2.2.4. Must maintain original fault codes (DTCs)
- I.84.2.2.5. Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner
- I.84.2.2.6. CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.
- I.84.2.2.7. Must provide a detailed floor plan of the placement of the CNG tanks.
- I.84.2.2.8. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.
- I.84.2.2.9. The Minimum CNG Type IV tank with a capacity of 15 Gasoline Gallon Equivalent.
- I.84.2.3. POWER RAMP AND DOOR**
 - I.84.2.3.1. Operated from switch mounted on right-side "B" pillar. All other specifications listed in this document for Wheelchair Ramp and Doors shall apply to this optional electrically operated ramp and right-side sliding door.
- I.84.2.4. FOLD-AWAY CENTER SEAT**
 - I.84.2.4.1. Fold-away center seat, which folds up behind the driver.
 - I.84.2.4.1.1. This seat shall be forward facing, standard heavy-duty vinyl (if available), of durable type and material that can be cleaned easily, fully padded for occupant comfort and retention.
 - I.84.2.4.1.2. This seat shall comply with FMVSS burn resistance requirements, and seat color shall match the vehicle color and be aesthetically pleasing.
 - I.84.2.4.1.3. Seat will comply with FMVSS seat anchorage requirements.
- I.84.2.5. BACK-UP MONITOR SYSTEM**
 - I.84.2.5.1. ASA Voyager AOM562A or approved equal with a 5.6" color LCD screen mounted on rear view mirror OEM Bracket. With a rear mounted outside backup camera and a second inside front mounted camera to view passengers.
- I.84.2.6. TWO-WAY RADIO SYSTEM: UHF**
 - I.84.2.6.1. ICOM F6021 UHF two-way Radio System with a PCTELMUF4505 UHF antenna and coax or approved equal.**
 - I.84.2.6.1.1. Antenna shall be mounted on Roof.
 - I.84.2.6.1.2. Radio must be mounted in an easy accessible location for the driver.
 - I.84.2.6.1.3. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.
- I.84.2.7. TWO-WAY RADIO SYSTEM: VHF**
 - I.84.2.7.1. ICOM F5021 VHF two-way Radio System with a PCTEL MHB5800 VHF antenna and coax or approved equal.**
 - I.84.2.7.1.1. Antenna shall be mounted on Roof.
 - I.84.2.7.1.2. Radio must be mounted in an easy accessible location for the driver.
 - I.84.2.7.1.3. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.
- I.84.2.8. TWO-WAY RADIO SYSTEM: 800 MHz**
 - I.84.2.8.1. Kenwood NX-900K 800 MHz two-way Radio System with a PCTEL MUF8003 antenna and coax or approved equal.**
 - I.84.2.8.1.1. Antenna shall be mounted on Roof.
 - I.84.2.8.1.2. Radio must be mounted in an easy accessible location for the driver.
 - I.84.2.8.1.3. Radio must be programmed with the correct Frequencies and the antenna tuned for agency issuing this purchase.
- I.84.2.9. INTEGRATED CHILD SEAT**
 - I.84.2.9.1. Integrated Child Restraint Seat must be a Freedman Seating ICS-10 or equivalent.
 - I.84.2.9.1.1. Must have an integrated 4-point safety harness for children 22-78lbs with under seat retractor seat belts for adults.

SECTION "T"

ADA MINIVAN

RESPONSE SHEET

BASE VEHICLE COST PER UNIT

BASE VEHICLE	COST PER UNIT
MINIVAN ADA VEHICLE	\$

CHASSIS SPECIFICATIONS

Specify Overall Vehicle Length (outside of front bumper to outside of Rear bumper): _____

OPTIONAL ITEMS

OPTIONAL ITEMS	COST PER ITEMS
CNG CONVERSION BI-FUEL	\$
POWER RAMP AND DOOR	\$
FOLD-AWAY CENTER SEAT	\$
BACK-UP MONITOR SYSTEM	\$
TWO-WAY RADIO SYSTEM: UHF	\$
TWO WAY RADIO SYSTEM	\$
TWO WAY RADIO SYSTEM	\$
INTEGRATED CHILD SEAT	\$

A LIST OF OPTIONAL EQUIPMENT AND/OR ACCESSORIES SHALL BE PROVIDED. THE LIST MUST CONTAIN:

- Item
- Description and functionality detail
- Cost of item installed in final delivery of vehicle
- Any changes to listed specifications as outlined above to accommodate options

PROPOSAL EXCEPTIONS

Supplier must list any exceptions here to be used as a part of the Proposal evaluation and analysis. Please list the roman numerical on the standard specs or the number for the options when listing any Proposal exceptions.

J. SOLICITATION SPECIFICATIONS FOR LOW FLOOR PURPOSE BUILT PARATRANSIT VEHICLE

J.1. ACCESSORIES

J.1.1. All safety items and air pollution controls required by statute or regulation in effect at the time the vehicle is produced, dual sunshades, horn, prismatic type day/night mirror, power point, parking brake with warning light, factory standard electronic AM/FM/CD stereo with clock, factory tinted glass in all windows, jack and tire tool, full size spare tire, and all other accessories or optional items which may be shown in the proposal shall be installed in each vehicle. In addition three sets of keys shall be provided with the vehicle.

J.2. AIR BAGS

J.2.1. Driver side shall be equipped with Generation II air bags.

J.3. AIR CONDITIONER

J.3.1. The air conditioning system shall be factory installed and shall be designed to adequately cool the interior of the vehicle with a full load of passengers.

J.3.2. The system shall consist of one evaporator installed in the front area with integral dash outlets and with rear outlets designed to direct the air throughout the vehicle.

J.3.3. Evaporator shall be equipped with multi-speed fan. On/Off switches and fan controls shall be within easy reach of the driver.

J.3.4. Air conditioning efficiency is of paramount concern to the purchaser.

J.3.5. The Vehicle's electrical system shall be designed so that an ample electrical supply will be provided to maintain optimum air conditioning performance without battery discharge.

J.3.6. All lines and hoses shall be sufficiently fastened, protected, and insulated to ensure against wear from friction and the elements.

J.3.7. The lines must be mechanically attached, with OEM clamps, to the vehicle structure at no greater than 18 inch intervals and must be routed so as not to be exposed to wheel spray and not pass within 2 inches of any part of the exhaust system.

J.4. ALTERNATOR

J.4.1. 12 Volt, 155 Amps. (Minimum) or OEM Maximum.

J.5. BACK-UP WARNING DEVICE

J.5.1. The vehicle shall be equipped with an audible warning device that is activated when the vehicle transmission is engaged in reverse and continues as the vehicle is being backed.

J.5.2. This should be located behind the rear axle of the vehicle and all wires should be enclosed and secured.

J.6. BATTERY

J.6.1. A Heavy duty, minimum 750 CCA, 12 Volt, maintenance free or OEM maximum.

J.6.2. The location and installation of the battery shall ensure easy access for replacement and maintenance.

J.7. BRAKES

J.7.1. 4 wheel anti-lock brake system (ABS) with disc brakes.

J.7.2. The vehicle must have been tested to comply with FMVSS 105. You cannot shift the automatic transmission out of Park unless brake pedal is depressed.

J.7.3. Brake warning light and ABS malfunction warning light shall be supplied.

J.8. BUMPERS

J.8.1. Front and rear. Bumper height shall provide proper ground clearance.

J.9. CRUISE CONTROL

J.9.1. Must be Standard OEM factory equipment.

J.10. DRIVER/Front PASSENGER DOOR

J.10.1. Standard OEM factory equipment.

J.11. PASSENGER DOORS

- J.11.1. The vehicle shall be equipped with manually operated single, left and right-side mounted (behind left and right-side front passenger doors) doors. (Sliding Doors Not Allowed)
- J.11.2. Doors must maintain seal to prevent the entrance of air, water and other elements.
- J.11.3. Doors must have a minimum opening of 36" and a minimum door clearance height of 56".
- J.11.4. The Ramp door shall be equipped with an interlock system
- J.11.5. The door must be capable of being opened from the inside of the vehicle.
- J.11.6. Passenger doors must be aligned correctly and able to open and close smoothly.

J.12. DOORS AND WINDOWS

- J.12.1. Shall have Power Windows and Power Door Locks:
 - J.12.1.1. Fit and finish standards must include that the doors and interior panels shall be painted or otherwise finished with a non-glare finish in order matching the other interior panels.

J.13. EMERGENCY EQUIPMENT

- J.13.1. All miscellaneous equipment must be secured to the vehicle and easily accessible.
- J.13.2. First aid kit: (24M – National Standard School Bus Metal)
 - J.13.2.1. Must be Certified Safety Mfg. Model S203-045 or equivalent.
- J.13.3. Fire extinguisher – Multi-purpose Stored Pressure Dry Chemical Extinguisher.
 - J.13.3.1. Must be a 5 lb. type 3A:40B: C Pro Line, Kiddie Model # FXBND9 or equivalent.
 - J.13.3.2. Must have a gauge to indicate state of charge and mounted to vehicle using a bracket and having a heavy duty vinyl cover.
- J.13.4. Triangle warning devices (3), with storage container.
 - J.13.4.1. must meet FMVSSP # 125
- J.13.5. Bloodborne Pathogens infection control kit.
 - J.13.5.1. Must be Certified Safety Mfg. Model #FK200-931, or equivalent.
- J.13.6. Seat belt cutter

J.14. ENGINE

- J.14.1. Minimum 4.6L liter V8 gasoline engine with electronic fuel injection and shall include: oil filter, air cleaner and heavy duty radiator capable of providing sufficient cooling capacity for the operation of all air conditioning equipment.
- J.14.2. Engines that are E-85 flexible fuel capable are preferred if available at no additional cost.
- J.14.3. Engine cooling system shall be protected with permanent type antifreeze to minus 20 degrees Fahrenheit.
- J.14.4. The Coolant used shall meet or exceed the engine manufacture's specification.
- J.14.5. A permanent label listing protection level shall be supplied and riveted or screwed to the close proximity to the radiator.
- J.14.6. Engine warning system with light indicated oil pressure below 6 psi and with a light to indicate water temperature above 210 degrees Fahrenheit.
- J.14.7. Engine shall meet the latest applicable emission control standards.

J.15. LIGHTING

- J.15.1. Must meet all ADA requirements as stated in the Federal Register, Part IV, Department of Transportation, 49 CFR Parts 27, 37 and 38, Transportation for Individuals with Disabilities; Final Rule, published Friday, September 6, 1991.
- J.15.2. Ramp area lighting shall illuminate automatically when door is opened.
- J.15.3. Adequate interior lighting shall be installed throughout which provides a minimum of two foot-candles at a seated level.
- J.15.4. Interior lighting fixtures shall be reasonably flush with the interior walls and ceiling to prevent a hazard to passengers.
- J.15.5. All lighting must be LED.

J.16. FRAME

- J.16.1.** Must have a fully boxed frame and tubed supportive cross members to provide additional frame stiffness and durability.
- J.16.2.** Frame must be coated with a rust inhibitor to increase longevity of vehicle.

J.17. BODY ASSEMBLY

- J.17.1.** Body assembly shall be the following.
- J.17.2.** Body shall be a Body on Frame Structure (Unibody Construction Not Allowed)
- J.17.3.** Body shall be made of Galvanized Steel.

J.18. SUB FLOOR

- J.18.1.** The interior floor shall be made of metal and provide a smooth surface for flooring attachment and to minimize interior noise.
- J.18.2.** The proper insulation should be used to prevent the exhaust from making the floor so hot that it would be uncomfortable for the passengers.

J.19. FLOOR COVERING MATERIAL

- J.19.1.** Shall be at minimum 3/16" thick continuous piece of fire retardant, nonskid transit-type flooring.
- J.19.2.** The floor covering shall be butt jointed and cemented to the floor with a waterproof adhesive in order to prevent bubbles and blisters which could create a safety hazard.
- J.19.3.** Mobility air restraint tracks and seat locks shall be beveled, with no sharp edges and will protrude no more than 1/4" above floor surface.

J.20. REAR AXLE

- J.20.1.** Minimum 3000 lbs. capacity or OEM maximum.
- J.20.2.** Shall be rear wheel drive with a 3.45 axle ratio.
- J.20.3.** Shall have an air self-leveling suspension system

J.21. FRONT AXLE

- J.21.1.** Minimum 3000 lbs. capacity or OEM maximum.

J.22. FUEL TANK

- J.22.1.** Largest available, but no less than 24 U.S. gallons.
- J.22.2.** Tank, fuel lines, and hardware must meet all current FMVSS, including FMVSS 301, as well as all current CARB and EPA requirements.
- J.22.3.** Fuel Tank shall include an easy access fuel pump cover in Body.
- J.22.4.** Tank shall be calibrated with the OEM dash fuel gauge.

J.23. GUAGES

- J.23.1.** Fuel, water-temperature, oil pressure, Voltmeter, speedometer, odometer and Tachometer.

J.24. HORN

- J.24.1.** Dual, electric

J.25. HEATER

- J.25.1.** Heavy-duty heater is required.
- J.25.2.** Shall be factory installed hot water type, of sufficient capacity to warm cabin area and clear windows of snow, ice and fog.
- J.25.3.** The water lines for the heater coil may be housed within the conduit used for the air conditioning refrigerant lines.
- J.25.4.** All lines and hoses shall be sufficiently fastened, protected, and insulated to ensure against wear from friction and the elements.
- J.25.5.** The lines must be mechanically attached, with OEM clamps, to the vehicle structure at no greater than 18 inch intervals and must be routed so as not to be exposed to wheel spray and not pass within 2 inches of any part of the exhaust system.

J.26. INTERIOR INSULATION

J.26.1. All side walls and areas around the windows shall be insulated and finished with matching trim and color.

J.26.2. Entire ceiling shall be insulated.

J.26.3. Insulation shall consist of a polystyrene composite and shall be nontoxic.

J.26.4. A polyurethane foam or honeycomb resin is also acceptable.

J.27. INTERIOR HEIGHT (at center)

J.27.1. Minimum 57 ½"

J.28. INTERIOR LENGTH

J.28.1. Overall interior floor length

J.28.2. Shall be a minimum of 81.5 ".

J.29. INTERIOR TRIM

J.29.1. Material and treatments shall be flame retardant to meet FMVSS 571.302 and be surface treated for efficient cleaning.

J.29.2. Panel fastening devices shall have smooth finishes without any unprotected sharp edges.

J.30. LAMPS

J.30.1. Automatic daytime running lamps, if available.

J.31. EXTERIOR MIRRORS

J.31.1. Left and Right folding power adjustable

J.31.2. Manual Folding

J.32. INTERIOR MIRROR

J.32.1. 10" automatic day/night rear view mirror.

J.33. FLOOR MATS

J.33.1. Must have Driver floor mat.

J.34. KEYS

J.34.1. Must have 3 sets of keys

J.35. OVERALL HEIGHT

J.35.1. Measured from front to highest point of vehicle.

J.35.2. Minimum 66", Maximum 83".

J.36. OVERALL LENGTH

J.36.1. Minimum of 195", Maximum 210"

J.37. OVERALL WIDTH-EXTERIOR

J.37.1. Maximum 80".

J.38. GROUND CLEARANCE

J.38.1. Minimum 6"

J.39. OVERALL WIDTH-INTERIOR

J.39.1. Minimum 64.5".

J.40. RADIATOR

J.40.1. Heavy-duty, with factory installed coolant recovery system.

J.40.2. Vehicle's cooling system must be winterized with ethylene glycol for temperature to 20 degrees F below zero.

J.41. REAR WINDOW

J.41.1. Defogger/defroster with wiper/washer

J.42. ROOF GUTTERS

J.42.1. Gutters shall be contoured into the roof design of vehicle.

J.43. DRIVER'S SEAT

J.43.1. Shall have a 6 way adjustable commercial driver seat.

J.44. FRONT PASSENGER SEAT AREA

J.44.1. The front passenger area must be dedicated for a wheel chair and meet all applicable ADA requirements.

J.45. REAR (3rd ROW) SEAT

J.45.1. Standard three (3) passenger capacity, all passenger seats shall be made of durable type materials that can be cleaned easily, fully padded for occupant comfort and retention.

J.45.1.1. All materials used in seats (including driver seat) shall comply with FMVSS burn resistance requirements.

J.45.1.2. All seat colors shall match the vehicle color and be aesthetically pleasing.

J.45.1.3. All seats will comply with FMVSS seat anchorage requirements.

J.45.1.4. The floor plan must comply with the current American with Disabilities Act standards such as axle width, knee room, etc.

J.46. SEAT BELTS

J.46.1. Passenger restraints (seat belts) shall be furnished for all passenger seating positions and for the driver.

J.46.2. Restraints shall consist of lap belts and/or shoulder seat belts.

J.46.3. Belts shall comply with FMVSS belt requirements and be of sufficient length for adults, and include two (2) Seat Belt Extensions.

J.46.4. There needs to be a commercial quality seat belt knife fastened to vehicle in driver's reach.

J.47. STEERING

J.47.1. Power assisted, with Tilt column

J.48. SUSPENSION

J.48.1. The vehicle shall have front and rear independent suspension system adequate to support the rated weight capacity of the individual axle.

J.48.2. Front Short Long Arm (SLA) suspension that provides a tight turning radius and a rack and pinion steering gear.

J.48.3. Rear suspension with steel leaf springs and air shocks to deliver a comfortable ride for all passengers.

J.49. TRANSMISSION

J.49.1. 4 speed minimum automatic including overdrive.

J.49.2. Transmission shall be capable of transmitting the torque and horsepower listed on the engine and have a transmission oil cooler.

J.50. UNDERCOATING

J.50.1. All exposed floor seams shall be sealed with an industrial grade butyl sealant or equivalent that conforms to ASTM C920.

J.50.2. The entire body and frame shall be tumbled rotated through a tank in which a high voltage electrical charge bonds a rust inhibitor necessary for rust and corrosion protection. And then baked in an oven to cure.

J.51. VEHICLE COLORS

J.51.1. Body: Vendor to supply list of colors and prices available.

J.51.2. Interior/Seats:

J.51.3. Gray Leatherette Seating Fabric

J.52. WARNING LIGHT

J.52.1. A warning light shall be in the driver's area, for the rear door, indicating "door ajar".

J.53. WARRANTY

J.53.1. Warranty must be as follows

J.53.2. A Bumper-to-Bumper Warranty 3 years or 36,000 miles

- J.53.3.** Vehicle shall have a 5 Year or 75,000 mile manufacture power train warranty.
- J.53.4.** 5 year or 100,000 mile Rust Through Warranty
- J.53.5.** Emissions warranty as mandated by Federal and State
- J.53.6.** Wheel Chair Ramp 5 years or 75,000 miles
- J.53.7.** These warranties shall begin on the date that vehicle delivery is accepted by the agency issuing the purchase order.

J.54. WHEEL BASE

- J.54.1.** Minimum of 122 inches.

J.55. WHEELS AND TIRES

- J.55.1.** Tire size must be compatible with each vehicle and must meet 6,600 lb. GVWR minimum.
- J.55.2.** Tires shall be steel-belted radial all season type tires.
- J.55.3.** Wheels shall be made of steel
- J.55.4.** Shall have full Wheel covers
- J.55.5.** Shall have an tire sealant and inflator kit included
- J.55.6.** Spare wheel and tire shall be of the same size as all the other wheels and shipped loose with vehicle

J.56. WHEELCHAIR ACCESSIBILITY SYMBOL

- J.56.1.** The international wheelchair accessibility symbol depicted on sign D9-6 in the "Manual of Uniform Traffic Control Devices" published by the federal Highway Administration shall be affixed to the outside of each vehicle on all four sides.
- J.56.2.** No vendor/dealer advertisements shall be on the symbols.
- J.56.3.** Symbols shall be between 3" and 4" in overall height.

J.57. WHEELCHAIR POSITIONS

- J.57.1.** 2 Wheelchair positions shall be provided as standard equipment: a center behind driver placement (straight in from the ramp entrance), and a right front passenger placement.
- J.57.2.** Multiple tie-down locations shall be provided to properly secure two wheelchairs as approved by the procuring agency.
- J.57.3.** The right front passenger placement should be located as far forward as possible.
- J.57.4.** This multiple tie-down configuration allows for up to two (2) wheelchair passengers or three (3) ambulatory passengers. Wheelchair positions must be forward facing.

J.58. WHEELCHAIR RAMP

- J.58.1.** Vehicle will be equipped with a manually deployed integrated ramp that stores under the floor.
- J.58.2.** The ramp shall have a minimum usable width of 30" and slope meeting the requirements of ADA, 49 CFR.
- J.58.3.** The ramp surface shall be continuous, with the surface being either expanded or solid metal. If solid metal, it shall be covered with (Armstrong Crosswalk, or equivalent) slip-retardant flooring.
- J.58.4.** The surfaces of the boarding edge of the ramp and door threshold shall have a bright yellow finish running the full surface, in order to contrast with the finish on the rest of the ramp.
- J.58.5.** Vinyl tape is not acceptable.
- J.58.6.** Ramp shall have a rated capacity of 1200 lbs. with a safety factor of at least three (3) based on the ultimate strength of the material.
- J.58.7.** Each side of the ramp shall have protective barriers at least two (2) inches high to prevent mobility aids from rolling off of the ramp edge and must have yellow tape on them.
- J.58.8.** Ramp must meet all ADA requirements as set out in the Federal Register, Part IV Department of Transportation, 49 CFR Parts 27, 37 and 38, Transportation for Individuals with Disabilities; Final Rule, published Friday, September 6, 1991.

J.59. WHEELCHAIR SECUREMENTS SYSTEM

- J.59.1.** The securement system shall be, Q'Straint QRT MAX Automatic Retractor System Q-8309-L with L-Track anchorage system and J-Hooks, or equivalent.

- J.59.1.1.** They must be fully assembled and ready to use.
- J.59.1.2.** Shall include securement pouches store wheelchair securement tie-downs.
- J.59.1.3.** Shall include four (4) Q5-7580 Webbing Loops for Securing Scooters. Belt system shall be of sufficient length to accommodate a motorized wheelchair.
- J.59.1.4.** A minimum of two tracks, (pads), each of sufficient length for proper attachment and positioning of the belts, shall be placed parallel to each other and perpendicular to the direction in which the wheelchair faces.
- J.59.1.5.** The anchors must be bolted to structural steel.
- J.59.1.6.** The tracks shall be securely mounted to the vehicle, flush from the floor and ramps, to insure that the track will not pull away from the van floor or shift position under anticipated loads.
- J.59.1.7.** Any tracks overlapping the access path must be recessed into the floor to prevent passengers from tripping.
- J.59.1.8.** All attachment hardware and anchorages shall meet or exceed the 30 mph/20 Impact Test criteria per SAE J2249, 36 CFR Part 1192 and CFR Part 38, and all applicable Federal Motor Vehicle Safety Standards, as amended.

J.60. WHEELCHAIR OCCUPANT RESTRAINT

- J.60.1.** The wheelchair occupant restraint system shall be Q'Straint Q8-6325 or equivalent.
 - J.60.1.1.** Shall have a standard manual lap/shoulder belt combo or equivalent to.
 - J.60.1.2.** That meets SAE J2249 and ADA requirements.
 - J.60.1.3.** The L tracks must be bolted to structural steel.
- J.60.2.** Price proposed should be for 2 sets of wheelchair restraints (which would cover both wheelchair placements).
- J.60.3.** VENDOR WILL SUPPLY WRITTEN OR VIDEO INSTRUCTIONS ON THE USE OF THE RESTRAINT SYSTEM.

J.61. WINDOWS

- J.61.1.** Factory tinted safety glass all around, (1) window on each side capable of being opened.
- J.61.2.** Shall be at least 30% smoked glass windows throughout passenger area that is be factory installed.
- J.61.3.** After market add on films is not acceptable.
- J.61.4.** All windows and emergency exits shall meet the performance and operational requirements as outlined in the Federal Motor Vehicle Safety Standards and Procedures.

J.62. WINDSHIELD

- J.62.1.** Tinted safety glass.

J.63. WINDSHIELD WASHER

- J.63.1.** Windshield washer must be protected with winter-strength solution.

J.64. WIPERS

- J.64.1.** Must have an intermittent wiper system.

J.65. WIRING

- J.65.1.** Schematic of wiring shall be included with the vehicle at the time of delivery.
- J.65.2.** Each vehicle shall have a 12-volt electrical charging system as supplied from the OEM.
- J.65.3.** All electrical wiring shall be automotive stranded copper, of sufficient gauge to handle the load, color-coded to match the OEM.
- J.65.4.** All harnesses will be secured to the frame/body at a maximum of two feet intervals with insulated clamps.
- J.65.5.** All exposed terminals and wiring shall be protected from the elements using sealed terminals or heat shrink where necessary. Exposed wires will be wrapped or loomed in corrosion/moisture-resistant material.
- J.65.6.** Must be continuous wiring with OEM type pin connectors at harness connections, butt connectors are not allowed.

J.66. MISCELLANEOUS TECHNICAL SPECIFICATIONS

- J.66.1.** There shall be no sharp corners on the unit. All corners shall be slightly rounded and filed smooth.
- J.66.2.**

- J.66.3.** All weld joints shall have been cleaned, primed, be free of slag intrusions, undercut, roll, blow holes, craters and porosity.
- J.66.4.** Welds shall be properly fused, of ample penetration and smoothly finished on exposed surfaces.
- J.66.5.** Sheet metal fit-up must be properly executed and concealed by a finish-coat of paint.
- J.66.6.** Finish and all glass must be free of any defects due to welding, welding slag, heat, warp age, or assembly damage.
- J.66.7.**
- J.66.8.** All materials installed shall be new and free of rust.
- J.66.9.**
- J.66.10.** No wires shall be visible on the exterior or interior of the unit.

J.67. DELIVERY

- J.67.1.** Vehicle must be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following:
 - J.67.1.1.** The vehicle must have a full tank of fuel when delivered.
 - J.67.1.2.** Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
 - J.67.1.3.** All parts added, as part of the modification process shall be new.
 - J.67.1.4.** Headlights properly aligned
 - J.67.1.5.** Engine Tuned
 - J.67.1.6.** All accessories properly adjusted
 - J.67.1.7.** Electrical, braking and suspension systems inspected
 - J.67.1.8.** Both batteries Charged
 - J.67.1.9.** Front-end alignment must be done after body is put on chassis. Chamber, caster and toe must be adjusted to the center of OEM specs. Ford chassis buses must have adjustable caster, camber bushings installed. Standard OEM bushings will not be accepted. Each bus must come with documentation stating before and after actual alignment readings of bus.
 - J.67.1.10.** All wheels balanced, including spare
 - J.67.1.11.** All lubricants checked, and greased if needed
 - J.67.1.12.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
 - J.67.1.13.** Warranty papers and owner's guide
 - J.67.1.14.** Exterior and interior cleaned and washed.
 - J.67.1.15.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.
 - J.67.1.16.** Under no circumstances are tow vehicles to be attached to any buses.
 - J.67.1.17.** Each vehicle must be delivered to the agency submitting the P.O.
 - J.67.1.18.** Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order **five** business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery is **not acceptable**.
 - J.67.1.19.** Vendor shall notify buyer of vehicle delivery **ten** business days prior.

J.68. ALTOONA TESTING

- J.68.1.** Proposal must include a copy of Altoona Test Report for this vehicle if applicable.

J.69. VEHICLE TESTING

- J.69.1.** Certification shall be provided that in accordance with 49 CFR part 665, Bus Testing, the vehicle either does not need to be tested (with justification specified for exemption) or has been tested at the bus testing facility and a test report is included.

J.70. INFORMATION TO BE FURNISHED WITH EACH VEHICLE

J.70.1. MANUALS

J.70.1.1. Must include OEM Repair service manuals and wiring diagram manual for the chassis. And as built wiring diagram and parts manual for body and for all auxiliary equipment.

J.70.1.2. Maintenance and inspection schedule incorporating the required maintenance and inspection of the basic vehicle and its sub-systems.

J.70.1.3. Operator's manual for vehicle and all add-on equipment.

J.70.1.4. Warranty papers for chassis, body, and additional equipment.

J.70.2. PRE-AWARD AUDIT

J.70.2.1. A Pre-Award Audit shall be conducted to determine if the proposal meets specifications. The Supplier shall submit documents, which include certification of the manufacturer's compliance with the Federal Transit Administration (FTA) Pre-Award Buy America Audit Requirements. The document submitted shall include the following information for each major component used on vehicle:

J.70.2.2. Name and address of each supplier.

J.70.2.3. Cost of each major component and subcomponent. In order to protect proprietary information, the document may reflect the percentage of total cost each item represents instead of the actual cost.

J.70.2.4. Country of origin of each major component and subcomponent.

J.70.2.5. Name and address of company where final assembly occurs.

J.70.2.6. Cost of final assembly

J.70.2.7. Signature of authorized representative of vehicle manufacturer.

J.70.2.8. Once the preceding steps have been completed, the contract shall be awarded.

J.70.3. POST- DELIVERY AUDIT

J.70.3.1. A Post Delivery Audit of the vehicle(s) shall be conducted at the purchaser's facility, to determine that the completed vehicle(s) meets specifications. Once this process has been satisfactorily completed, the vehicle(s) shall be considered acceptable.

J.70.4. ACCESSIBILITY REQUIREMENTS

J.70.5. When submitting a Proposal for an accessible vehicle for the disabled, the vendor shall provide a list of the vehicle related equipment illustrating the component cost and related installation charges. The purpose of this list is to reflect an accurate cost for those vehicle related items, which are required to make the vehicle accessible to the disabled.

J.71. OPTIONAL ITEMS

J.71.1. Must be installed by vendor or factory before delivery

J.71.1.1. CNG

J.71.1.1.1. Unique CNG fuel system option designed and factory-installed, not an aftermarket conversion.

J.71.1.1.2. Estimated 290-mile CNG range (which includes a 40-mile low-level indicator).

J.71.1.1.3. Three Type-3 CNG tanks integrated seamlessly into the vehicle design and factory-installed.

J.71.1.1.4. 21.1 Gasoline Gallon Equivalent (GGE).

J.71.1.1.5. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional control module will be accepted.

J.71.1.1.6. Closed-loop fuel control

J.71.1.1.7. Sequential fuel injection (SFI)

J.71.1.1.8. Optimized ignition timing

J.71.1.1.9. Must maintain original fault codes (DTCs)

J.71.1.1.10. Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner

J.71.1.1.11. CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.

J.71.1.1.12. The Minimum CNG Type III tank with a capacity of 21 Gasoline Gallon Equivalent. (gge)

J.71.1.1.13. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture

J.71.2. POWER RAMP

J.71.2.1. Telescoping Power Ramp (meets ADA/CSA guidelines).

J.71.2.2. Anti-Slip Ramp Surface.

J.71.2.3. Two deployment settings: 4.4:1 Short Deploy Slope & 6.0:1 Long Deploy Slope.

J.71.2.4. Ramp Lighting.

J.71.3. TWO-WAY RADIO SYSTEM UHF

J.71.3.1. ICOM F6021 UHF two-way Radio System with a PCTELMUF4505 UHF antenna and coax or approved equal.

J.71.3.2. Antenna shall be mounted on Roof.

J.71.3.3. Radio must be mounted in an easy accessible location for the driver.

J.71.3.4. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

J.71.4. TWO-WAY RADIO SYSTEM

J.71.4.1. ICOM F5021 VHF two-way Radio System with a PCTEL MHB5800 VHF antenna and coax or approved equal.

J.71.4.2. Antenna shall be mounted on Roof.

J.71.4.3. Radio must be mounted in an easy accessible location for the driver.

J.71.4.4. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

J.71.5. TWO-WAY RADIO SYSTEM

J.71.5.1. Kenwood NX-900K 800 MHz two-way Radio System with a PCTEL MUF8003 antenna and coax or approved equal.

J.71.5.2. Antenna shall be mounted on Roof.

J.71.5.3. Radio must be mounted in an easy accessible location for the driver.

J.71.5.4. Radio must be programmed with the correct Frequencies and the antenna tuned for agency issuing this purchase.

J.71.6. FOLDING JUMP SEAT

J.71.6.1. A rear facing folding jump seat behind driver's seat for additional passenger.

J.71.7. AUXILLARY A/C UNIT

J.71.7.1. An additional A/C unit to help with the cooling of the interior of the vehicle.

SECTION “J”

Low Floor, Purpose Built Paratransit Vehicle

RESPONSE SHEET

BASE VEHICLE COST PER UNIT

BASE VEHICLE	COST PER UNIT
	\$

LIST OPTIONAL ITEMS COST

OPTIONAL ITEMS	COST PER ITEM
CNG	
POWER RAMP	
TWO-WAY RADIO (UHF)	
TWO-WAY RADIO (VHF)	
TWO-WAY RADIO (800 MZ)	
FOLDING JUMP SEAT	
AUXILLARY A/C UNIT	

A LIST OF OPTIONAL EQUIPMENT AND/OR ACCESSORIES SHALLE BE PROVIDED. THE LIST MUST CONTAIN:

- Item
- Description and functionality detail
- Cost of item installed in final delivery of vehicle
- Any changes to listed specifications as outlined above to accommodate options

PROPOSAL EXCEPTIONS

Supplier must list any exceptions here to be used as a part of the Proposal evaluation and analysis. Please list the roman numerical on the standard specs or the number for the options when listing any Proposal exceptions.

K. SOLICITATION SPECIFICATIONS FOR LOW FLOOR, PARATRANSIT CUTAWAY BUS

K.1. SPECIFICATIONS FOR LOW FLOOR PARATRANSIT CUTAWAY WITH WHEEL CHAIR RAMP

- K.1.1.** The bus will be of a "Steel Cage" type construction with FRP Composite Skin laminated to a moisture resistant (less than 1%) substrate (not Luan) attached to the steel cage with urethane adhesive. The roof will consist of a single piece FRP skin laminated to the substrate and roof steel with urethane adhesive. The bus body is constructed of welded walls, sub floor, roof framing, and rear steel structure which are bonded and bolted together, forming an integrated steel cage around the passenger area. The steel structure of the walls must extend below the floor level and continue to the lowest part of the bus. Separate skirting that only serves a decorative purpose is not allowed; every part of the sidewall must have the steel cage structure behind the exterior skin. Construction methods utilizing a matrix of honeycomb composite will not be acceptable.
- K.1.2.** Unless otherwise specified, all units shall be furnished complete with standard equipment and factory-installed accessories as listed in the manufacturer's literature for the models specified herein. The following items are minimum requirements and shall be provided whether shown as optional or standard equipment by the manufacturer.

K.2. BUMPERS

- K.2.1.** Chassis manufacturer's standard front chrome bumper and vehicle manufactured standard rear bumper. Rear bumper must be of sufficient strength to allow the vehicle to be pushed without damage.

K.3. ELECTRICAL

- K.3.1.** Electrical box for the bus body shall be located inside above the driver in a compartment with a door. Fuse, relay and component location will be labeled on the inside of this door.
- K.3.2.** Automotive type fuses are required.
- K.3.3.** Wiring needs to be color coded, and labeled for function every 12" and meet all the requirements of the Society of Automotive Engineers (SAE Standards).
- K.3.4.** All body component circuits shall be protected in convoluted split loom tubing for protection and tied/anchored a minimum every 16".
- K.3.5.** The bus will be equipped and labeled with extra fuse protected circuits for the use of the customer.(minimum of 4 extra circuits). Fuses to be located in electrical box described in section 15.1 All exterior loomed wire harnesses shall have waterproof connectors and sprayed with corrosion resistance spray.
- K.3.6.** Rotary battery disconnect switch located near the driver.
- K.3.7.** Wired for 2 way radio with a minimum 6"X6" metal ground plane for the antenna. Motorola radio CDM1250, or approved equal, with low profile wing type antenna and ground plane shall be installed and preprogrammed with customer supplied frequencies.
- K.3.8.** A wiring diagram, "As Built" is required. The wiring diagram should indicate schematics and wire color, gauge, and location. There should be separate diagrams for each system ie. Doors, heaters, lights etc. A master wiring diagram will also be included of the complete wiring system added to the chassis. An example of the wiring diagrams will need to be included with the Proposal.
- K.3.9.** A minimum of 200 ampere alternators shall be provided. KEI or approved equal.
- K.3.10.** Chassis manufacturer supplied batteries shall be mounted on a stainless steel roller mounted pull out tray with battery hold down secured with bolts. Inside of compartment should be covered with a durable insulating material to prevent shorts. Battery compartment should be vented and the battery shall be easily serviceable without removal from battery tray.
- K.3.11.** All wiring other than that provided with the OEM chassis shall be number and function coded every 6 inches and shall be color coded. The body manufacturer shall furnish a complete wiring diagram with integrated body and chassis marked to show the codes used.
- K.3.12.** Intermotive Gateway or approved equal idle with manual switch, volt sensor and light shall be installed. Solenoid is to automatically shut off when transmission is in gear or brake is applied.

K.4. LIGHTING

- K.4.1.** Overhead entrance and step well lights shall be Light Emitting Diode (LED) and provide no less than five foot-candles of illumination on the entrance step area with the door open. This system shall be illuminated automatically when the door is open. Overhead and step well lights shall be wired to and activated automatically by door control and by a separate dash mounted switch.
- K.4.2.** All exterior lights, with the exception of headlights, passenger entry door, lift door, curb light, and rear back-up lights shall be Light Emitting Diode (LED) lights. Lighting shall be in accordance with Federal Motor Carrier Safety Regulations 393.12. All lights shall have wire long enough to move the light at least six inches (6") from vehicle for

service. Lights shall be grounded to body framing structure. All lights shall be sealed from moisture. Marker lights shall be armored, surface mounted. Center brake light shall be furnished.

K.5. AIR CONDITIONING

K.5.1. In addition to the OEM chassis A/C system, the installed auxiliary air conditioning system shall be a minimum 75,000 BTU rated. Unit shall be a model TC70 by American Climate Controls or approved equal.

K.5.2. Compressors:

K.5.2.1. A chassis OEM supplied compressor and an engine mounted TM-21 or larger compressor shall be provided. Each unit shall have a nominal ten (10) cubic-inch displacement, and is to be belt driven off of the vehicle's engine. The compressors are to be equipped with an electro-magnetic clutch controlling each of the system's (2) thermostats.

K.6. HEATING AND DEFROSTING

K.6.1. A rear hot water heater with blower fan shall have a minimum BTU rating of sixty five thousand (65,000) and shall be installed under a seat near the rear of the vehicle. The controls shall be readily accessible to the driver. Heater hose connections shall be installed above the floor of the vehicle body and through the fire wall to the engine compartment. Easily accessible all brass gate valve(s) shall be furnished to cut off the flow of coolant water to the rear heater.

K.7. SAFETY EQUIPMENT

K.7.1. First Aid Kit; 64 unit

K.7.2. Fire Extinguisher; One 5-pound dry type (BC rated), securely mounted near the driver's seat.

K.7.3. Reflectors; Three folding triangle reflectors with storage container(s).

K.7.4. Back up Alarm; Meeting the requirements of SAE J994B or the latest revision thereto.

K.7.5. Fresnel Lens; provided on the rear window of the vehicle.

K.7.6. Seat belt cutter

K.8. MIRRORS

K.8.1. Exterior; Rearview mirror, manufacturer's exterior low mount type with extension arms (below eye level) wide view type mirror. Mirror shall be a minimum of 6 inches by 9 inches. Additionally minimum 5-inch convex mirrors to be mounted with brackets on top of the main mirrors on the left and right sides. Mirrors are to be Velvac model 2020 XG or approved equal

K.8.2. Interior; Day/night type, conforming to FMVSS No. 111 and affording a good view of the road to the rear as well as the passenger area. The mirror(s) shall be made of safety glass, having rounded corners and protective edges. If more than one interior mirror is installed, at least one of the mirrors shall have a minimum of 90 square inch of clear vision, reflective surface area.

K.8.3. Passenger Mirror; an additional minimum 6-inch by 10-inch interior mirror shall be furnished for the driver to view the passengers.

K.8.4. OE Compliant mirror (tested for vibrations, door slams, UV testing, Salt spray testing, Thermal testing (temperatures of -40F to 212F) and shell load test (holds 225 lbs. max. load).

K.8.5. Die Cast Aluminum construction (durability).

K.8.6. Powder Coating (No rust/corrosion with this type of coating).

K.8.7. No exposed fasteners weld spots or wires (weld spots and fasteners can create corrosion areas over time due to inclement weather and the wires run internal through arm for heated/remote upgrade option to mirror).

K.8.8. Replaceable parts which include flat glass and convex glass mirrors that is cost effective rather than replacing complete head mount.

K.8.9. Spring detent with adjustable home position arm (arm folds either forward or backwards to allow buses to go through bus washes and park close together in bus yards). This arm would also move if hit from either direction and fold rather than cause damage to mount or body of bus.

K.9. WINDOWS

K.9.1. One Double T – Slider window on each side of the bus will be standard. Option of all T slider windows is available.

K.9.2. Passenger windows shall be a minimum 18 ½", 36" or 45" wide and 36" high (body length will dictate sizes).

K.9.3. Egress windows shall be provided in sufficient numbers and labeled to meet FMVSS and state requirements (23 ½" x 60") minimum. A minimum of one on each side and the rear is required.

- K.9.4.** Side windows to be provided the full length of the vehicle. If the windows are transit type T-slider windows they shall be equipped with emergency release latches to provide emergency exits. Release instructions shall be provided at or near the release handles and an audible alarm shall be activated when any handle is released. Side windows, rear window(s) and glass in passenger entrance door shall be of uniform dark tint sufficient to permit no more than 31% light transmission. Tinted film is not acceptable.

K.10. PASSENGER SEATS AND DRIVER'S SEAT

- K.10.1.** All seating installed in this vehicle shall be in compliance with FMVSS 207 (Seating System) and any associated seat belt assemblies shall be in compliance with FMVSS 209, 210 (Seat Belt Assembly, Seat Belt Assembly Anchorage's). Testing of the seats must have been performed in the bus. A level 5 fabric must be used.

K.10.1.1. Freedman featherweight or approved equal mid high seats shall be provided with top mounted grab rails and flip up arm rests on all aisle seats. Seats shall be covered with a durable level 5 cloth with antimicrobial properties and that is impervious to liquids.

K.10.1.2. All passenger seats shall be equipped with Under Seat Retractable seat belts manufactured by Freedman Seating or approved equal.

K.10.1.3. Minimum Aisle: 18" Standard; (Optional wider seats will decrease aisle width).

K.10.1.4. Seating quantity shall be determined by the floor plan selected.

K.10.1.5. Driver's seat shall be a USSC G2E mounted to a 6-way power seat base.

K.10.1.6. All materials used in seats (including driver seat) shall comply with FMVSS burn resistance requirements

K.11. BODY CONSTRUCTION SIDE WALL AND REAR WALL CONSTRUCTION

- K.11.1.** Bus shall have successfully completes FMVSS214 Side Impact Protection testing.

K.11.2. Sides and roof shall be constructed of fiberglass panels. Roof shall be of sufficient height to provide at least 76 inches headroom at the center aisle. Headroom may be reduced slightly in some areas of the vehicle to accommodate other specified equipment such as air conditioner components and the normal contour of the roof. The structure shall be watertight and shall meet the requirements of Federal Safety Standards as to school bus rollover protection, No. 220, as well as FMVSS 214 Side Impact Protection

K.11.3. There is one 1 ½" X 1 ½" horizontal 16 gauge steel tube below the window line and one 1 ½" X 2 ½" 14 gauge tube at the floor level, or approved equal. There is one 1 ½" X 1 ½" horizontal 16 gauge steel tube at the top sidewall forming the top edge of the wall, or approved equal Steel structure must extend to or below the floor level to the lowest point in the sidewall, or approved equal.

K.11.4. Vertical steel 16 gauge square tubing nominal dimensions 1 ½" X 1 ½". Vertical steel ribs consist of one (1) 1 ½" X 2" 16 gauge steel spaced at the sides of each window opening, or approved equal.

K.11.5. Two (2) 1½" X 1½" 16 gauge steel tubes are required at the front of the sidewall to form the front & rear of the door opening. One (1) 1 ½" X 1 ½" 16 gauge steel tube is welded vertically at the midpoint of each window with a width greater than 24 inches connecting the horizontal tube welded below the window line and the horizontal tube that is welded at the floor line, or approved equal.

K.11.6. Horizontal steel tubes are welded to the vertical steel tubes. The entire steel structure must be bonded and bolted together with Sikaflex 252 or Locktite H8600 adhesive and have a full E-Coat corrosion protection to prevent rust/corrosion.

K.11.7. Exterior skin is FRP composite skin laminated to a moisture resistant (less than 1% absorption) substrate (not Luan) attached to the steel cage with urethane adhesive.

K.11.8. No wood or Luan is permitted in the sidewalls or rear end wall of the bus. Laminated constructions with Luan or other wood materials are not allowed as they can lead to corrosion of the skin due to the wicking of moisture into the wood material.

K.11.9. Rear of the bus shall have vacuum formed caps bonded to a FRP Composite Skin laminated to a moisture resistant (less than 1% absorption) substrate (not Luan) attached to the steel cage with urethane adhesive or a full Fiberglass panel. The LED lights shall be mounted to the vacuum formed or Fiberglass caps.

K.12. ROOF LINER

- K.12.1.** The roof liner shall be of molded fiberglass installed the full length so as to cover all protrusions.

K.13. STANCHIONS, GRAB RAILS, AND MODESTY PANELS

- K.13.1.** Vertical stanchions shall be provided at the aisle immediately behind the driver's seat and the step well; a horizontal grab rail shall extend from the wall to each stanchion. A modesty panel shall be attached to the stanchion behind the step well.

- K.13.2.** A smoked three eighths inch (3/8") thick panel Plexiglas panel shall be provided behind the driver's seat. Panels shall extend from the top of the horizontal grab rail to the ceiling and shall extend from the wall to the vertical stanchion. Stanchion and panel shall not impair driver's seat adjustment
- K.13.3.** An overhead handrail shall be installed in the roof of the vehicle on the driver and curb side and shall run the length of the seating area.

K.14. PASSENGER AND WHEELCHAIR RAMP DOOR

- K.14.1.** Passenger entrance door shall be a transit type, and shall have a minimum horizontal opening of approximately 35 inches and a minimum vertical opening of approximately 75 inches. The door shall be operated from controls at or near the vehicle driver's seated position. The door shall be automatically operated by pressing a switch on the driver's console, and shall be designed to allow manual opening in case of an emergency. The entry ramp shall be designed so that the top of the first step is no more than 10.5 inches above the ground with the vehicle unloaded and bus fully kneeled. The entry ramp shall have a non-skid material applied.
- K.14.2.** The passenger entry door shall be angled at 12.5° so that wheel chairs need only to be turned 77.5° to proceed down the aisle. The forward most door jamb (right side when entering bus) shall be in line with the driver to minimize driver head turn to view entry way. Doorways positioned behind the driver are not acceptable.

K.15. AIR SUSPENSION WITH KNEELING

- K.15.1.** The bus shall be of the Low Floor type with air suspension both front and rear, and shall have a kneeling feature to lower the bus to meet 1:6 angle when ramp is deployed.
- K.15.2.** All chassis shall be equipped with Air Suspension System supplied with two electric compressors.
- K.15.3.** The pump pressurizes air and stores it in a tank for use in the air springs while the vehicle is operational. If the vehicle is not operated for an extended period of time, the springs will gradually decrease pressure as the compressed air escapes to the atmosphere. Once the vehicle is powered up the suspension controller will level the vehicle automatically.
- K.15.4.** System is equipped with a suspension status LED and buzzer which will flash at 1Hz to indicate an error in the system.
- K.15.5.** When stopping for non-wheelchair passengers, operators may choose to maintain the vehicle at its normal ride height condition by keeping the kneel switch in the off position.
- K.15.6.** When Kneel switch is on, the kneel sequence shall be follows:
 - K.15.6.1.** Driver pulls into position, places the vehicle transmission shifter in the park position, and engages the emergency brake.
 - K.15.6.2.** Driver opens door by pressing and holding open door switch until door is fully opened.
 - K.15.6.3.** Door open limit switch sends signal to the suspension controller to kneel the front.
 - K.15.6.4.** The front of the vehicle kneels.
 - K.15.6.5.** Driver then deploys the ramp by pressing/holding ramp deploy switch until ramp is fully deployed.
 - K.15.6.6.** Ramp deploy switch sends a signal to the suspension controller to fully kneel the vehicle.
 - K.15.6.7.** Full kneel drops the vehicle to meet 1:6 angle.
 - K.15.6.8.** Once the ramp is stowed and the door is closed the suspension controller will raise the vehicle to the normal ride height.

K.16. WHEELCHAIR RAMP

- K.16.1.** The wheelchair ramp shall comply with all Federal ADA requirements.
- K.16.2.** The ramp shall be a power ramp that is designed to let wheelchair passengers enter the bus unassisted once the ramp is deployed. Ramps shall be rated at 800# minimum and have 34 inches clear width. Ramp length shall be 62 inches minimum. The use of exposed chains is not allowed.

K.17. WHEELCHAIR SECUREMENT AND SEATBELTS

- K.17.1.** The vehicle shall have forward facing wheelchair positions per the attached floor plan. Each wheelchair position shall be provided with restraint devices that will secure the wheelchair and its passenger while in the wheelchair. These devices shall be adjustable to accommodate varying track widths of wheelchairs. Each wheelchair shall have a four (4) point securement (2 front, 2 back) in the vehicle with recessed anchor points of sufficient strength to secure a wheelchair and/or three wheel scooter. The entire securement system shall comply with all applicable regulations including ADA.

- K.17.2.** Floor mounted pucks shall be used to secure the restraint devices. The pucks shall be recessed mounted in the floor with three-eighths inch (3/8") diameter, SAE Grade 5 bolts, washers and self-locking nuts with National Fine Threads.
- K.17.3.** There shall be four (4) retractors assemblies for each wheelchair position in the vehicle to secure the wheelchair to the tracks. Example: Q' Strain QRT Deluxe (Q-8100-A1) System, or approved equal. Each retractor assembly shall consist of a heavy duty series "L" track fitting, the front left and right retractor shall be equipped with manual tension knobs for manual tightening and/or release. Each retractor assembly shall be equipped with a quick release, push-button buckle and buckle connector.
- K.17.4.** Two (2) seat belts shall be provided for each wheelchair passenger. The torso belts shall be two inches (2") wide, seventy-two inches (72") long, adjustable, with a strength rating of not less than three thousand pounds (3,000 lbs.). One end of the belt shall be secured to a female seat belt fitting and the other end shall have a male seat belt fitting. The seat belt assembly shall provide for a quick-release and also provide for a snap locking to connect both ends together.
- K.17.5.** A wall mounted height adjustable of approximately twelve inches (12") shoulder harness system shall be provided at each wheelchair securement location that is compatible with the specified restraints. The harness system shall be installed in accordance with all structural requirements established by the restraint supplier and all applicable regulations, including 49 CFR part 571.
- K.17.6.** All belts, straps, and harness assemblies in bundled sets and shall include a container in which to store them. Storage compartments shall be provided over the windshield and over the driver's door.

K.18. EMERGENCY EXITS

- K.18.1.** Emergency egress points shall be provided on both sides and the rear of the vehicle as required by applicable Federal Motor Vehicle Safety Standards.

K.19. ROOF, FLOOR AND FLOOR COVERING

K.19.1. Floor:

- K.19.1.1.** Steel sub floor cross members shall be 2" X 2", 14 Gauge steel tubing and coated to prevent rust and corrosion.
- K.19.1.2.** Body is mounted directly over the chassis frame to provide an integrated body chassis mounting, or approved equal.
- K.19.1.3.** Flooring shall be 5/8" thick single piece, engineered wood with moisture barrier laminated to upper surface, with moisture sealed edges. The underside of the flooring shall be sprayed with a Poly-Urea coating (material thickness of 40 mils), or approved equal.
- K.19.1.4.** A sealant shall be installed in body to floor corners to provide a water tight seal as an aid in floor cleaning. Interior floor/lower side wall covering shall be seamless sprayed-in Poly-Urea coating (material thickness of 50 mils), for durability and which will allow the floor to be cleaned with a hose if desired, or approved equal.
- K.19.1.5.** The floor will also cover the area around the ramp (but not the ramp platform itself). The cab floor shall be the General Motors OEM or approved equal insulated floor covering. Floor will have a removable fuel tank access panel for easy access to fuel pump and fuel gauge sending unit.
- K.19.1.6.** Steel 1 1/2" x 1 1/2", 18 gauge, (minimum) square tubing bent to the radius of the roof is required, or approved equal. Roof bows must be bent square steel tubing. All roof cross members shall be a minimum 18 gauge steel, (minimum) spaced no more than 24" apart or two (2) 1 1/2" X 1 1/2" tubing welded together. One (1) 1 1/2" X 1 1/2" tube installed to form the center longitudinal members front to rear of roof structure.
- K.19.1.7.** The outer edge of the roof structure shall consist of one (1) 1 1/2" X 1 1/2", 18 gauge (minimum) steel tube running the length of the roof welded to the roof bow steel tubes and bonded with Sikaflex 252, Loctite H8600 or equivalent and four (4) weld studs to the 1 1/2" X 1 1/2" steel tube that forms the top of the sidewall structure.
- K.19.1.8.** Exterior roof surface shall be Fiberglas, in a single piece that extends across the roof from rain gutter to rain gutter. The roof surface base material will be attached to the roof bows using urethane adhesive.
- K.19.1.9.** Seams are allowed only at the junction of the front cap and the junction of the rear cap. Any other seams on the exterior of the roof are not permitted.

K.20. PAINTING

- K.20.1.** Exterior surfaces normally painted shall be thoroughly degreased, primed, and painted solid white. The base vehicle shall be Bright White in color. The area around the passenger windows shall be black.

K.20.2. All sections of the steel body cage are to be Electro-coated (Cathodic E-coating to 1500 hour salt spray test) after fabrication, prior to final assembly. Galvanized steel with "Gatorshield" is acceptable.

K.21. ADDITIONAL EQUIPMENT REQUIRED

K.21.1. Stainless Steel wheel inserts for front and rear.

K.21.2. Valve stem extensions for rear dual wheels with a tire equalization system installed.

K.21.3. All stainless steel grab rails and stanchion poles shall be powder coated yellow.

K.21.4. Energy absorbing rear bumper – Romeo Rim or approved equal.

K.21.5. AM/FM/CD radio – chassis OEM

K.22. DELIVERY

K.22.1. Vehicle must be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following:

K.22.1.1. The vehicle must have a full tank of fuel when delivered.

K.22.1.2. Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.

K.22.1.3. All parts added, as part of the modification process shall be new.

K.22.1.4. Headlights properly aligned

K.22.1.5. Engine Tuned

K.22.1.6. All accessories properly adjusted

K.22.1.7. Electrical, braking and suspension systems inspected

K.22.1.8. Both batteries Charged

K.22.1.9. Front-end aligned, all wheels balanced, including spare

K.22.1.10. All lubricants checked, and greased if needed

K.22.1.11. Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).

K.22.1.12. Warranty papers and owner's guide

K.22.1.13. Exterior and interior cleaned and washed.

K.22.1.14. Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.

K.22.1.15. Under no circumstances are tow vehicles to be attached to any buses.

K.22.1.16. Each vehicle must be delivered to the agency submitting the P.O.

K.23. CERTIFICATE OF ORIGINS

K.23.1. Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order five business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery is not acceptable.

K.23.2. Vendor shall notify buyer of vehicle delivery ten business days prior.

K.23.3. NOTE: If these specifications contradict any listed in the Federal Regulations, they are superseded by those of the Federal Regulations.

K.24. MANUALS

K.24.1. A line setting sheet and manual(s) containing operating and servicing instructions for the vehicle shall be provided with each unit. The manual(s) shall be as detailed as possible outlining all necessary operating and servicing instructions for each vehicle including the vehicle's driveline components. Necessary warnings and safety precautions shall be included. In addition, manual(s) containing illustrated parts lists, operating and servicing instructions for related and special equipment supplied with the vehicle shall be provided with the unit.

K.25. WARRANTY

- K.25.1.** The manufacturer of this vehicle will provide a warranty of 3 years or 36,000 miles parts and labor. The body structure shall be warranted for a period of five (5) years and 100,000 miles.
- K.25.2.** The major subcomponents, including but not limited to, the Wheelchair Ramp, the Wheelchair Tie Downs, and the optional rear Air Conditioning Systems are warranted by the manufacturer of that component. Detailed warranty coverage shall be provided with each bus. The Electric Air Ride Systems are warranted for 3 years and 100,000 miles, minimum.
- K.25.3.** The Electrical System will be warranted for a minimum of 3 Years or 36,000 miles parts and labor.
- K.25.4.** LED Lights, Exterior/Interior, will be warranted for 7 years parts and labor (warranted by the manufacturer of those components)
- K.25.5.** Chassis warranty is provided for 3 years or 36,000 miles. Details of the Warranty shall be provided with every bus delivered. Drive train warranty shall be 5 yr. or 100,000 miles.
- K.25.6.** EXCLUSIONS: The using agency will assume the expense for replacement filters, fuel, cleaning, painting and other minor items normally consumed in day to day operations. The using agency will assume responsibility for cost of repairs resulting from collision, theft, vandalism, operator negligence and/or acts of God.

K.26. PARTS AND SERVICE

- K.26.1.** The successful Supplier shall have factory-trained personnel available for warranty repairs and the performance of service. The dealer shall also maintain an inventory of high-usage parts and a quick source for low-usage parts.

K.27. SAFETY DECAL(S)

- K.27.1.** Safety decal(s) shall be furnished and shall be affixed at any applicable area (emergency exit, steps, etc.). The decals shall include necessary warnings and precautions. Permanent decals (plaques) are preferred.

K.28. INSTRUCTION ON SAFETY, OPERATION AND PREVENTIVE MAINTENANCE

- K.28.1.** The successful Supplier shall provide the agency sufficient instruction on safety, operation and preventive maintenance of the vehicle after the unit has been delivered and is ready for operation but prior to payment.

K.29. OPTIONAL EQUIPMENT

- K.29.1.** Dedicated CNG conversion

K.29.1.1. The chassis shall be modified to operate on dedicated Compressed Natural Gas (CNG) and have a minimum fuel capacity of 58GGE. Fuel tanks shall be mounted horizontally in a rear compartment accessible from the outside only via a hinged door on each side and the rear. The gasoline engine shall be converted to operate strictly on CNG. As part of this conversion, the original intake and exhaust valve seats and the exhaust valves of the L96 engine shall be removed and replaced with case hardened intake and exhaust valve seats and exhaust valves with LC8 heads. The CNG system must be OBD2 compliant operating parameters must be obtained by re-flashing the OEM ECM. Conversions utilizing a separate control module will not be considered. Fuel port shall be conveniently located inside the curb side rear door with pressure gauge and de-fueling port. A vehicle interlock shall be provided that will prevent the vehicle from running while a fuel nozzle is attached to the filler port. This option shall also include a roof escape hatch, as the rear storage compartment prevents egress out the back of the bus.

- K.29.2.** Stop Request System

K.29.2.1. Stop request system will have a pull cord type activation and a large "Stop Request" display with an adjustable audible Chime. The display will need to be easily seen by the passengers and driver or have a second dash light in the driver's area. Display will be reset to off with the opening of the passenger doors. The system will need a switch to reset false trip of pull cord other than the opening and closing of the doors. Activation strips or pull cords will need to be at an appropriate level for activation by riders in wheelchairs in the par transit locations.

- K.29.3.** Traffic Control Light Bar

K.29.3.1. Traffic controlling light bar mounted on rear wall of bus above rear door. "Arrow Stik" or equal. Controls to activate flashing arrow shall be mounted in convenient location within driver's reach.

- K.29.4.** LED Front and Side Destination Signs

K.29.4.1. Front and side LED full color destination signs shall be provided. Front sign shall be mounted in front bulkhead. Side sign shall be mounted in foremost curb side window.

K.29.4.2. Signs shall be manufactured by Hanover Displays or approved equal.

- K.29.5.** Aluminum Wheels

K.29.5.1. Aluminum wheels shall be provided in lieu of the standard steel wheels from the OEM chassis manufacturer. There will be no stainless steel wheel inserts with this option.

K.29.6. Camera System – 4 Cameras

K.29.6.1. CWI Digital or approved equal

K.29.7. Camera System – 8 Cameras

K.29.7.1. CWI Digital or approved equal

K.29.8. Bicycle Rack

K.29.8.1. Shall be a Sportworks **DL-2** bicycle rack or approved equal mounted to the front bumper

K.29.9. Door activated 4 way flashers

K.29.9.1. Hazard flashers shall be activated when passenger door is opened. This includes 2 additional amber LED flashing lights mounted high on each side of the rear wall.

SECTION "K"

LOW FLOOR ADA BUS

RESPONSE SHEET

BASE VEHICLE COST PER UNIT

BASE VEHICLE	COST PER UNIT
TRANSIT BUS	\$

VEHICLE SPECIFICATIONS

SPECIFICATIONS	MINIMUM/MAXIMUM IN INCHES	SUPPLIER'S RESPONSE
WHEELBASE	165" minimum	
INTERIOR HEIGHT FROM FLOOR TO CEILING-FRONT	86" minimum	
INTERIOR HEIGHT FROM FLOOR TO CEILING-REAR	76" minimum	
HEIGHT AT FIRST STEP AT RIDE HEIGHT	14.5" maximum	
HEIGHT AT FIRST STEP AT RIDE HEIGHT-BUS KNELT	10.5" maximum	
HEIGHT AT PASSENGER DOOR ENTRANCE	75" minimum	
AISLE WIDTH	14" minimum	
INTERIOR WIDTH	91" minimum	
EXTERIOR WIDTH	96" maximum	
GROSS VEHICLE WEIGHT RATING	14,200 lbs minimum	

OPTIONAL ITEMS

OPTIONAL ITEMS	COST PER ITEM
DEDICATED CNG CONVERSION	
STOP REQUEST SYSTEM	
TRAFFIC CONTROL LIGHT BAR	
LED FRONT AND SIDE DESTINATION SIGNS	
ALUMINUM WHEELS	
CAMERA SYSTEM-4 CAMERAS	
CAMERA SYSTEM-8 CAMERAS	
BYCYCLE RACK	
REAR VIEW CAMERA SYSTEM	
DOOR ACTIVATED 4 WAY FLASHERS	

PROPOSAL EXECPTIONS

Proposal must list any exceptions here to be used as a part of the Proposal evaluation and analysis. Please list the roman numerical on the standard specs or the number for the options when listing any bid exceptions.

L. SOLICITATION SPECIFICATIONS LOW FLOOR, CNG TRANSIT BUS

L.1. DELIVERY

- L.1.1.** Vehicle must be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following:
 - L.1.1.1.** The vehicle must have a full tank of fuel when delivered.
 - L.1.1.2.** Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
 - L.1.1.3.** All parts added, as part of the modification process shall be new.
 - L.1.1.4.** Headlights properly aligned
 - L.1.1.5.** Engine Tuned
 - L.1.1.6.** All accessories properly adjusted
 - L.1.1.7.** Electrical, braking and suspension systems inspected
 - L.1.1.8.** Both batteries Charged
 - L.1.1.9.** Front-end aligned, all wheels balanced, including spare
 - L.1.1.10.** All lubricants checked, and greased if needed
 - L.1.1.11.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
 - L.1.1.12.** Warranty papers and owner's guide
 - L.1.1.13.** Exterior and interior cleaned and washed.
 - L.1.1.14.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.
 - L.1.1.15.** Under no circumstances are tow vehicles to be attached to any buses.
 - L.1.1.16.** Each vehicle must be delivered to the agency submitting the P.O.

L.2. CERTIFICATE OF ORIGINS

- L.2.1.** Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order five business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery is not acceptable.
- L.2.2.** Vendor shall notify buyer of vehicle delivery ten business days prior.

L.3. WARRANTY REQUIREMENTS

- L.3.1.** The contractor warrants and guarantees to the original Agency submitting PO, each complete bus and specific subsystem and components for 100% parts and labor as follows:
 - L.3.1.1.** OEM standard factory warranties for chassis and engine.
 - L.3.1.2.** Add-on components shall have component manufacture's standard warranty.
 - L.3.1.3.** Warranty shall begin on the date that the vehicle delivery is accepted by the agency issuing the purchase order.
 - L.3.1.4.** The destination sign reading list and other information should be provided by the agency after award.

L.4. DESIGN OPERATING PROFILE

- L.4.1.** Design Operating Profile. The operating profile for design purposes should consist of simulated transit type service. The duty cycle is described in the figure "Transit Bus Duty Cycle." The duty cycle consists of three phases to be repeated in sequence: a central business district (CBD) phase of 2 miles with 7 stops per mile and a top speed of 20 mph, an arterial route phase of 2 miles with 2 stops per mile and a top speed of 40 mph, and a commuter phase of 4 miles with 1 stop and a maximum speed of 55 mph and a 5 minute idle phase.
- L.4.2.** The bus should be loaded to SLW and should average approximately 18 mph while operating on this duty cycle. Operation should continue regardless of the ambient temperature or weather conditions. The passenger doors should be opened and closed at each stop, and the bus should be knelt at each stop during the CBD phase. The braking profile should be:

- L.4.2.1. 16 percent of the stops at 3 ft/sec/sec
- L.4.2.2. 50 percent of the stops at 6 ft/sec/sec
- L.4.2.3. 26 percent of the stops at 9 ft/sec/sec
- L.4.2.4. 8 percent of the stops at 12 ft/sec/sec

L.4.3. These percentages of stops should be evenly distributed over the three phases of the duty cycle. For scheduling purposes, the average deceleration rate is assumed.

L.5. CLASS OF FAILURES

L.5.1. Classes of failures are described below.

L.5.1.1. Class 1: Physical Safety. A failure that could lead directly to passenger or operator injury or represents a severe crash situation.

L.5.1.2. Class 2: Road Call. A failure resulting in an en route interruption of revenue service. Service is discontinued until the bus is replaced or repaired at the point of failure.

L.5.1.3. Class 3: Bus Change. A failure that requires removal of the bus from service during its assignments. The bus is operable to a rendezvous point with a replacement bus.

L.5.2. Class 4: Bad Order. A failure that does not require removal of the bus from service during its assignments but does degrade bus operation. The failure should be reported by operating personnel.

L.6. MAINTENANCE PERSONNEL SKILL LEVELS

L.6.1. Defined below are maintenance personnel skill levels used in Part 5: Technical Specifications.

L.6.1.1. 5M: Specialist Mechanic or Class A Mechanic Leader

L.6.1.2. 4M: Journeyman or Class A Mechanic

L.6.1.3. 3M: Service Mechanic or Class B Servicer

L.6.1.4. 2M: Mechanic Helper or Bus Servicer

L.6.1.5. 1M: Cleaner, Fueler, Oiler, Hostler, or Shifter

L.6.1.6. Whenever a specific time is indicated to access components or complete a task, it is assumed the vehicle is in the location where the work is to be performed. All necessary equipment is in its correct position (tools, jacks, vehicle lifts, lighting, fluid recovery systems, etc.) and ready for use.

L.7. STANDARDS

L.7.1. Standards referenced in Part 5: Technical Specifications are the latest revisions unless otherwise stated.

L.8. WHEELCHAIR

L.8.1. 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 inches in width and 48 inches in length measured two inches above the ground, and does not weigh more than 600 pounds when occupied.

L.9. STRUCTURE

L.9.1. The structure should be defined as the basic body, including floor deck material and installation, load bearing external panels, structural components, axle mounting provisions and suspension beams and attachment points.

L.10. LOW FLOOR BUS

L.10.1. A bus which, between at least the front (entrance) and rear (exit) doors, has a floor sufficiently low and level so as to remove the need for steps in the aisle between the doors and in the vicinity of these doors

L.11. FUEL MANAGEMENT SYSTEM

L.11.1. 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. O2 sensor, MAP sensor), spark and coil components, and air control devices (e.g. main throttle, wastegate).

L.12. AMBIENT TEMPERATURE

L.12.1. The temperature of the surrounding air. For testing purposes, ambient temperature must be between + 16° C (+50°F) and +38°C (+100°F).

L.13. BURST PRESSURE

L.13.1. The highest pressure reached in a container during a burst test.

L.14. CAPACITY (FUEL CONTAINER)

L.14.1. The water volume of a container in gallons (liters).

L.15. CNG CYLINDER

L.15.1. A container constructed, inspected, and maintained in accordance with U.S. Department of Transportation or Transport Canada regulations or ANSI/IAS NGV2, Basic Requirements for Compressed Natural Gas Vehicle (NGV) Fuel Containers, or CSA B51, Boiler, Pressure Vessel and Pressure Piping Code.

L.16. CNG CYLINDER TYPES

L.16.1. Type 1: Metal

L.16.2. Type 2: Resin impregnated continuous filament with metal liner with a minimum burst pressure of 125% of service pressure. The cylinder may be either hoop-wrapped or full-wrapped (Hoop Wrapped: Reinforcement by a composite material applied in a substantially circumferential pattern over the cylindrical portion of the liner so that the filament does not transmit any significant stresses in a direction parallel to the container/cylinders longitudinal axis. Full Wrapped: the reinforcement by a composite material applied over the entire liner including the domes).

L.16.3. Type 3: Resin impregnated continuous filament with metal liner. The container may be either hoop-wrapped or full-wrapped.

L.16.4. Type 4: Resin impregnated continuous filament with a nonmetallic liner.

L.17. CODE

L.17.1. A legal requirement.

L.18. COMBINATION GAS RELIEF DEVICE

L.18.1. A relief device that is activated by a combination of high pressures or high temperatures, acting either independently or together.

L.19. COMPOSITE CONTAINER FOR CNG

L.19.1. A container fabricated of two or more materials that interact to facilitate the container design criteria.

L.20. COMPRESSED NATURAL GAS (CNG)

L.20.1. Mixtures of hydrocarbon gases and vapors consisting principally of methane in gaseous form that has been compressed for use as a vehicular fuel.

L.21. CONTAINER

L.21.1. A pressure vessel, cylinder, or cylinders permanently manifolded together used to store CNG.

L.22. CONTAINER APPURTENANCES

L.22.1. Devices connected to container openings for safety, control, or operating purposes.

L.23. CONTAINER VALVE

L.23.1. A valve connected directly to a container outlet.

L.24. DEFUELING

L.24.1. The process of removing fuel from a CNG vehicle.

L.25. DEFUELING PORT

L.25.1. Device which allows for, or point at which a vehicle is defueled.

L.26. DESTROYED

L.26.1. Physically made permanently unusable.

L.27. FILL PRESSURE FOR CNG

L.27.1. 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 should not exceed 125 percent of service pressure.

L.28. FLOW CAPACITY

L.28.1. 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.

L.29. FUEL LINE

L.29.1. The pipe, tubing, or hose on a vehicle, including all related fittings, through which natural gas passes.

L.30. FUSIBLE MATERIAL

L.30.1. A metal, alloy, or other material capable of being melted by heat.

L.31. HIGH PRESSURE

L.31.1. Those portions of the CNG fuel system that see full container or cylinder pressure.

L.32. INTERMEDIATE PRESSURE

L.32.1. 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 -70 psi).

L.33. LABELED

L.33.1. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that 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.

L.34. LEAKAGE

L.34.1. Release of contents through a defect or crack, see "Rupture".

L.35. LINER

L.35.1. Inner gas tight container or gas container to which the overwrap is applied.

L.36. LOWER EXPLOSIVE LIMIT

L.36.1. The lowest concentration of gas where, given and ignition source, combustion is possible.

L.37. MAXIMUM SERVICE TEMPERATURE

L.37.1. The maximum temperature to which a container/cylinder will be subjected in normal service.

L.38. METALLIC HOSE

L.38.1. A hose whose strength depends primarily on the strength of its metallic parts; it can have metallic liners or covers, or both.

L.39. METERING VALVE

L.39.1. A valve intended to control the rate of flow of natural gas.

L.40. OPERATING PRESSURE

L.40.1. The varying pressure which is developed in a container during service.

L.41. PRESSURE ACTIVATED GAS RELIEF DEVICE

L.41.1. A pressure and/or temperature activated device used to vent the container/cylinder contents, and thereby prevent rupture of a NGV fuel container/cylinder when subjected to a standard fire test as required by fuel container/cylinder standards.

L.41.2. Since this is a pressure activated device, it may not protect against rupture of the container when the application of heat weakens the container to the point where its rupture pressure is less than the rated burst pressure of the relief device, particularly if the container is partially full.

L.42. REJECTABLE DAMAGE

L.42.1. 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.

L.43. RUPTURE

L.43.1. Sudden and unstable damage propagation in the structural components of the container resulting in a loss of contents, see "Leakage".

L.44. SPECIFICATION

L.44.1. A particular or detailed statement, account, or listing of the various elements, materials, dimensions etc. involved in the manufacturing and construction of a product.

L.45. SERVICE PRESSURE

L.45.1. 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.

L.46. SETTLED PRESSURE

L.46.1. The gas pressure when a given settled temperature, usually 21°C (70°F), is reached.

L.47. SETTLED TEMPERATURE

L.47.1. The uniform gas temperature after any change in temperature caused by filling has dissipated.

L.48. STANDARD

L.48.1. A firm guideline from a consensus group.

L.49. STRESS LOOPS

L.49.1. The "pig-tails" commonly used to absorb flexing in piping.

L.50. SOURCES OF IGNITION

L.50.1. 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 and that will permit propagation of flame away from them.

L.51. THERMALLY ACTIVATED GAS RELIEF DEVICE

L.51.1. A relief device that is activated by high temperatures, and generally contains a fusible material.

L.51.2. Since this is a thermally activated device, it does not protect against overpressure from improper charging practices.

L.52. AGENCY

L.52.1. The company purchasing the vehicle.

L.53. SPECIFICATIONS

L.53.1. The contractor should ensure that the application and installation of major bus subcomponents and systems are compliant with all such subcomponent vendors' requirements and recommendations. Components used in the vehicle should be of heavy-duty design and proven in transit service.

L.54. DIMENSIONS

L.54.1. PHYSICAL SIZE

L.54.1.1. With the exceptions of exterior mirrors, marker and signal lights, bumpers, fender skirts, washers, wipers, ad frames and rub rails, the bus should have the following overall dimensions as shown in the figure "Transit Bus Exterior Dimensions" at static conditions and design height.

L.54.1.2. Thirty foot bus: Body Length: 30 feet ± 6 inches

L.54.1.3. Thirty-five foot bus: Body Length: 35 feet ± 6 inches.

L.54.1.4. Body Width: 102 inches (+0, -1 inch)

L.54.1.5. Maximum Overall Height: 140 inches, includes all rigid roof mounted items such as A/C, exhaust, Fuel system and cover, etc.

L.54.2. UNDERBODY CLEARANCE

L.54.2.1. The bus should maintain the minimum clearance dimensions as shown in the figure "Transit Bus Minimum Road Clearance" and defined in SAE Standard J689, regardless of load up to the gross vehicle weight rating.

L.54.3. RAMP CLEARANCES

L.54.3.1. Approach angle should be no less than 8.5 degrees. Break over angle should be no less than 8 degrees. Departure angle should be no less than 9 degrees.

- L.54.3.2.** 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.
- L.54.3.3.** 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.
- L.54.3.4.** 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.

L.54.4. GROUND CLEARANCE

- L.54.4.1.** Ground clearance should be no less than 10 inches, except within the axle zone and wheel area.

L.54.5. AXLE CLEARANCE

- L.54.5.1.** Axle zone clearance, which is the projected area between tires and wheels on the same axial centerline, should be no less than 5½ inches.

L.54.6. WHEEL AREA CLEARANCE

- L.54.6.1.** Wheel area clearance, should be no less than 8 inches for parts fixed to the bus body and 6 inches for parts that move vertically with the axles.

L.54.7. FLOOR HEIGHT

- L.54.7.1.** Height of the floor above the street should be no more than 15 ½ inches measured at the centerline of the front and rear doorway. The floor may be inclined along the longitudinal axis of the bus, and the incline should be less than 3 ½ Deg. off the horizontal except locally at the doors where 2o slope toward the door is allowed. All floor measurements should be with the bus at the design running height and on a level surface and with the standard 305 tires.

L.54.8. INTERIOR HEADROOM

- L.54.8.1.** Headroom above the aisle and at the centerline of the aisle seats should be no less than 78 inches in the forward half of the bus tapering to no less than 74 inches forward of the rear settee. At the centerline of the window seats, headroom should be no lower than 65 inches. Headroom at the back of the rear bench seat may be reduced to a minimum of 56 inches, but it should 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/her head, padding should be provided on the overhead paneling.

L.54.9. WEIGHT

- L.54.9.1.** Curb weight of the bus, as defined in these Specifications, should not exceed 33,000 pounds.

L.55. CAPACITY

- L.55.1.** The vehicle should be designed to carry the Gross Vehicle Weight which should not exceed the bus GVWR.

L.56. SERVICE LIFE AND MAINTENANCE

- L.56.1.** The bus should be designed to operate in transit service for at least 12 years or 500,000 miles. It should be capable of operating at least 40,000 miles per year including the twelfth year.

L.57. MAINTENANCE AND INSPECTION

- L.57.1.** Scheduled maintenance or inspection tasks as specified by the Contractor should require a skill level of 3M or less. Scheduled maintenance tasks should be related and should be grouped in maximum mileage intervals. Based upon the Design Operating routine scheduled maintenance actions, such as filter replacement and adjustments, should be in general at intervals of 6,000 miles (along with routine daily service performed during the fueling operations). Oil/filter change intervals may be extended, as indicated from a regular oil analysis program undertaken in cooperation with the engine manufacturer.
- L.57.2.** Any special tools required to maintain the bus should be provided in quantities as specified in Technical Specifications. Additional requirements for Maintenance and Inspection Equipment are also provided in these specifications.
- L.57.3.** Test ports should be provided for commonly checked functions on the bus such as air intake, exhaust, hydraulic, pneumatic, charge-air and engine cooling systems.
- L.57.4.** The Contractor should provide a manual listing the times required for typical repair and service items on the bus.

L.58. CNG CYLINDER VISUAL INSPECTION

- L.58.1.** A general visual inspection of all cylinders should occur during routine maintenance or as specified in the agency safety plan. The purpose of this general inspection is to look for signs of gross external damage or abuse to the cylinders. This cursory inspection can be performed by a skill level of 3M or less.
- L.58.2.** A detailed visual inspection of all cylinders should occur every 3 years (NGV2) or every 3 years or 36,000 miles (FMVSS 304). This detailed visual inspection should be performed by an experienced third party or a trained in-house individual following criteria established by CGA pamphlet C-6.4 (Methods for External Visual Inspection of Natural Gas Vehicle Fuel Containers and their Installations). If a question arises the respective coach manufacturer and cylinder manufacturer should be consulted.

L.59. ACCESSIBILITY

- L.59.1.** All systems or components subject to periodic maintenance or that are subject to periodic failures should be readily accessible for service and inspection. To the extent practicable, removal or physical movement of components unrelated to the specific maintenance and/or repair tasks involved should be unnecessary.
- L.59.2.** As a goal, relative accessibility of components, measured in time required to gain access, should be inversely proportional to frequency of maintenance and repair of the components.
- L.59.3.** The location of CNG cylinders should allow access for routine external surface cylinder cleaning and inspections. CNG cylinder labels should be readily viewable without requiring cylinder rotation or the removal of any components with the exception of cylinder protection devices (shields), CNG cylinder manual shut-off valves (if equipped) should be easily accessible to allow for CNG fuel system shut-off or CNG cylinder isolation. Non-skid roof surfaces/walkways should be incorporated on buses when roof-top CNG cylinder access is provided.

L.60. INTERCHANGEABILITY

- L.60.1.** Components with identical functions should be interchangeable to the extent practicable. These components should include, but not limited to, passenger window hardware, interior trim, lamps, lamp lenses, and seat assemblies. Components with non-identical functions should not be, or appear to be, interchangeable. A component should not be used in an application for which it was neither designed nor intended.
- L.60.2.** Any one component or unit used in the construction of these buses should be an exact duplicate in design, manufacture, and assembly for each bus in each order group in this Contract.
- L.60.3.** Durable labels should be displayed in the engine compartment, fuel storage compartment(s) and on other fuel system component compartments stating that CNG fuel system components may not be interchangeable within a vehicle or between vehicles. In recognition that fuel system components may not be fully interchangeable, the issue of fuel system component interchangeability must be addressed in the vehicle maintenance manual.

L.61. OPERATING ENVIRONMENT

- L.61.1.** The bus should achieve normal operation in ambient temperature ranges of -10 to 115 F, at relative humidity between 5 percent and 100 percent, and at altitudes up to 3,000 feet above sea level. Degradation of performance due to atmospheric conditions should be minimized at temperatures below -10 F, above 115 F, or at altitudes above 3,000 feet. Altitude requirements above 3,000 ft. will need separate discussions with the engine manufacturer to ensure performance requirements are not compromised.
- L.61.2.** Special equipment or procedures may be employed to start the bus after being exposed for more than 4 hours to temperatures less than 30° F without the engine in operation. Speed, gradability, and acceleration performance requirements should be met at, or corrected to, 77F, 29.31 inches Hg, dry air per SAE J1995.

L.62. NOISE

L.62.1. INTERIOR NOISE

- L.62.1.1.** The combination of inner and outer panels and any material used between them should provide sufficient sound insulation so that a sound source with a level of 80 dBA measured at the outside skin of the bus should have a sound level of 65 dBA or less at any point inside the bus. These conditions should prevail with all openings, including doors and windows, closed and with the engine and accessories switched off.
- L.62.1.2.** The bus-generated noise level experienced by a passenger at any seat location in the bus should not exceed 83 dBA and the operator should not experience a noise level of more than 75 dBA under the following test conditions. The bus should be empty except for test personnel, not to exceed 4 persons, and the test equipment. All openings should be closed and all accessories should be operating during the test. The bus should accelerate at full throttle from a standstill to 35 mph on level commercial asphalt or concrete pavement in an area free of large reflecting surfaces within 50 feet of the bus path. During the test, the ambient noise level in the test area should be at least 10 dBA lower than the bus under test. Instrumentation and other general requirements should conform to SAE Standard J366

L.62.2. EXTERIOR NOISE

L.62.2.1. Airborne noise generated by the bus and measured from either side should not exceed 83 dBA under full power acceleration when operated at or below 35 mph at curb weight and just prior to transmission upshift. The maximum noise level generated by the bus pulling away from a stop at full power should not exceed 83 dBA. The bus-generated noise at curb idle should not exceed 65 dBA. All noise readings should be taken 50 feet from, and perpendicular to, the centerline of the bus with all accessories operating. Instrumentation, test sites, and other general requirements should be in accordance with SAE Standard J366. The pull away test should begin with the front bumper even with the microphone. The curb idle test should be conducted with the rear bumper even with the microphone.

L.63. FIRE SAFETY

- L.63.1.** The bus should be designed and manufactured in accordance with all applicable fire safety and smoke emission regulations. These provisions should include the use of fire-retardant/low-smoke materials, fire detection systems, firewalls, and facilitation of passenger evacuation.
- L.63.2.** All materials used in the construction of the Passenger Compartment of the bus should be in accordance with the Recommended Fire Safety Practices defined in FTA Docket 90, dated October 20, 1993. Materials entirely enclosed from the passenger compartment, such as insulation within the sidewalls, need not comply. In addition, smaller components and items, such as seat grabrails, switch knobs and small light lenses, should be exempt from this requirement.
- L.63.3.** Fire sensing and suppression systems as required in in this document should be provided.

L.64. ELDERLY AND DISABLED PASSENGERS

- L.64.1.** The contractor should comply with all applicable Federal requirements defined in the Americans with Disabilities Act, 49 CFR Part 38, and all state and local regulations regarding mobility-impaired persons. Local regulations are defined as those below the state level.

L.65. PROPULSION SYSTEM

L.65.1. VEHICLE PERFORMANCE

L.65.2. POWER REQUIREMENTS

- L.65.2.1.** Propulsion system and drive train should provide power to enable the bus to meet the defined acceleration, top speed, and gradability requirements, and operate all propulsion-driven accessories. Power requirements are based on heavy heavy-duty gas (HHDG) engines certified for use in all 50 states using actual road test results or computerized vehicle performance data.

L.66. TOP SPEED

- L.66.1.** The bus should be capable of a top speed of 68 mph. on a straight, level road at GVWR with all accessories operating.

L.67. GRADABILITY

- L.67.1.** Gradability requirements should be met on grades with a dry commercial asphalt or concrete pavement at GVWR with all accessories operating. The propulsion system and drive train should enable the bus to achieve and maintain a speed of 40 mph on a 2-1/2 percent ascending grade and 7 mph on a 16 percent ascending grade.

L.68. ACCELERATION

- L.68.1.** The acceleration should meet the requirements below and should be sufficiently gradual and smooth to prevent throwing standing passengers off-balance. Acceleration measurement should commence when the accelerator is depressed (Idle Start.)

L.69. MAXIMUM IDLE START ACCELERATION TIMES ON A LEVEL SURFACE

- L.69.1.** (Vehicle weight = GVWR, 50-State Power Plant)

L.69.1.1. SPEED

MPH	TIME
10 SECONDS	5.6
20 SECONDS	11.0
30 SECONDS	20.0
40 SECONDS	31.0

L.70. OPERATING RANGE

- L.70.1.** The operating range of the coach when run on the transit coach duty cycle should be at least 350 miles with an initial gas settled pressure of 3,600 psi (US) at 70 F.

L.71. ENGINE

- L.71.1.** Cummins ISL G 8.9L CNG or approved equal.
- L.71.2.** The HHDG engine should be designed to operate for not less than 300,000 miles without major failure or significant deterioration. Components of the fuel management and/or control system should be designed to operate for not less than 150,000 miles without replacement or major service. Exception: Spark plugs and wires, spark coil, oxygen sensor.
- L.71.3.** The engine should meet all requirements of Technical Specifications, 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.
- L.71.4.** The engine should be equipped with an electronically controlled fuel management system, compatible with multiplex wiring systems and either 12 or 24 volt electrical systems. The engine control system should be capable of receiving electronic inputs from the engine and other vehicle systems. Communication between these electronic systems should be made using the SAE J1939 Recommended Practice communication link. The engine's electronic management system should monitor operating conditions and provide instantaneous adjustments to optimize both engine and bus performance. The system should be programmable to allow optimization of engine performance.
- L.71.5.** In order to avoid potential warranty disputes during the engine warranty period, initial performance settings should only be changed with the authorization from the bus and engine manufacturers.
- L.71.6.** The engine should have onboard diagnostic capabilities, able to monitor vital functions, store out of parameter conditions in memory, and communicate faults and vital conditions to service personnel. Diagnostic reader device connector ports, suitably protected against dirt and moisture, should be provided in operator's area and near or inside engine compartment. The onboard diagnostic system should inform the operator via visual and/or audible alarms when out of parameter conditions exist for vital engine functions.
- L.71.7.** The engine starter should be protected by an interlock that prevents its engagement when the engine is running. Special equipment or procedures may be employed to start the engine when exposed to temperatures less than 30° F for a minimum of four hours without the engine in operation. All cold weather starting aids, engine heating devices and procedures should be of the type recommended by the engine manufacturer and approved by the Central Oklahoma Transportation and Parking Authority.
- L.71.8.** The engine should be equipped with an operator-controlled fast idle device. The fast idle control should be a two-way toggle mounted on the dash or side console and should activate only with the transmission in neutral and the parking brake applied. This device may be used to help meet the requirements of bus cool down.
- L.71.9.** The engine control system should protect the engine against progressive damage. The system should monitor conditions critical for safe operation and automatically reduce power and/or speed and initiate engine shutdown as needed. The on-board diagnostic system should trigger a visual and audible alarm to the operator when the engine control unit detects a malfunction and the engine protection system is activated. Automatic shutdown should only occur when parameters established for the functions below are exceeded:
- L.71.9.1.** Coolant Level
 - L.71.9.2.** Coolant Temperature
 - L.71.9.3.** Exhaust Temperature

L.72. OIL PRESSURE

- L.72.1.** A control should be available to the operator, which when constantly depressed, will allow the drive to delay the engine shutdown, but not the FSS System activation and alarm system

L.73. COOLING SYSTEMS

- L.73.1.** The cooling systems should be of sufficient size to maintain all engine and transmission fluids and engine intake air at safe, continuous operating temperatures during the most severe operations possible and in accordance with engine and transmission manufacturers' cooling system requirements. The cooling system fan/fans control should sense the temperatures of the operating fluids and the intake air and if either is above safe operating conditions the cooling fan should be engaged. The fan control system should be designed with a fail-safe mode of "fan on." The cooling system in new condition should have an ambient capacity of at least 110° F with water as coolant and sea level operation.

L.74. ENGINE COOLING

- L.74.1.** The engine should be cooled by a water-based, pressure type, cooling system that does not permit boiling or coolant loss during the operations described above. Engine thermostats should be easily accessible for replacement. Shutoff valves should allow filter replacement without coolant loss. Valves should permit complete

shutoff of lines for the heating and defroster units, and water booster pumps. The water boost pump should be a magnetically coupled, brushless design. All low points in the water-based cooling system should be equipped with drain cocks. Air vent valves should be fitted at high points in the cooling system unless it can be demonstrated that the system is self-purging.

- L.74.2.** A sight glass to determine satisfactory engine coolant level should be provided and should be accessible by opening one of the engine compartment's access doors. A spring-loaded, push button type valve to safely release pressure or vacuum in the cooling system should be provided with both it and the water filler no more than 60 inches above the ground and both should be accessible through the same access door.
- L.74.3.** The radiator, and charge air cooler if integrated, should be of durable corrosion-resistant construction with bolted-on removable tanks. The radiator should be designed so a 2M mechanic can gain access to a substantial portion of the side facing the engine for the purpose of cleaning the radiator in five minutes or less.
- L.74.4.** Radiators with a fin density greater than 12 fins per inch, and louvered/slit designs, are more susceptible to clogging and deteriorating cooling performance over time and should not be used.
- L.74.5.** The radiator and charge air cooler should be designed to withstand thermal fatigue and vibration associated with the installed configuration.
- L.74.6.** The engine cooling system should be equipped with a properly sized water filter with a spin-on element and an automatic system for releasing supplemental coolant additives as needed to replenish and maintain protection properties.
- L.74.7.** The cooling fan should be temperature controlled, allowing the engine to reach operating temperature quickly. The temperature-controlled fan should not be driven when the coolant temperature falls below the minimum level recommended by the engine manufacturer.

L.75. CHARGE AIR COOLING

- L.75.1.** The charge air cooling system, also referred to as aftercoolers or intercoolers, should provide maximum air intake temperature reduction with minimal pressure loss. The charge air radiator should be sized and positioned to meet engine manufacturer's requirements. The charge air radiator should not be stacked ahead or behind the engine radiator and should be positioned as close to the engine as possible unless integrated with the radiator. Air ducting and fittings should be protected against heat sources, and should be configured to minimize restrictions and maintain sealing integrity.

L.76. TRANSMISSION COOLING

- L.76.1.** The transmission should be cooled by a separate heat exchanger sized to maintain operating fluid within the transmission manufacturer's recommended parameters of flow, pressure and temperature. The transmission cooling system should be matched to retarder and engine cooling systems to ensure that all operating fluids remain within recommended temperature limits established by each component manufacturer.

L.77. TRANSMISSION

- L.77.1.** The transmission should be multiple speed, automatic shift with torque converter, retarder and electronic controls. Gross input power, gross input torque and rated input speed should be compatible with the engine. A 3M mechanic, with optional assistance, should be able to remove and replace the transmission assembly for service in less than 16 total combined man-hours. The transmission should be designed to operate for not less than 300,000 miles on the design operating profile without replacement or major service.
- L.77.2.** The electronic controls should be compatible with multiplex wiring systems, capable of receiving inputs from the throttle, shift selector, engine, and transmission. Communication between the transmission and other electronically controlled vehicle systems should be made using the SAE J1939 Recommended Practice communication link. Electronic controls should be compatible with either 12 or 24 volt systems, provide consistent shift quality, and compensate for changing conditions such as variations in vehicle weight and engine power. A brake pedal application of 15 to 20 psi should be required by the operator to engage forward or reverse range from the neutral position.
- L.77.3.** The electronically controlled transmission should have on-board diagnostic capabilities, able to monitor functions, store out-of-parameter conditions in memory, and communicate faults and vital conditions to service personnel. A diagnostic reader device connector port, suitably protected against dirt and moisture, should be provided in the operator's area. The on-board diagnostic system should trigger a visual alarm to the operator when the electronic control unit detects a malfunction. The transmission should contain built-in protection software to guard against severe damage.
- L.77.4.** An electronic transmission fluid level monitoring and protection system should be provided. This system should allow a 2M or 3M mechanic to accurately determine transmission fluid levels during checking or oil change and should be in addition to the manual dipstick. This system should also provide protection against any damage resulting from improper fluid level conditions.
- L.77.5.** The transmission should have an auto neutral feature that should cause it to automatically and immediately shift to "Neutral" whenever the transmission is left in gear and the parking brake is applied. This system should also

automatically shift the transmission to "Neutral," after a 5-minute delay, whenever the exit door brake interlock is applied.

L.78. RETARDER

- L.78.1.** THE TRANSMISSION should be equipped with an integral hydraulic retarder designed to extend brake lining service life. The application of the retarder should cause a smooth blending of both retarder and service brake functions without exceeding jerk requirements. Brake lights should illuminate when the retarder is activated.
- L.78.2.** The retarder should become partially engaged (approximately 1/4 to 1/3 of its total application, with a resulting deceleration of no greater than 0.03 g) when the throttle is completely released (e.g., zero throttle). Maximum retarder should be achieved when brake pedal is depressed prior to engagement of service brakes with a maximum resulting deceleration of approximately 0.13 g. The resulting decelerations specified include the effects of engine braking, wind resistance and rolling resistance.
- L.78.3.** The thermostatically controlled cooling fan should be activated when the retarder is engaged and the coolant temperature exceeds the maximum limit established by the engine and transmission manufacturers.

L.79. JERK

- L.79.1.** Jerk, the rate of change of acceleration measured at the centerline, floor level of the bus should be minimized throughout the shifting of each transmission range and retarder application and should be no greater than 0.3 g/sec. for a duration of a quarter-second or more.

L.80. MOUNTING

- L.80.1.** The power plant should be mounted in a compartment in the rear of the bus. All power plant mounting should be mechanically isolated to minimize transfer of vibration to the body. Mounts should control movement of the power plant so as not to affect performance of belt driven accessories or cause strain in piping and wiring connections to the power plant.

L.81. SERVICE

- L.81.1.** The power plant should be arranged so that accessibility for all routine maintenance is assured. No special tools, other than dollies and hoists, should be required to remove the power plant. Two 3M mechanics should be able to remove and replace the engine and transmission assembly in less than 12 total combined man-hours. The muffler, exhaust system, air cleaner, air compressor, starter, alternator, radiator, all accessories, and any other component requiring service or replacement should be easily removable and independent of the engine and transmission removal. An engine oil pressure gauge and coolant temperature gauge should be provided in the engine compartment. These gauges should be easily read during service and mounted in an area where they should not be damaged during minor or major repairs.
- L.81.2.** Engine oil and the radiator filler caps should be hinged to the filler neck and closed with spring pressure or positive locks. All fluid fill locations should be properly labeled to help ensure correct fluid is added and all fillers should be easily accessible with standard funnels, pour spouts, and automatic dispensing equipment. All lubricant sumps should be fitted with magnetic-type, external, hex head, drain plugs.
- L.81.3.** The engine and transmission should be equipped with sufficient heavy-duty fuel and oil filters for efficient operation and to protect the engine and transmission between scheduled filter changes. To the extent practicable, the filters should be of the spin-on, disposable type or integral with the engine and transmission. All filters should be easily accessible and the filter bases should be plumbed to assure correct reinstallation.
- L.81.4.** An oil sampling and fill provision compatible with standard should be included in the engine compartment.
- L.81.5.** An air cleaner with a dry filter element and a graduated air filter restriction indicator should be provided. The filter should be removable by a 3M mechanic in 10 minutes or less. The location of the air intake system should be designed to minimize the entry of dust and debris and maximize the life of the air filter. The engine air duct should be designed to minimize the entry of water into the air intake system. Drainage provisions should be included to allow any water/moisture to drain prior to entry into air filter.

L.82. ACCESSORIES

- L.82.1.** Engine-driven accessories should be mounted for quick removal and repair. Accessory drive systems should operate without unscheduled adjustment for not less than 50,000 miles on the design operating profile. These accessories should be driven at speeds sufficient to assure adequate system performance during extended periods of idle operation and low route speed portion of the design operating profile. Belt guards should be provided as required for safety and should be sturdy in design and installation and readily removable.

L.83. HYDRAULIC SYSTEMS

- L.83.1.** Any accessory may be driven hydraulically. The hydraulic system should demonstrate a mean time between repairs in excess of 50,000 miles. Hydraulic system service tasks should be minimized and scheduled no more frequently than those of other major coach systems. All elements of the hydraulic system should be easily accessible for service or unit replacement. Critical points in the hydraulic system should 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.

L.84. HYDRAULIC SYSTEM SENSORS

- L.84.1.** Sensors in the hydraulic system, excluding those in the power steering system, should indicate on the operator's on-board diagnostic panel conditions of low hydraulic fluid level. Specific systems for which low hydraulic fluid level sensors are required are included in attachments to Part 5: Technical Specifications.
- L.84.2.** Fluid Lines, Fittings and Clamps, and Charge Air Piping
- L.84.3.** All lines and piping should be supported to prevent chafing damage, fatigue failures, and tension strain. Lines passing through a panel, frame or bulkhead should be protected by grommets (or similar device) that fit snugly to both the line and the perimeter of the hole that the line passes through to prevent chafing and/or wear.
- L.84.4.** Lines should be as short as practicable and should be routed or shielded so that failure of a line should not allow the contents to spray or drain onto any component operable above the auto-ignition temperature of the fluid.
- L.84.5.** Compression fittings should be standardized as much as practicable to prevent the intermixing of components. Compression fitting components from more than one manufacturer should not be mixed even if the components are known to be interchangeable.

L.85. RADIATOR

- L.85.1.** Radiator piping should be stainless steel or brass tubing and, if practicable, hoses should be eliminated. Necessary hoses should be a premium, silicone rubber type that is impervious to all bus fluids. All hoses should be as short as practicable. All hoses should be secured with premium, stainless steel clamps that provide a complete 360° seal. The clamps should maintain a constant tension at all times, expanding and contracting with the hose in response to temperature changes and aging of the hose material.

L.86. OIL & HYDRAULIC LINES

- L.86.1.** Oil and hydraulic lines should be compatible with the substances they carry. The lines should be designed and intended for use in the environment which they are installed, i.e., high temperatures in engine compartment, road salts, oils, etc. Lines should be capable of withstanding maximum system pressures. Lines within the engine compartment should be composed of steel tubing where practicable except in locations where flexible lines are specifically required by in attachments to Part 5: Technical Specifications.
- L.86.2.** Hydraulic lines of the same size and with the same fittings as those on other piping systems of the bus, but not interchangeable, should be tagged or marked for use on the hydraulic system only.

L.87. FUEL LINES

- L.87.1.** This section was written to be in compliance with NFPA-52 for U.S. buses and CAN/CGA-B149.4-M91 for Canadian buses. All tubing should be a minimum of seamless Type 304 stainless steel [ASTM A269 or equivalent]. Fuel lines and fittings should not be fabricated from cast iron, galvanized pipe, aluminum, plastic, or copper alloy with content exceeding 70 percent copper. Piping fittings, and hoses should be clear and free from cuttings, burrs, or scale. Pipe thread joining material that is impervious to CNG should be utilized as required.
- L.87.2.** Fuel lines should be securely mounted, braced, and supported every 24 inches, or as designed by the bus manufacturer to minimize vibration and should be protected against damage, corrosion, or breakage due to strain or wear.
- L.87.3.** Manifolds connecting fuel containers should be designed and fabricated to minimize vibration and should be installed in a protected location(s) to prevent line or manifold damage from unsecured objects or road debris.
- L.87.4.** Fuel hose and hose connections, where permitted, should be less than 48 inches in length, made from materials resistant to corrosion and action of natural gas, and protected from fretting and high heat.
- L.87.5.** High pressure CNG lines should be pressure tested to a minimum of 125% of system working pressure prior to fueling. CNG or Nitrogen should be used to pressure test the lines/assembly. The bus manufacturer should have a documented procedure of testing the high pressure line assembly.

L.88. CHARGE AIR PIPING

- L.88.1.** Charge air piping and fittings should be designed to minimize air restrictions and leaks. Piping should be as short as possible and the number of bends should be minimized. Bend radii should be maximized to meet the pressure drop and temperature rise requirements of the engine manufacturer. The cross section of all charge air piping should not be less than the cross section of the intake manifold inlet. Any change in pipe diameter should be gradual to ensure a smooth passage of air and to minimize restrictions. Piping should be routed away from exhaust manifolds and other heat sources, and shielded as required to meet the temperature rise requirements of the engine manufacturer.

- L.88.2.** Charge air piping should be constructed of stainless steel, aluminized steel or anodized aluminum, except between the air filter and turbocharger inlet where piping may be constructed of fiberglass. Connections between all charge air piping sections should be sealed with a short section of reinforced

L.89. FUEL SYSTEM

- L.89.1.** NOTE: CNG fueling and defueling station characteristics relating to the design and construction of the CNG bus fuel system will be provided as detailed this document.

L.90. FUEL CONTAINERS

- L.90.1.** Cylinders

L.91. OPERATING RANGE

- L.91.1.** The operating range of the coach, when run on the transit coach duty cycle, should be at least 350 miles with a gas settled pressure of 3600 psi (US) at 70 F.

L.92. FUEL CAPACITY

- L.92.1.** Should be sufficient to meet the required Operating Range stated without exceeding the estimated curb weight of this bus configuration/Specification.

L.93. DESIGN AND CONSTRUCTION

- L.93.1.** CNG fuel containers/cylinders must be designed, constructed manufactured and tested in accordance with at least one of the following:
- L.93.2.** US applications;
 - L.93.2.1.** NFPA 52-Standard for Compressed Natural Gas (CNG) Vehicular Fuel Systems
 - L.93.2.2.** FMVSS 304
 - L.93.2.3.** any local standard(s) specifically intended for CNG fuel containers Installation
- L.93.3.** Fuel cylinders should 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 3-3. In the case of a low floor transit bus, the placement of tanks should be limited to the roof of the vehicle or in the compartment above the engine of the vehicle.
- L.93.4.** 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.

L.94. LABELING

- L.94.1.** CNG fuel systems should be labeled in accordance with NFPA 52, Compressed Natural Gas (CNG) Vehicular Fuel Systems Code, 1998 edition.

L.95. PRESSURE RELIEF DEVICES

- L.95.1.** PRD's 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, should be stainless steel.

L.96. VALVES

- L.96.1.** 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.

L.97. FUEL FILLER

- L.97.1.** The fuel filler should be located 7 to 38 feet behind the centerline of the front door on the curbside of the bus. The filler cap should be retained to prevent loss and should be recessed into the body.
- L.97.2.** Fuel system should be capable of being filled (for 350 mile range) from 500 psi to a settled pressure of 3600 psi in a maximum of five minutes.

L.98. CNG FUELING SYSTEM

- L.98.1.** The CNG fueling port receptacle should be an ANSI/AGA NGV1 certified receptacle. The coach should be capable of being fueled by a nozzle (insert procuring agencies standard fueling nozzle). The fueling port receptacle location should be such that connection by fueling personnel can be performed without physical strain or interference. A Dust Cap should be permanently "tethered" to the fueling port receptacle. The fueling port receptacle access door should be equipped with an interlock sensor which disables the engine starting system

when the access door is open, to prevent drive-away. The interlock should be of the type such that if the sensor fails the coach will not start.

- L.98.2.** Fueling port receptacle should be located on the curbside of the vehicle between the rear axle and the rear of the bus.

L.99. CNG DE-FUELING SYSTEM

- L.99.1.** The CNG de-fueling port should be an ANSI/AGA NGV1 certified receptacle. The CNG de-fueling port should be located on the curbside of the coach, in a location that is compatible with standard de-fueling station operations. The de-fueling system should incorporate the following characteristics:

- L.99.1.1.** Dust Cap permanently “tethered” to the de-fueling port
- L.99.1.2.** Device(s) to prevent inadvertent defueling. Specifications to be provided by procuring agency
- L.99.1.3.** Location/method of attaching CNG fuel system to earth ground
- L.99.1.4.** Components compatible with procuring Agency’s de-fueling operation

L.100. FINAL DRIVE

- L.100.1.** The bus should be driven by a single heavy-duty axle at the rear with a load rating sufficient for the bus loaded to GVWR. Transfer of gear noise to the bus interior should be minimized. The drive axle should be designed to operate for not less than 300,000 miles on the design operating profile without replacement or major repairs. The lubricant drain plug should be magnetic type, external hex head. If a planetary gear design is employed, the oil level in the planetary gears should be easily checked through the plug or sight gauge. The drive shaft should be guarded to prevent it striking the floor of the coach or the ground in the event of a tube or universal joint failure.

L.101. EMISSIONS/EXHAUST

- L.101.1.** Exhaust Emissions
- L.101.2.** The engine should meet all applicable emission standards.

L.102. EXHAUST SYSTEM

- L.102.1.** Exhaust gases and waste heat should be discharged from the roadside rear corner of the roof. The exhaust pipe should be of sufficient height to prevent exhaust gases and waste heat from discoloring or causing heat deformation to the bus. The entire exhaust system should be adequately shielded to prevent heat damage to any bus component. The exhaust outlet should 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 catalyst.

L.103. CHASSIS

- L.103.1.** SUSPENSION
- L.103.2.** GENERAL REQUIREMENTS

- L.103.2.1.** Both the front and rear suspensions should be pneumatic type. The basic suspension system should last the service life of the bus without major overhaul or replacement. Normal replacement items, such as one suspension bushing, shock absorbers, or air spring should be replaceable by a 3M mechanic in 30 minutes or less. Adjustment points should be minimized and should not be subject to a loss of adjustment in service. Necessary adjustments should be easily accomplished without removing or disconnecting the components.

L.104. SPRINGS AND SHOCK ABSORBERS

- L.104.1.** Travel
- L.104.2.** The suspension system should permit a minimum wheel travel of 3 inches jounce-upward travel of a wheel when the bus hits a bump (higher than street surface), and 3 inches rebound-downward travel when the bus comes off a bump and the wheels fall relative to the body. Elastomeric bumpers should be provided at the limit of jounce travel. Rebound travel may be limited by elastomeric bumpers or hydraulically within the shock absorbers. Suspensions should 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 1/2 inch at any point from the height required.

L.105. DAMPING

- L.105.1.** Vertical damping of the suspension system should be accomplished by hydraulic shock absorbers mounted to the suspension arms or axles and attached to an appropriate location on the chassis. Damping should be sufficient to control coach motion to 3 cycles or less after hitting road perturbations. Shock absorbers should maintain their effectiveness for at least 50,000 miles of the service life of the bus. Each unit should be replaceable by a 2M mechanic in less than 15 minutes. The shock absorber bushing should be made of elastomeric material that will last the life of the shock absorber.

L.106. LUBRICATION

L.106.1. All elements of steering, suspension, and drive systems requiring scheduled lubrication should be provided with grease fittings conforming to SAE Standard J534. These fittings should be located for ease of inspection, and should be accessible with a standard grease gun without flexible hose end from a pit or with the bus on a hoist. Each element requiring lubrication should have its own grease fitting with a relief path. Lubricant specified should be standard for all elements on the bus serviced by standard fittings.

L.107. KNEELING

L.107.1. A kneeling system should lower the entrance(s) of the bus a minimum of 2.5 inches during loading or unloading operations regardless of load up to GVWR, measured at the longitudinal centerline of the entrance door(s), by the driver using a three position, spring loaded to center switch. Downward direction will lower the bus. Release of switch at any time will completely stop lowering motion and hold height of the bus at that position. Upward direction of the switch will allow the system to go to floor height without the driver having to hold the switch up.

L.107.2. Brake and Throttle interlock should prevent movement when the bus is kneeled. The kneel control should be disabled when the bus is in motion. The bus should kneel at a maximum rate of 1.25 inches per second at essentially a constant rate. After kneeling, the bus should rise within 2 seconds to a height permitting the bus to resume service and should rise to the correct operating height within 7 seconds regardless of load up to GVWR. During the lowering and raising operation, the maximum acceleration should not exceed 0.2g and the jerk should not exceed 0.3g/sec.

L.107.3. An indicator visible to the driver should 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, minimum 3" diameter, amber lens should be provided that will blink when kneel feature activated. Kneeling should not be operational while the wheelchair ramp is deployed or in operation.

L.108. WHEELS AND TIRES

L.108.1. Wheels and rims should be hub-piloted with polished aluminum rims and should resist rim flange wear. All wheels should be interchangeable and should be removable without a puller. Wheels should be compatible with tires in size and load-carrying capacity. Front wheels and tires should be balanced as an assembly per SAE J1986.

L.109. TIRES

L.109.1. Tires should 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 should not exceed the tire supplier's rating

L.110. STEERING

L.110.1. FRONT AXLE

L.110.1.1. The front axle should be solid beam, non-driving with a load rating sufficient for the bus loaded to GVWR and should be equipped with grease type front wheel bearings and seals.

L.110.1.2. All friction points on the front axle should be equipped with replaceable bushings or inserts and lubrication fittings easily accessible from a pit or hoist.

L.111. STRENGTH

L.111.1. Fatigue life of all steering components should exceed 1,000,000 miles. No element of the steering system should sustain a Class I failure when one of the tires hits a curb or strikes a severe road hazard.

L.112. TURNING RADIUS

L.112.1. Outside body corner turning radius for a standard configuration. The 35-foot long bus should have a turning radius not to exceed 39 feet and the 30-foot long bus should have a turning radius not to exceed 34 feet.

L.113. TURNING EFFORT

L.113.1. The steering wheel should be no less than 19 inches in diameter and should be shaped for firm grip with comfort for long periods of time. The steering wheel should be removable with a standard or universal puller. The steering column should have full tilt and telescoping capability allowing the operator to easily adjust the location of the steering wheel.

L.113.2. Hydraulically assisted power steering should be provided. The steering gear should be an integral type with flexible lines eliminated or the number and length minimized. Steering torque applied by the driver should not exceed 10 foot pounds with the front wheels straight ahead to turned 10 degrees. Steering torque may increase to 70 foot pounds when the wheels are approaching the steering stops. Steering effort should be measured with the bus at GVWR, stopped with the brakes released and the engine at normal idling speed on clean, dry, level, commercial asphalt pavement and the tires inflated to recommended pressure. Power steering failure should not result in loss of steering control. With the bus in operation the steering effort should not exceed 55 pounds at the

steering wheel rim and perceived free play in the steering system should not materially increase as a result of power assist failure. Gearing should require no more than seven turns of the steering wheel lock to lock.

- L.113.3. Caster angle should be selected to provide a tendency for the return of the front wheels to the straight position with minimal assistance from the driver.

L.114. BRAKES

L.114.1. SERVICE BRAKE

L.114.2. Actuation

- L.114.2.1. Service brakes should be controlled and actuated by a compressed air system. Force to activate the brake pedal control should be an essentially linear function of the bus deceleration rate and should not exceed 50 pounds at a point 7 inches above the heel point of the pedal to achieve maximum braking. The heel point is the location of the driver's heel when foot is rested flat on the pedal and the heel is touching the floor or heel pad of the pedal. A microprocessor controlled Automatic Braking System (ABS) should be provided. The microprocessor for the ABS system should be protected yet in an accessible location to allow for ease of service. The total braking effort should be distributed between all wheels in such a ratio as to ensure equal friction material wear rate at all wheel locations

- L.114.2.2. Actuation of ABS should override the operation of the brake retarder.

L.115. FRICTION MATERIAL

- L.115.1. The entire service brake system, including friction material, should have a minimum overhaul or replacement life of 30,000 miles with a brake retarder on the design operating profile. Brakes should be self-adjusting throughout this period. Visible stroke indicators should be provided to allow service personnel to easily identify when the brakes are not in correct adjustment. The brake linings should be made of non-asbestos material. In order to aid maintenance personnel in determining extent of wear, a provision such as a scribe line or chamfer indicating the thickness at which replacement becomes necessary, should be provided on each brake lining.

L.116. HUBS AND DRUMS

- L.116.1. Replaceable wheel bearing seals should run on replaceable wear surfaces or be of an integral wear surface sealed design. Wheel bearing and hub seals should not leak or weep lubricant for 100,000 miles when running on the design operating profile.
- L.116.2. The bus should be equipped with brake drums. Brake drums should allow machining to ¼ inch oversize.
- L.116.3. The brake system material and design should be selected to absorb and dissipate heat quickly so the heat generated during braking operation does not glaze brake linings. The heat generated should not increase the temperature of tire beads and wheel contact area to more than that allowed by the tire manufacturer.

L.117. PARKING /EMERGENCY BRAKE

- L.117.1. The parking brake should 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 emergency brake release should be provided to release the brakes in the event of automatic emergency brake application. The parking brake valve button will pop out when air pressure drops below requirements of FMVSS 121. The driver should be able to manually depress and hold down the emergency brake release valve to release the brakes and maneuver the bus to safety. Once the operator releases the emergency brake release valve, the brakes should engage to hold the bus in place.

L.118. PNEUMATIC SYSTEM

L.118.1. GENERAL

- L.118.1.1. The bus air system should operate the air-powered accessories and the braking system with reserve capacity. New buses should not leak down more than 5 psi as indicted on the instrument panel mounted air gauges, within 15 minutes from the point of governor cut-off.
- L.118.1.2. Provision should be made to apply shop air to the bus air systems using a standard tire inflation type valve. A quick disconnect fitting specified in attachments to Part 5: Technical Specifications, should be easily accessible and located in the engine compartment and near the front bumper area for towing. Retained caps should be installed to protect fitting against dirt and moisture when not in use.
- L.118.1.3. Air for the compressor should be filtered through the main engine air cleaner system. The air system should be protected by a pressure relief valve set at 150 psi and should be equipped with check valve and pressure protection valves to assure partial operation in case of line failures.

L.119. AIR COMPRESSOR

- L.119.1. The engine-driven air compressor should be sized to charge the air system from 40 psi to the governor cutoff pressure in less than 3 minutes while not exceeding the fast idle speed setting of the engine.

L.120. AIR LINES AND FITTINGS

- L.120.1.** Air lines, except necessary flexible lines, should 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 degrees F. Nylon tubing should be installed in accordance with the following color-coding standards:
- L.120.1.1.** *Green* Indicates primary brakes and supply
 - L.120.1.2.** *Red* Indicates secondary brakes
 - L.120.1.3.** *Brown* Indicates parking brake
 - L.120.1.4.** *Yellow* Indicates compressor governor signal
 - L.120.1.5.** *Black* Indicates accessories
- L.120.2.** Line supports should prevent movement, flexing, tension strain, and vibration. Copper lines should 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 should be pre-bent on a fixture that prevents tube flattening or excessive local strain. Copper lines should be bent only once at any point, including pre-bending and installation. Rigid lines should be supported at no more than 5-foot intervals. Nylon lines may be grouped and should be supported at 2-foot intervals or less.
- L.120.3.** The compressor discharge line between power plant and body-mounted equipment should 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 should be flexible Teflon hose with a braided stainless steel jacket. End fittings should be standard SAE or JIC brass or steel, flanged, swivel type fittings. Flexible hoses should be as short as practicable and individually supported. They should not touch one another or any part of the bus except for the supporting grommets. Flexible lines should be supported at 2-foot intervals or less.
- L.120.4.** Air lines should be clean before installation and should be installed to minimize air leaks. All air lines should be sloped toward a reservoir and routed to prevent water traps. Grommets or insulated clamps should protect the air lines at all points where they pass through understructure components.

L.121. AIR RESERVOIRS

- L.121.1.** All air reservoirs should meet the requirements of FMVSS Standard 121 and SAE Standard J10 and should be equipped with clean-out plugs and guarded or flush type drain valves. Major structural members should protect these valves and any automatic moisture ejector valves from road hazards. Reservoirs should be sloped toward the drain valve. All air reservoirs should have brass drain valves which discharge below floor level with lines routed to eliminate the possibility of water traps and/or freezing in the drain line.

L.122. AIR SYSTEM DRYER

- L.122.1.** An air dryer should prevent accumulation of moisture and oil in the air system. The air dryer system should include a replaceable desiccant bed, electrically heated drain, and activation device. A 2M/3M mechanic should replace the desiccant in less than 15 minutes.
- L.122.2.** A provision should be included to collect/remove oil from the air system to prevent affecting function and/or damaging pneumatic system components.

L.123. BODY

L.123.1. DESIGN

- L.123.1.1.** The exterior and body features, including grilles and louvers, should be shaped to facilitate cleaning by automatic bus washers without snagging washer brushes. Water and dirt should not be retained in or on any body feature to freeze or bleed out onto the bus after leaving the washer. The body and windows should 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 should be sufficiently stiff to minimize vibration, drumming or flexing while the bus is in service. When panels are lapped, the upper and forward panels should act as a watershed. However if entry of moisture into interior of vehicle is prevented by other means, then rear cap panels may be lapped otherwise. The windows, hatches, and doors should be able to be sealed. Accumulation on any window of the bus of spray and splash generated by the bus' wheels on a wet road should be minimized.

L.124. CRASHWORTHINESS

- L.124.1.** The bus body and roof structure should withstand a static load equal to 150 percent of the curb weight evenly distributed on the roof with no more than a 6-inch reduction in any interior dimension. Windows should remain in place and should not open under such a load. These requirements must be met without the roof mounted CNG cylinders installed.

- L.124.2.** The bus should withstand a 25-mph impact by a 4,000-pound automobile at any point, excluding doorways, along either side of the bus with no more than 3 inches of permanent structural deformation at seated passenger hip height. This impact should not result in sharp edges or protrusions in the bus interior.
- L.124.3.** Exterior panels below 35 inches from ground level should withstand a static load of 2,000 pounds applied perpendicular to the bus by a pad no larger than 5 inches square. This load should not result in deformation that prevents installation of new exterior panels to restore the original appearance of the bus.
- L.124.4.** In addition to the above requirements, NFPA-52 and local regulations must be met.

L.125. MATERIALS

- L.125.1.** Body materials should be selected and the body fabricated to reduce maintenance, extend durability, and provide consistency of appearance throughout the service life of the bus. Detailing should be kept simple; add-on devices and trim, where necessary, should be minimized and integrated into the basic design.

L.126. CORROSION

- L.126.1.** The bus flooring, sides, roof, understructure, axle suspension components should resist corrosion or deterioration from atmospheric conditions and road salts for a period of 12 years or 500,000 miles whichever comes first. It should maintain structural integrity and nearly maintain original appearance throughout its service life, provided that it is maintained by the agency in accordance with the procedures specified in the Contractor's service manual. With the exception of periodically inspecting the visible coatings applied to prevent corrosion and reapplying these coatings in limited spots, the Contractor should not require the complete reapplication of corrosion compounds over the life of the bus.
- L.126.2.** All exposed surfaces and the interior surfaces of tubing and other enclosed members below lower window line should be corrosion resistant.
- L.126.3.** All materials that are not inherently corrosion resistant should be protected with corrosion-resistant coatings. All joints and connections of dissimilar metals should be corrosion-resistant and should be protected from galvanic corrosion. Representative samples of all materials and connections should withstand a 2-week (336-hour) salt spray test in accordance with ASTM Procedure B-117 with no structural detrimental effects to normally visible surfaces, and no weight loss of over 1 percent.

L.127. RESONANCE AND VIBRATION

- L.127.1.** All structure, body, and panel-bending mode frequencies, including vertical, lateral, and torsional modes, should be sufficiently removed from all primary excitation frequencies to minimize audible, visible, or sensible resonant vibrations during normal service.

L.128. FIRE PROTECTION

- L.128.1.** The passenger and engine compartments should be separated by a bulkhead(s) that should, by incorporation of fireproof materials in its construction, be a firewall. The engine compartment should include areas where the engine and exhaust system are housed including the muffler, if mounted above the horizontal shelf. This firewall should preclude or retard propagation of an engine compartment fire into the passenger compartment and should be in accordance with the Recommended Fire Safety Practices defined in FTA Docket 90, dated October 20, 1993. Only necessary openings should be allowed in the firewall, and these should be fireproofed. Any passageways for the climate control system air should be separated from the engine compartment by fireproof material. Piping through the bulkhead should have copper, brass, or fireproof fittings sealed at the firewall with copper or steel piping on the forward side. Wiring may pass through the bulkhead only if connectors or other means are provided to prevent or retard fire propagation through the firewall. Engine access panels in the firewall should be fabricated of fireproof material and secured with fireproof fasteners. These panels, their fasteners, and the firewall should be constructed and reinforced to minimize warping of the panels during a fire that will compromise the integrity of the firewall.

L.129. DISTORTION

- L.129.1.** The bus, loaded to GVWR and under static conditions, should not exhibit deflection or deformation that impairs the operation of the steering mechanism, doors, windows, passenger escape mechanisms and service doors. Static conditions should include the vehicle at rest with any one wheel or dual set of wheels on a 6-inch curb or in a 6-inch deep hole.

L.130. STRUCTURE

L.130.1. Design

- L.130.1.1.** The structure of the bus should be designed to withstand the transit service conditions typical of an urban duty cycle throughout its service life.

L.131. ALTOONA TESTING

- L.131.1.** Prior to acceptance of first bus, the structure of the bus should have undergone appropriate structural testing and/or analysis, including FTA required Altoona testing, to ensure adequacy of design for the urban transit service.

Any items that required repeated repairs or replacement must undergo the corrective action with supporting test and analysis. A report clearly describing and explaining the failures and corrective actions taken to ensure any and all such failures will not occur should be submitted to the agency.

L.132. TOWING

- L.132.1.** Towing devices should be provided on each end of the bus. Towing devices should accommodate flat-bedding or flat-towing. Each towing device should withstand, without permanent deformation, tension loads up to 1.2 times the curb weight of the bus within 20 degrees of the longitudinal axis of the bus. The rear towing device(s) should not provide a toehold for unauthorized riders.
- L.132.2.** The front towing devices should allow attachment of adapters for a rigid tow bar and should permit lifting and towing of the bus, at curb weight, until the front wheels are clear off the ground.
- L.132.3.** The rear towing devices should permit lifting and towing of the bus for a short distance, such as in cases of an emergency, to allow access to provisions for front towing of a bus. Each towing device should accommodate a crane hook with a 1-inch throat.

L.133. JACKING

- L.133.1.** It should 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 should 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 should permit easy and safe jacking with the flat tire or dual set on a 6 inch high run up block not wider than a single tire. Jacking and changing any one tire should be completed by a 2M mechanic helper in less than 30 minutes from the time the bus is approached. The bus should withstand such jacking at any one or any combination of wheel locations without permanent deformation or damage.
- L.133.2.** Jacking pads should be painted safety yellow or orange for ease of identification.

L.134. HOISTING

- L.134.1.** The bus axles or jacking plates should accommodate the lifting pads of a 2 post hoist system. Jacking plates, if used as hoisting pads, should be designed to prevent the bus from falling off the hoist. Other pads or the bus structure should support the bus on jack stands independent of the hoist.

L.135. FLOOR

L.135.1. Design

- L.135.1.1.** The floor should be essentially a continuous flat plane, except at the wheel housings and platforms. The floor height as specified to eliminate steps and facilitate boarding and de-boarding of passengers.
- L.135.1.2.** The floor design should consist of two levels (bi-level construction). Aft of the rear door extending to the rear settee riser, the floor height may be raised to a height approximately 18 inches above the lower level. An increase slope should be allowed on the upper level not to exceed 3½° off the horizontal.
- L.135.1.3.** Where the floor meets the walls of the bus, as well as other vertical surfaces, such as, platform risers, the surface edges should be blended with a circular section of radius not less than 1 inch. Similarly, a molding or cove should prevent debris accumulation between the floor and wheel housings. The vehicle floor in the area of the entrance and exit doors should have a lateral slope not exceeding 2deg to allow for drainage.

L.136. STRENGTH

- L.136.1.** 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 should not be used to retain the floor and all floor fasteners should be serviceable from one side only. The use of adhesives to secure the floor to the structure should be allowed only in combination with the use of bolt or screw fasteners and its effectiveness should last throughout life of the coach. Tapping plates, if used for the floor fasteners, should be no less than the same thickness as a standard nut and all floor fasteners should be secured and protected from corrosion for the service life of the bus. The floor deck should be reinforced as needed to support passenger loads. At GVWR, the floor should have an elastic deflection of no more than 0.60 inches from the normal plane. The floor should withstand the application of 2.5 times gross load weight without permanent detrimental deformation. Floor, with coverings applied, should withstand a static load of at least 150 pounds applied through the flat end of a ½-inch-diameter rod, with 1/32-inch radius, without permanent visible deformation.

L.137. CONSTRUCTION

- L.137.1.** The floor should consist of the subfloor and the floor covering (See 5.4.4.5 Floor Covering). The floor, as assembled, including the sealer, attachments and covering should be waterproof, nonhygroscopic, and resistant to mold growth. The subfloor should be resistant to the effects of moisture, including decay (dry rot). It should be impervious to wood destroying insects such as termites.

L.137.2. If plywood is used, it should be certified at the time of manufacturing by an industry approved third-party inspection agency such as APA- The Engineered Wood Association (formerly the American Plywood Association). Plywood should be of a thickness adequate to support the design loads, manufactured with exterior glue, satisfy the requirements of a Group I Western panel as defined in PS 1-95 (Voluntary Product Standard PS 1-95, Construction and Industrial Plywood) and be of a grade that is manufactured with a solid face and back. Plywood should be installed with the highest-grade veneer up. Plywood should be pressure-treated with a preservative chemical that prevents decay and damage by insects. Preservative treatments should utilize no EPA listed hazardous chemicals. The concentration of preservative chemical should 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 should have a moisture content at or below fifteen percent. A barrier should be installed to prevent contact by road salt with the plywood panels.

L.138. PLATFORMS

L.138.1. General

L.138.1.1. Platform height should not exceed 12 inches. Trim should be provided along top edges of platforms unless integral nosing is provided. Except where otherwise indicated, covering of platform surfaces and risers should be same material as specified for floor covering.

L.138.1.2. Trim installed along edges of platforms should be constructed of stainless steel.

L.138.1.3. Other raised areas such as for providing space for underfloor installation of components, should be limited. Such raised areas should be constructed in accordance to these specifications.

L.139. OPERATOR'S PLATFORM

L.139.1. The operator's platform should be of a height to render the position of the operator with respect to the road surface the same as on standard floor buses. If the height of the operator's platform exceeds 12 inches, a step should be provided to allow for ease in boarding. A warning decal or sign should be provided to alert operator to the change in floor level.

L.140. FAREBOX

L.140.1. If the driver's platform is higher than 12 inches, then the farebox is to be mounted on platform of suitable height to provide this accessibility for operator without compromising passenger's access.

L.141. INTERMEDIATE PLATFORM

L.141.1. If the vehicle is of a bi-level floor design, an intermediate platform should be provided along the center aisle of the bus to facilitate passenger traffic between the upper and lower floor levels. This intermediate platform should be cut into the rear platform and should be approximately the aisle width, 18 inches deep and approximately one half the height of the upper level relative to the lower level. The horizontal surface of this platform should be covered with yellow Hypalon ribbed rubber or skid-resistant material and should be sloped slightly for drainage. A warning decal or sign should be provided at the immediate platform area to alert passengers to the change in floor level.

L.142. WHEEL HOUSING

L.142.1. Design

L.142.1.1. Sufficient clearance and air circulation should be provided around the tires, wheels, and brakes to preclude overheating when the bus is operating on the design operating profile.

L.142.1.2. Interference between the tires and any portion of the bus should not be possible in maneuvers up to the limit of tire adhesion with weights from curb weight to GVWR. Wheel housings should be adequately reinforced where seat pedestals are installed. Wheel housings should have sufficient sound insulation to minimize tire and road noise.

L.142.1.3. Design and construction of front wheel housings should allow for the installation of radio/electronic equipment storage compartment on interior top surface or its use as a luggage rack.

L.142.1.4. The exterior finish of the front wheel housings should be scratch-resistant, Interior Panels and Finishes, and complement interior finishes of the bus to minimize the visual impact of the wheel housing. If fiberglass wheel housings are provided, then they should be color-impregnated to match interior finishes. The lower portion extending to approximately 12 inches above floor should be equipped with additional mar-resistant coating or stainless steel trim.

L.143. CONSTRUCTION

L.143.1. Wheel housings should be constructed of corrosion-resistant, fire-resistant material. Wheel housings, as installed and trimmed, should withstand impacts of a 2-inch steel ball with at least 200 foot-pounds of energy without penetration.

L.144. EXTERIOR PANELS AND FINISHES

L.144.1. PEDESTRIAN SAFETY

L.144.1.1. Exterior protrusions greater than ½ inch and within 80 inches of the ground should have a radius no less than the amount of the protrusion. The exterior rearview mirrors and required lights and reflectors are exempt from the protrusion requirement. Advertising frames should protrude no more than ⅜ inch from the body surface and should have the exposed edges and corners rounded to the extent practicable. Grilles, doors, bumpers and other features on the sides and rear of the bus should be designed to minimize the ability of unauthorized riders to secure toeholds or handholds.

L.145. REPAIR AND REPLACEMENT

L.145.1. Exterior panels below the lower daylight opening and within 35 inches above ground level should be divided into sections that are repairable or replaceable by a 3M mechanic in less than 30 minutes for a section up to 5 feet long (excludes painting).

L.145.2. Rain gutters should 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 should not drain onto the windshield, or operator's side window, or into the door boarding area. Cross sections of the gutters should be adequate for proper operation.

L.145.3. Rain gutter should also be provided above passenger side windows.

L.146. RUBRAILS

L.146.1. Rubrails composed of flexible, resilient material should be provided to protect both sides of the bus body from damage caused by minor sideswipe accidents with automobiles. Rubrails should have vertical dimensions of no less than 2 inches or 50 mm with the centerline no higher than 35 inches above the ground between the wheelwells. The rubrails should withstand impacts of 200 foot-pounds of energy from a steel-faced spherical missile no less than 9 inches in diameter and of a 500-pound load applied anywhere along their length by a rigid plate 1 foot in length, wider than the rubrail, and with 1/4-inch end radii, with no visible damage to the rubrail, retainer, or supporting structure. The rubrail may be discontinued at doorways and wheelwells. A damaged portion of the rubrail should be replaceable without requiring removal or replacement of the entire rubrail.

L.147. FENDER SKIRTS

L.147.1. Features to minimize water spray from the bus in wet conditions should be included in wheel housing design. Any fender skirts should be easily replaceable. They should be flexible if they extend beyond the allowable body width. Wheels and tires should be removable with the fender skirts in place.

L.148. SPLASH APRONS

L.148.1. Splash aprons, composed of 1/4-inch-minimum composition or rubberized fabric, should be installed behind and/or in front of wheels as needed to reduce road splash and protect underfloor components. The splash aprons should extend downward to within 4 inches of the road surface at static conditions. Apron widths should be no less than tire widths, except for the front apron which should extend across the width of the bus. Splash aprons should be bolted to the bus understructure. Splash aprons and their attachments should be inherently weaker than the structure to which they are attached. The flexible portions of the splash aprons should not be included in the road clearance measurements. Other splash aprons should be installed where necessary to protect bus equipment.

L.149. SERVICE COMPARTMENTS AND ACCESS DOORS

L.149.1. ACCESS DOORS

L.149.1.1. Conventional or pantograph hinged doors should 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 and transmission fluid. Access openings should be sized for easy performance of tasks within the compartment including tool operating space. Access doors should be of rugged construction and should maintain mechanical integrity and function under normal operations throughout the service life of the bus. They should close flush with the body surface. All doors should be hinged at the top or on the forward edge and should be prevented from coming loose or opening during transit service or in bus washing operations. Doors with top hinges should have safety props stored behind the door or on the doorframe. All access doors should be retained in the open position by props or counterbalancing with over-center or gas-filled springs and should be easily operable by one person. Springs and hinges should be corrosion resistant. Latch handles should be flush with, or recessed behind, the body contour and should be sized to provide an adequate grip for opening. Access doors, when opened, should not restrict access for servicing other components or systems.

L.149.1.2. Access doors larger in area than 100 square inches should be equipped with corrosion resistant flush-mounted locks. All such access door locks which require tool to open should be standardized throughout the vehicle and will require a nominal 5/16 inch square male tool to open or lock.

L.149.1.3. The battery compartment or enclosure should be vented and self-draining. It should be accessible only from outside the bus. All components within the battery compartment, and the compartment itself, should be protected from damage or corrosion from the electrolyte and gases emitted by the battery. The inside surface of the battery compartment's access door should 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.

L.150. SERVICE AREA LIGHTING

L.150.1. Lights should 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. Sealed lamp assemblies should be provided in the engine compartment and should be controlled by a switch located near the rear start controls in the engine compartment. Necessary lights, located in other service compartments, should be provided with switches on the light fixture or convenient to the light.

L.151. BUMPERS

L.151.1. LOCATION

L.151.1.1. Bumpers should provide impact protection for the front and rear of the bus with the top of the bumper being 28 +/- 2 inches above the ground. Bumper height should be such that when one bus is parked behind another, a portion of the bumper faces will contact each other.

L.152. FRONT BUMPER

L.152.1. No part of the bus, including the bumper, should 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' longitudinal centerline. The bumper should return to its pre-impact shape within 10 minutes of the impact. The bumper should protect the bus from damage as a result of 6.5 mph impacts at any point by the Common Carriage with Contoured Impact Surface defined in Figure 2 of FMVSS 301 loaded to 4,000 pounds parallel to the longitudinal centerline of the bus and 5.5-mph impacts into the corners at a 30° angle to the longitudinal centerline of the bus. The energy absorption system of the bumper should be independent of every power system of the bus and should not require service or maintenance in normal operation during the service life of the bus. The bumper may increase the overall bus length by no more than 7 inches.

L.153. REAR BUMPER

L.153.1. No part of the bus, including the bumper, should 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 should return to its pre-impact shape within 10 minutes of the impact. When using a yard tug with a smooth, flat plate bumper 2 feet wide contacting the horizontal centerline of the rear bumper, the bumper should provide protection at speeds up to 5 mph, over pavement discontinuities up to 1 inch high, and at accelerations up to 2 mph/sec. The rear bumper should protect the bus, when impacted anywhere along its width by the Common Carriage with Contoured Impact Surface defined in Figure 2 of FMVSS 301 loaded to 4,000 pounds, at 4 mph parallel to, or up to a 30° angle to, the longitudinal centerline of the bus. The rear bumper should be shaped to preclude unauthorized riders standing on the bumper. The bumper should be independent of all power systems of the bus and should not require service or maintenance in normal operation during the service life of the bus. The bumper may increase the overall bus length by no more than 7 inches.

L.154. BUMPER MATERIAL

L.154.1. Bumper material should be corrosion-resistant and withstand repeated impacts of the specified loads without sustaining damage. Visible surfaces should be black or color -coordinated with the bus exterior. The bumper qualities should be sustained throughout the service life of the bus.

L.155. FINISH AND COLOR

L.155.1. All exterior surfaces should be smooth and free of wrinkles and dents. Exterior surfaces to be painted should be properly prepared as required by the paint system supplier, prior to application of paint to assure a proper bond between the basic surface and successive coats of original paint for the service life of the bus. Drilled holes and cutouts in exterior surfaces should be made prior to cleaning, priming and painting to prevent corrosion. The bus should be completely painted prior to installation of exterior lights, windows, mirrors and other items which 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.

L.155.2. Paint should be applied smoothly and evenly with the finished surface free of dirt and the following other imperfections:

L.155.2.1. Blisters or bubbles appearing in the topcoat film.

L.155.2.2. Chips, scratches, or gouges of the surface finish.

L.155.2.3. Cracks in the paint film.

L.155.2.4. Craters where paint failed to cover due to surface contamination.

L.155.2.5. Overspray.

L.155.2.6. Peeling

L.155.2.7. Runs or sags from excessive flow and failure to adhere uniformly to the surface.

L.155.2.8. Chemical stains and water spots.

L.155.3. To the degree consistent with industry standards for commercial vehicle finishes, painted surfaces should have gloss and orange peel should be minimized. All exterior finished surfaces should be impervious to diesel fuel, gasoline and commercial cleaning agents. Finished surfaces should resist damage by controlled applications of commonly used graffiti-removing chemicals. Colors and paint schemes should be in accordance with the attachments to Part 5: Technical Specifications.

L.156. NUMBERING AND SIGNING

L.156.1. Monograms, numbers and other special signing specified by the agency should be applied to the inside and outside of the bus as required. Signs should be durable and fade-chip , and peel-resistant; they may be painted signs, decals, or pressure-sensitive appliques. All decals should be sealed with clear, waterproof sealant around all exposed edges if required by the decal supplier. Signs should be provided in compliance with the ADA requirements defined in 49 CFR Part, Subpart B, 38.27. The exact wording, size, color, and locations for these signs are found with requirements for other special signs in attachments to Part 5: Technical Specifications.

L.157. EXTERIOR LIGHTING

L.157.1. All exterior lights should be designed to prevent entry and accumulation of moisture or dust, and each lamp should be replaceable in less than 5 minutes by a 2M mechanic helper. Commercially available LED (Light Emitting Diode)-type lamps should be used unless approved by the agency, excluding applications where white lights are used, such as for headlights. Lights mounted on the engine compartment doors should be protected from the impact shock of door opening and closing. Lamps, lenses and fixtures should be interchangeable to the extent practicable. Two hazard lamps at the rear of the bus should be visible from behind when the engine service doors are opened. Light lenses should be designed and located to prevent damage when running the vehicle through an automatic bus washer. Lights located on the roof and sides (directionals) of the bus should have protective shields or be of the flush mount type to protect the lens against minor impacts.

L.157.2. Visible and audible warning should inform following vehicles or pedestrians of reverse operation. Visible reverse operation warning should conform to SAE Standard J593. Audible reverse operation warning should conform to SAE Recommended Practice J994 Type C or D.

L.157.3. Lamps at the front and rear passenger doorways should comply with ADA requirements and should activate only when the doors open. These lamps should illuminate the street surface to a level of no less than 1 foot-candle for a distance of 3 feet outward from the outboard edge of the door threshold. The lights may be positioned above or below the lower daylight opening of the windows and should be shielded to protect passengers' eyes from glare.

L.158. INTERIOR PANELS AND FINISHES

L.158.1. GENERAL

L.158.1.1. Materials should be selected on the basis of maintenance, durability, appearance, safety, flammability, and tactile qualities. Trim and attachment details should be kept simple and unobtrusive. Materials should be strong enough to resist everyday abuse and vandalism; they should be resistant to scratches and markings. Interior trim should be secured to avoid resonant vibrations under normal operational conditions.

L.158.1.2. Interior surfaces more than 10 inches below the lower edge of the side windows or windshield should be shaped so that objects placed on them fall to the floor when the coach is parked on a level surface. The entire interior should be cleanable with a hose, using a liquid soap attachment. Water and soap should not normally be sprayed directly on the instrument and switch panels.

L.159. FRONT END

L.159.1. The entire front end of the bus should be sealed to prevent debris accumulation behind the dash and to prevent the operator's feet from kicking or fouling wiring and other equipment. The front end should be free of protrusions that are hazardous to passengers standing or walking in the front of the bus during rapid decelerations. Paneling across the front of the bus and any trim around the operator's compartment should be formed metal or plastic material. Formed metal dash panels should be painted and finished or may be carpeted or vinyl covered. Plastic dash panels should be reinforced, as necessary, vandal-resistant, and replaceable. All colored, painted, and plated parts forward of the operator's barrier should be finished with a dull matte surface to reduce glare.

REAR END

- L.159.2.** The rear bulkhead and rear interior surfaces should be material suitable for exterior skin, painted and finished to exterior quality, or paneled with melamine-type material, plastic, or carpeting and trimmed with stainless steel, aluminum, or plastic.

L.160. INTERIOR PANELS

L.160.1. GENERAL

- L.160.1.1.** Interior side trim panels and operator's barrier should be textured stainless steel, anodized aluminum, plastic, melamine-type material, or carpeting. Panels should be easily replaceable and tamper-resistant. They should be reinforced, as necessary, to resist vandalism and other rigors of transit bus service. Individual trim panels and parts should be interchangeable to the extent practicable. All materials should comply with the Recommended Fire Safety Practices defined in FTA Docket 90, dated October 20, 1993.

L.161. OPERATOR BARRIER

- L.161.1.** A barrier or bulkhead between the operator and the street-side front passenger seat should be provided. The barrier should minimize glare and reflections in the windshield directly in front of the barrier from interior lighting during night operation.
- L.161.2.** The barrier should extend from the floor or wheel housing to the ceiling and should fit the bus side windows, wall, and ceiling panels to effectively close off driver's area and prevent passengers from reaching the operator or the operator's personal effects.

L.162. MODESTY PANELS

- L.162.1.** Sturdy divider panels constructed of durable, unpainted, corrosion-resistant material complementing the interior trim should be provided to act as both a physical and visual barrier for seated passengers. Modesty panels should be located at doorways to protect passengers on adjacent seats, and along front edge of rear upper level. Design and installation of modesty panels located in front of forward facing seats should include a handhold/grabhandle along its top edge. These dividers should be mounted on the sidewall and should project toward the aisle no farther than passenger knee projection in longitudinal seats or the aisle side of the transverse seats. Modesty panels should extend no higher than the lower daylight opening of the side windows and those forward of transverse seats should extend downward to a level between 1-1/2 and 1 inches above the floor. Panels forward of longitudinal seats should extend to below the level of the seat cushion. Dividers positioned at the doorways should provide no less than a 2-1/2-inch clearance between the modesty panel and the opened door to protect passengers from being pinched. Modesty panels installed at doorways should be equipped with grab rails. The modesty panel and its mounting should withstand a static force of 250 pounds applied to a four-inch by four-inch area in the center of the panel without permanent visible deformation.

L.163. REAR BULKHEAD

- L.163.1.** The rear bulkhead paneling should be contoured to fit the ceiling, side walls, and seat backs so that any litter, such as a cigarette package or newspaper, will tend to fall to the floor or seating surface when the bus is on a level surface. Any air vents in this area should be louvered to reduce airflow noise and to reduce the probability of trash or litter being thrown or drawn through the grille. If it is necessary to remove the panel to service components located on the rear bulkhead, the panel should be hinged or should be able to be removed and replaced by a 3M mechanic in 5 minutes. Grilles where access to or adjustment of equipment is required should be heavy duty and designed to minimize damage.

L.164. HEADLINING

- L.164.1.** Ceiling panels should be textured stainless steel, anodized aluminum, melamine-type material, carpeting, or material suitable for exterior skin painted and finished to exterior quality. Headlining should be supported to prevent buckling, drumming, or flexing and should be secured without loose edges. Headlining materials should 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, should be stainless steel, aluminum, or plastic, colored to complement the ceiling material. Headlining panels covering operational equipment that is mounted above the ceiling should be on hinges for ease of service but retained to prevent inadvertent opening.

L.165. FASTENING

- L.165.1.** Interior panels should be attached so that there are no exposed unfinished or rough edges or rough surfaces. Panels and fasteners should not be easily removable by passengers. Interior trim fasteners, where required, should be rivets or cross-recessed head screws.

L.166. INSULATION

- L.166.1.** Any insulation material used between the inner and outer panels should be sealed or self-sealing to minimize entry and/or retention of moisture. Insulation properties should be unimpaired during the service life of the bus. Any insulation material used inside the engine compartment should not absorb or retain oils or water and should be

designed to prevent casual damage that may occur during maintenance operations. All insulation materials should comply with the Recommended Fire Safety Practices defined in FTA Docket 90, dated October 20, 1993.

- L.166.2.** The combination of inner and outer panels on the sides, roof, wheelwells and ends of the bus, and any material used between these panels should provide a thermal insulation sufficient to meet the interior temperature requirements of Part 5: Technical Specifications. The bus body should be thoroughly sealed so that the operator or passengers cannot feel drafts during normal operations with the passenger doors closed.

L.167. FLOOR COVERING

- L.167.1.** The floor covering should 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, should be smooth and present no tripping hazards. The standee line should be at least 2 inches wide and should extend across the bus aisle. This line should be the same color as the outboard edge of the entrance/exit areas. Color/pattern should be consistent throughout the floor covering.
- L.167.2.** Any areas on floor, which are not intended for standees, such as areas "swept" during passenger door operation, should be clearly and permanently marked.
- L.167.3.** The floor in the operator's compartment should be easily cleaned and should be arranged to minimize debris accumulation.
- L.167.4.** A one-piece center strip should 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 center strip should 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 should extend from the center strip to the outboard edge of the rear/exit area.
- L.167.5.** The floor under the seats should be covered with smooth surface flooring material. The floor covering should closely fit the sidewall cove or extend to the top of the cove.

L.168. PASSENGER INTERIOR LIGHTING

- L.168.1.** The interior LED lighting system should provide a minimum 15 foot-candle illumination on a 1 square foot plane at an angle of 45 degrees from horizontal, centered 33 inches above the floor and 24 inches in front of the seat back at each seat position. Allowable average light level for the rear bench seats should be 7 foot-candles. Floor surface in the aisles should be a minimum of 10 foot-candles, vestibule area a minimum of 4 foot-candles with the front doors open and a minimum of 2 foot-candles with the front doors closed. The front entrance area and curb lights should illuminate when the front door is open and master run switch is in the "Lights" positions. Rear exit area and curb lights should illuminate when rear door is unlocked.
- L.168.2.** Step lighting for the intermediate platform between lower and upper floor levels should be provided and should illuminate in all engine run positions. The step lighting should be low-profile to minimize tripping and snagging hazard for passengers and should be shielded as necessary to protect passenger's eyes from glare.
- L.168.3.** The light source should 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. Fluorescent tubes should be a maximum 6-foot length, single-pin, T 12 type. (with an exception granted for extinguishing or dimming fixtures as noted)
- L.168.4.** Lens material should be clear polycarbonate. Lens should be designed to effectively "mask" the fluorescent tube. Lens should be sealed to inhibit incursion of dust and insects yet are easily removable for service. If threaded fasteners are used they must be held captive in the lens. Access panels should be provided to allow servicing of components located behind light panels. If necessary, the entire light fixture should be hinged.
- L.168.5.** When the master switch is in the RUN or NITE/RUN mode, the first light module on each side of the coach should automatically extinguish or dim when the front door is in the closed position and illuminate when the door is opened. This should be accomplished through use of a ballast specifically designed for this type application without diminishing the life of the fluorescent tubes.
- L.168.6.** The light system may be designed to form part or the entire air distribution duct.
- L.168.7.** A light fixture should be mounted in the ceiling above the farebox location. The fixture should be capable of projecting a concentrated beam of light on the farebox. This light will automatically come on whenever the front doors are opened and the run switch is in the "night run" or "night park" position.

L.169. FARE COLLECTION

- L.169.1.** Space, as far forward as practicable, and structural provisions should be made for installation of currently available fare collection device(s). Location of the fare collection device should not restrict traffic in the vestibule, including wheelchairs if a front door loading device is used, and should allow the operator to easily reach the farebox controls and to view the fare register. The fare box should not restrict access to the operator area, should not restrict operation of operator controls and should not restrict operator's field of view per SAE Recommended Practice. Location and mounting of fare collection device should allow use, without restriction, by passengers.

Fare box location should permit accessibility to the vault for easy manual removal or attachment of suction devices. Meters and counters on the fare box should be readable on a daily basis. A 15-amp minimum, 12 -volt, DC, protected circuit should be available to power the fare box and a 15 amp 24-volt protected circuit should be available for transfer equipment. This power service should include a grounded lead with both wires enclosed in a flexible conduit. The floor under the fare box should be reinforced, as necessary, to provide a sturdy mounting platform and to prevent shaking of the fare box. The fare box, including make, model, mounting provisions, size, weight, and meter locations.

- L.169.2.** Transfer mounting, cutting, and punching equipment should be located in a position convenient to the operator. This equipment is defined in attachments to Part 5: Technical Specifications.

L.170. ACCESS PANELS AND DOORS - INTERIOR

- L.170.1.** Access for maintenance and replacement of equipment should be provided by panels and doors that appear to be an integral part of the interior. Access doors should be hinged with gas props or over-center springs, where practical, to hold the doors out of the mechanic's way. Panel fasteners should be standardized so that only one tool is required to service all special fasteners within the bus.
- L.170.2.** Access doors for the door actuator compartments should be secured with locks, and should prevent entry of mechanism lubricant into the bus interior. The locks should be standardized so that only one tool is required to open access doors on the bus. All fasteners that retain access panels should be captive in the cover.
- L.170.3.** Access openings in the floor should be sealed to prevent entry of fumes and water into the bus interior. Flooring material should be flush with the floor and should be edge-bound with stainless steel, or other material that is acceptable with approval, to prevent the edges from coming loose. Access openings should be asymmetrical so that reinstalled flooring should be properly aligned. Fasteners should tighten flush with the floor.

L.171. PASSENGER ACCOMMODATIONS

L.171.1. PASSENGER SEATING

L.171.2. ARRANGEMENTS AND SEAT STYLE

- L.171.2.1.** The passenger seating arrangement in the bus should be such that seating capacity is maximized and in compliance to the following requirements. The agency recognizes that ramp location, foot room, hip-to-knee room, doorway type and width, seat construction, floor level type, seat spacing requirements, etc. ultimately affect seating capacity and layout.
- L.171.2.2.** Passenger seats should be arranged in a transverse, forward facing configuration, except at the wheel housings where aisle-facing seats may be arranged as appropriate with due regard for passenger access and comfort. Other areas where aisle-facing seats may be provided are at wheelchair securement areas and platforms (such as for fuel tank storage space).
- L.171.2.3.** The passenger seats should be fully cushioned throughout the bus. Note that all applicable seat dimensions specified below should be measured with cushion fully depressed.
- L.171.2.4.** Hip-to-knee room measured from the front of one seat back horizontally across the highest part of the seat to the seat or panel immediately in front, should be no less than 28 inches. At all seating positions in paired transverse seats immediately behind other seating positions hip-to-knee room should be no less than 28 inches.
- L.171.2.5.** In order to maximize seating capacity without unduly affecting passenger comfort, minor variations in the required hip-to-knee room will be allowed in limited areas. All such areas should be identified to the agency prior to bid for approval.
- L.171.2.6.** Foot room, measured at the floor forward from a point vertically below the front of the seat cushion, should be no less than 14 inches. Seats immediately behind the wheel housings and modesty panels may have foot room reduced, provided the wheelhouse is shaped so that it may be used as a footrest or the design of modesty panel effectively allows for foot room.
- L.171.2.7.** Thickness of the transverse seat backs should be minimized at the bottom to increase passenger knee room and passenger capacity. The area between the longitudinal seat backs and the attachment to the bus sidewalls should be designed to prevent debris accumulation.
- L.171.2.8.** The aisle between the seats should be no less than 20 inches wide at seated passenger hip height. Seat backs should be shaped to increase this dimension to no less than 24 inches at standing passenger hip height.
- L.171.2.9.** Raised platforms for passenger seats should not be allowed without Procuring Agency's approval. If vehicle is of a sloped floor design, then raised platforms for passenger seats may be provided in the rear sloped section.

L.172. DIMENSIONS

- L.172.1.** Seat dimensions for the various seating arrangements should have the dimensions as follows (refer to the figure above):
- L.172.1.1.** The width, W, of the seat should be 35 inches.
 - L.172.1.2.** The length, L, should be 17 ±1 inches.
 - L.172.1.3.** The seat back height, B, should be a minimum of 15 inches.
 - L.172.1.4.** The seat height, H, should be 17 ± 1 inches. For the rear lounge (or settee) and longitudinal seats, and seats located above raised areas for storage of under floor components, a cushion height of up to 18 ±2 inches will be allowed. This should also be allowed for limited transverse seats, but only with expressed approval of the agency.
 - L.172.1.5.** The seat cushion slope, S, should be between 5° to 11°.
 - L.172.1.6.** The seat back slope, C, should be between 8° to 17°.
 - L.172.1.7.** The pitch, P, is shown as reference only.

L.173. STRUCTURE AND DESIGN

- L.173.1.** The passenger seat frame and its supporting structure should be constructed and mounted so that space under the seat is maximized to increase wheelchair maneuvering room and is completely free of obstructions to facilitate cleaning.
- L.173.2.** The transverse seat structure should be fully cantilevered from the sidewall with sufficient strength for the intended service. The lowest part of the seat assembly that is within 12 inches of the aisle should be at least 10 inches above the floor. Folding seats used in wheelchair securement areas, as well as, transverse seats mounted in locations at which cantilevered installation is precluded by design and/or structure, need not be cantilevered.
- L.173.3.** The underside of the seat and the sidewall should be configured to prevent debris accumulation and the transition from the seat underside to the bus sidewall to the floor cove radius should be smooth. All transverse objects, including seat backs, modesty panels, and longitudinal seats, in front of forward facing seats should not impart a compressive load in excess of 1,000 pounds onto the femur of passengers ranging in size from a 5th-percentile female of a 95th-percentile male during a 10g deceleration of the bus. This deceleration should peak at .05 □ .015 seconds from initiation. Permanent deformation of the seat resulting from two 95th-percentile males striking the seat back during this 10g deceleration should not exceed 2 inches, measured at the aisle side of the seat frame at height H. Seat back should not deflect more than 14 inches, measured at the top of the seat back, in a controlled manner to minimize passenger injury. Structural failure of any part of the seat or sidewall should not introduce a laceration hazard.
- L.173.4.** The seat assembly should withstand static vertical forces of 500 pounds applied to the top of the seat cushion in each seating position with less than 1/4-inch permanent deformation in the seat or its mountings. The seat assembly should withstand static horizontal forces of 500 pounds evenly distributed along the top of the seat back with less than 1/4-inch permanent deformation in the seat or its mountings. The seat backs at the aisle position and at the window position should withstand repeated impacts of two 40-pound sandbags without visible deterioration. One sandbag should strike the front 40,000 times and the other sandbag should strike the rear 40,000 times. Each sandbag should be suspended on a 36-inch pendulum and should strike the seat back 10,000 times each from distances of 6, 8, 10, and 12 inches. Seats at both seating positions should withstand 4,000 vertical drops of a 40-pound sandbag without visible deterioration. The sandbag should be dropped 1,000 times each from heights of 6, 8, 10, and 12 inches. Seat cushions should withstand 100,000 randomly positioned 3-1/2-inch drops of a squirming, 150-pound, smooth-surfaced, buttocks-shape striker with only minimal wear on the seat covering and no failures to seat structure or cushion suspension components.
- L.173.5.** The back of each transverse seat should incorporate a handhold no less than 7/8 inch in diameter for standees and seat access/egress. The handhold should not be a safety hazard during severe decelerations. The handhold should extend above the seat back near the aisle so that standees should have a convenient vertical assist, no less than 4 inches long that may be grasped with the full hand. This handhold should not cause a standee using this assist to interfere with a seated 50th-percentile male passenger. The handhold should 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 should 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) should 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 vertical assist is. Armrests should not be included in the design of transverse seats.
- L.173.6.** Longitudinal seats should be the same general design as transverse seats but without seat back handholds. Longitudinal seats may be mounted on the wheelhouses. Armrests should be included on the ends of each set of longitudinal seats except on the forward end of a seat set that is immediately to the rear of a transverse seat, the operator's barrier, or a modesty panel and these fixtures perform the function of restraining passengers from sliding forward off the seat. Armrests are not required on longitudinal seats located in the wheelchair parking area that

fold up when the armrest on the adjacent fixed longitudinal seat is within 1-1/2 to 3-1/2 inches of the end of the seat cushion. Armrests should be located from 7 to 9 inches above the seat cushion surface. The area between the armrest and the seat cushion should be closed by a barrier or panel. The top and sides of the armrests should have a minimum width of 1 inch and should be free from sharp protrusions that form a safety hazard.

- L.173.7.** Seat back handhold and armrests should withstand static horizontal and vertical forces of 250 pounds applied anywhere along their length with less than 1/4-inch permanent deformation. Seat back handhold and armrests should withstand 25,000 impacts in each direction of a horizontal force of 125 pounds with less than 1/4-inch permanent deformation and without visible deterioration.
- L.173.8.** A test report should be provided by the Contractor fully documenting compliance with all the requirements defined above upon request. The test report should contain a record of all testing activities, test diagrams, testing equipment, as well as test data related to loads, deflections and permanent deformation of the seat assembly.

L.174. CONSTRUCTION AND MATERIALS

- L.174.1.** Seat should be constructed with materials which comply with the physical test. Selected materials should minimize damage from vandalism and should reduce cleaning time. The seats should be attached to the frame with tamperproof fasteners. Coloring should be consistent throughout the seat material, with no visually exposed portion painted. All visually exposed metal of the standard seat structure including mounting brackets and other components should be aluminum or stainless steel. The seat, pads and cushions should be contoured for individuality, lateral support, and maximum comfort and should fit the framework to reduce exposed edges.
- L.174.2.** Seating and interior trim should have features to maximize passenger comfort. The seat cushion should be supported by springs. The seat cushion and back should be padded with, a cellular foam product that complies with the physical test requirements cited in this document and is no less than 2 inches thick in areas contacted and loaded by passengers in the normal seated position and should be upholstered with vinyl and/or fabric materials.
- L.174.3.** Armrests should be padded with material that is the same as, or similar to, the seat back padding and handhold. Seats, back cushions and other pads should be securely attached and should be detachable by means of a simple release mechanism employing a special tool so that they are easily removable by maintenance personnel but not by passengers. To the extent practicable, seat cushions and pads should be interchangeable throughout the coach bus. Materials should have high resistance to tearing, flexing, and wetting.
- L.174.4.** The minimum radius of any part of the seat back, handhold, or modesty panel in the head or chest impact zone should be a nominal 1/4-inch. Seat covering materials should be selected on the basis of durability, ease of maintenance, and pleasing texture and appearance. The seat back and seat back handhold immediately forward of transverse seats should be constructed of energy absorbing materials to provide passenger protection and, in a severe crash, allow the passenger to deform the seating materials in the impact areas in accordance with the Knee Impact and Head Impact Criteria. Complete seat assemblies should be interchangeable to the extent practicable. Additional construction details, color of the seat material and optional safety padding are defined in attachments to Part 5: Technical Specifications.

L.175. PASSENGER ASSISTS

L.175.1. GENERAL

- L.175.1.1.** Passenger assists in the form of full grip, vertical stanchions or handholds should be provided for the safety of standees and for ingress/egress. Passenger assists should 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 should be provided either as the vertical portion of 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 front doorway, around farebox, and at interior steps for bi-level designs should be powder-coated in high contrast yellow color. The forward-most vertical stanchions on either side of the aisle immediately behind the driver's area, should be plain stainless steel finish to match the rest of vehicle.
- L.175.1.2.** Excluding those mounted on the seats and doors, the assists should have a cross-sectional diameter between 1-1/4 and 1-1/2 inches or should provide an equivalent gripping surface with no corner radii less than 1/4 inch. All passenger assists should permit a full hand grip with no less than 1-1/2 inches of knuckle clearance around the assist. Passenger assists should be designed to minimize catching or snagging of clothes or personal items and should be capable of passing the NHTSA Drawstring Test.
- L.175.1.3.** Any joints in the assist structure should be underneath supporting brackets and securely clamped to prevent passengers from moving or twisting the assists. Passenger assists should be designed to minimize glare in the Operator's area to the extent possible. With the exception of seat and door handholds, all areas of the passenger assists that are handled by passengers including functional components used as passenger assists should be of anodized aluminum or stainless steel. Seat handholds may be of the same construction and finish as the seat frame. Door mounted passenger assists should be of anodized aluminum, stainless steel, or powder coated metal. Connecting tees and angles may be powder coated metal castings. Assists should withstand a force of 300 pounds applied

over a 12-inch lineal dimension in any direction normal to the assist without permanent visible deformation. All passenger assist components, including brackets, clamps, screw heads, and other fasteners used on the passenger assists should be designed to eliminate pinching, snagging and cutting hazards and free from burrs or rough edges.

L.176. FRONT DOORWAY

L.176.1. Front doors, or the entry area, should be fitted with ADA compliant assists. Assists should be as far outward as practicable, but should be located on farther inboard than 6 inches from the outside edge of the entrance step and should be easily grasped by a 5th-percentile female boarding from street level. Door assists should 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.

L.177. VESTIBULE

L.177.1. The aisle side of the operator's barrier, the wheel housings, and when applicable the modesty panels should be fitted with vertical passenger assists that are functionally continuous with the overhead assist and that extend to within 36 inches of the floor. These assists should have sufficient clearance from the barrier to prevent inadvertent wedging of a passenger's arm.

L.177.2. A horizontal passenger assist should be located across the front of the bus and should 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 should provide support for a boarding passenger from the front door through the fare collection procedure. Passengers should be able to lean against the assist for security while paying fares. The assist should be no less than 36 inches above the floor. The assists at the front of the bus should be arranged to permit a 5th-percentile female passenger to easily reach from the door assist, to the front assist, to vertical assists on the operator's barrier, wheel housings, or front modesty panel.

L.178. REAR DOORWAY

L.178.1. Vertical assists that are functionally continuous with the overhead assist should 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 should be provided on modesty panels that are functionally continuous with the rear door assists. Rear doors, or the exit area, should be fitted with assists no less than 3/4 inch in width and should provide at least 1-1/2 inches of knuckle clearance between the assists and their mounting. The assists should be designed to permit a 5th-percentile female to easily move from one assist to another during the entire exiting process. The assists should be located no farther inboard than 6 inches from the outside edge of the rear doorway.

L.179. OVERHEAD

L.179.1. Except forward of the standee line and at the rear door, a continuous, full grip, overhead assist should be provided. This assist should be convenient to standees anywhere in the bus and should be located over the center of the aisle seating position of the transverse seats. The assist should be no less than 70 inches above the floor.

L.179.2. Overhead assists should simultaneously support 150 pounds on any 12-inch length. No more than 5 percent of the full grip feature should be lost due to assist supports.

L.180. LONGITUDINAL SEATS

L.180.1. Longitudinal seats should have vertical assists located between every other designated seating position, except for seats that fold/flip up to accommodate wheelchair securement. Assists should extend from near the leading edge of the seat and should be functionally continuous with the overhead assist. Assists should be staggered across the aisle from each other where practicable and should be no more than 52 inches apart or functionally continuous for a 5th percentile female passenger.

L.181. WHEEL HOUSING BARRIERS/ASSISTS

L.181.1. Unless passenger seating is provided on top of wheel housing, passenger assists should be mounted around the exposed sides of the wheel housings (and propulsion compartments if applicable) which should also be designed to prevent passengers from sitting on wheel housings. Such passenger assists should also effectively retain items, such as bags and luggage, placed on top of wheel housing.

L.182. PASSENGER DOORS

L.182.1. General

L.182.1.1. Two doorways should be provided in the curbside of the bus for passenger ingress and egress. The front doorway should be forward of the front wheels and located so that the operator will be able to collect or monitor the collection of fares. Passenger doors and doorways should comply with ADA requirements.

L.182.1.2. The rear doorway centerline should be rearward of the point midway between the front door centerline and the rearmost seat back. Rear doors should be operated by passenger push-to-exit.

L.183. MATERIALS AND CONSTRUCTION

L.183.1. Structure of the doors, their attachments, inside and outside trim panels, and any mechanism exposed to the elements should be corrosion-resistant. Door panel construction should be of corrosion-resistant metal or reinforced non-metallic composite materials. The doors, when fully opened, should provide a firm support and should not be damaged if used as an assist by passengers during ingress or egress. The front leaves of the passenger doors should overlap the rear leaves.

L.184. DIMENSIONS

L.184.1. Front door clear width should be no less than 31.75 inches with the doors fully opened.

L.184.2. When open, the doors should leave an opening no less than 76 inches in height.

L.185. DOOR GLAZING

L.185.1. The upper section of both front and rear doors should be glazed for no less than 45 percent of the respective door opening area of each section. The lower section of the front door should be glazed for no less than 25 percent of the door opening area of the section.

L.185.2. The front door panel glazing material should have a nominal ¼ inch or 6 mm thick laminated safety glass conforming to the requirements of ANSI Z26.1 Test Grouping 2 and the Recommended Practices defined in SAE J673.

L.185.3. Glazing material in the rear doorway door panels should be the same material, thickness and color as the side windows defined in Section 5.4.7.4.2.

L.186. DOOR PROJECTION

L.186.1. Exterior projection of the doors should be minimized and should not exceed 13 inches during the opening or closing cycles or when doors are fully opened. Projection inside the bus should not exceed 21 inches. The closing edge of each door panel should have no less than 2 inches of soft weather stripping. The doors, when closed, should be effectively sealed and the hard surfaces of the doors should be at least 4 inches apart.

L.187. DOOR HEIGHT ABOVE PAVEMENT

L.187.1. It should be possible to open and close either passenger door when the bus loaded to GVWR is not knelt and parked with the tires touching an 8-inch-high curb on a street sloping toward the curb so that the street side wheels are 5 inches higher than the right side wheels.

L.188. CLOSING FORCE

L.188.1. Closing door edge speed should not exceed 19 inches per second. Power close rear doors should be equipped with a sensitive edge or other obstruction sensing system such that if an obstruction is struck by a closing door edge, the doors will stop and/or reverse direction prior to imparting a 10-pound force on 1 square inch of that obstruction. Doors closed by return spring or counterweight-type device need not be equipped with an obstruction sensing device but should be capable of being pushed to the point where the door starts to open with a force not to exceed 20 pounds applied to the center edge of the forward door panel. Whether or not the obstruction sensing system is present or functional it should be possible to withdraw a 1-1/2 inch diameter cylinder from between the center edges of a closed and locked door with an outward force not greater than 35 pounds.

L.189. ACTUATORS

L.189.1. Door actuators should be adjustable so that the door opening and closing speeds can be independently adjustable. Actuators and the complex door mechanism should be concealed from passengers but should be easily accessible for servicing. The door actuators should be rebuild-able. If powered by compressed air, exhaust from the door system should be routed below the floor of the bus to prevent accumulation of any oil which may be present in air system and to muffle sound.

L.190. EMERGENCY OPERATION

L.190.1. In the event of an emergency, it should be possible to open the doors manually from inside the bus using a force of no more than 25 pounds after actuating an unlocking device at each door. The unlocking devices should be clearly marked as an emergency-only device and should require two distinct actions to actuate. The respective door emergency unlocking device should be accessible from the entrance and exit areas. When the rear emergency device is actuated, the door interlock throttle system should return the engine to idle and the door interlock brake system should apply to stop the bus. When the front door emergency device is actuated only the door interlock throttle system should be actuated. Locked doors should require a force of more than 100 pounds to open manually. When the locked doors are manually forced to open, damage should be limited to the bending of minor door linkage with no resulting damage to the doors, engines, and complex mechanism.

L.191. ACCESSIBILITY PROVISIONS

L.191.1. GENERAL

- L.191.1.1.** The design and construction of the bus should be in accordance with all requirements defined in 49 CFR, Part 38, Subpart B: ADA Accessibility Specifications for Transportation Vehicles - Buses, Vans and Systems. Space and body structural provisions should be provided at the front or rear door of the bus to accommodate the wheelchair loading system. Specific requirements, including the number of wheelchairs to be accommodated, the tiedown and securement devices, and fold-down seats, are provided in attachments to Part 5: Technical Specifications. Prior to submission of bid, the Contractor should provide a plan, including layout drawings for entry, maneuvering, parking, and exiting of wheelchair passengers, to show compliance with ADA regulations.

L.192. LOADING SYSTEM

- L.192.1.** An automatically-controlled, power-operated ramp system compliant to requirements defined in 49 CFR Part 38, Subpart B, §38.23c should 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.
- L.192.2.** The wheelchair loading system should be located at the rear door.
- L.192.3.** The ramp should be of a simple hinged, flip-out type design.
- L.192.4.** When the system is not in use, the passageway should appear normal. In the stored position of the ramp, no tripping hazards should be presented and any resulting gaps should be minimized. The controls should be simple to operate with no complex phasing operations required, and the loading system operation should be under the surveillance and complete control of the operator. If the loading system and controls are at the rear doors, a switch should be provided in the operator's area to disable the loading system. The bus should be prevented from moving during the loading or unloading cycle by a throttle and brake interlock system. The wheelchair loading system should not present a hazard, nor inconvenience any passenger. The loading system should be inhibited from retracting or folding when a passenger is on the ramp/platform. A passenger departing or boarding via the ramp should be able to easily obtain support by grasping the passenger assist located on the doors or other assists provided for this purpose. The platform should be designed to protect the ramp from damage and persons on the sidewalk from injury during the extension/retraction or lowering/raising phases of operation. The loading platform should be covered with a replaceable or renewable, nonskid material and should be fitted with devices to prevent the wheelchair from rolling off the sides during loading or unloading. Deployment or storage of the ramp should require no more than 15 seconds. The device should function without failure or adjustment for 500 cycles or 5,000 miles in all weather conditions on the design operating profile when activated once during the idle phase. A manual override system should permit unloading a wheelchair and storing the device in the event of a primary power failure. The manual operation of the ramp should not require more than 20 lbs. of force. The ramp assembly components should be replaceable within 30 minutes by 3M mechanic.

L.193. WHEELCHAIR ACCOMMODATIONS

- L.193.1.** Two forward-facing locations, as close to the wheelchair loading system as practical, should provide parking space and securement system compliant with ADA requirements for a passenger in a wheelchair.
- L.193.2.** Additional equipment, including passenger restraint seat belts, shoulder harnesses and wheelchair securement devices should be provided for each wheelchair passenger. All belt assemblies must stow up and out of the way when not in use. Q'Strain Slide and Click or approved equal should be used to secure the wheelchair.

L.194. INTERIOR CIRCULATION

- L.194.1.** Maneuvering room inside the bus should accommodate easy travel for a passenger in a wheelchair from the loading device through the bus to the designated parking area, and back out. No portion of the wheelchair or its occupant should protrude into the normal aisle of the bus when parked in the designated parking space(s). As a guide, no width dimension should be less than 34 inches. Areas requiring 90-degree turns of wheelchairs should have a clearance arc dimension no less than 45 inches and in the parking area where 180-degree turns are expected, space should be clear in a full 60-inch-diameter circle. A vertical clearance of 12 inches above the floor surface should be provided on the outside of turning areas for wheelchair footrest.

L.195. PASSENGER INFORMATION

- L.195.1.** ADA priority seating signs as required and defined by 49 CFR, Part 38.27 should be provided to identify the seats designated for passengers with disabilities.
- L.195.2.** Requirements for a public information system in accordance with 49 CFR, Part 38.35 should be provided.
- L.195.3.** Requirements for a stop-request passenger signal in accordance with 49 CFR, Part 38.37 should be provided.
- L.195.4.** Requirements for exterior destination signs in accordance with 49 CFR, Part 38.39 should be provided as required.

L.196. OPERATOR PROVISIONS

- L.196.1.** OPERATOR'S AREA
- L.196.2.** General

L.196.2.1. The operator's work area should be designed to minimize glare to the extent possible. Objects within and adjacent to this area should be matte black or dark gray in color wherever possible to reduce the reflection of light onto the windshield. The use of polished metal and light-colored surfaces within and adjacent to the operator's area should be avoided. Such objects include dash panels, switches and controls, cowlings, windshield wipers and arms, barriers and modesty panels, fare stanchions, access panels and doors, fasteners, flooring, ventilation and heating ducting, window and door frames, and visors. Interior lighting located ahead of the standee line should be controlled by the operator.

L.197. VISORS

L.197.1. An adjustable roller type sunscreen should be provided over the operator's windshield and the operator's side window. The sunscreen should be capable of being lowered to the midpoint of the operator's window. To secure and stabilize the screen, it should be attached to thin metal rods on each side of the window. Once lowered, the screen should remain in the lowered position until returned to the stowed position by the operator.

L.198. OPERATOR'S CONTROLS

L.198.1. All switches and controls necessary for the operation of the bus should be conveniently located in the operator's area and should provide for ease of operation. Switches and controls should be essentially within the hand reach envelope described in SAE Recommended Practice, J287, Driver Hand Control Reach. Controls should be located so that boarding passengers may not easily tamper with control settings.

L.198.2. Accelerator and brake pedals should be designed for ankle motion. Foot surfaces of the pedals should be faced with wear-resistant, nonskid, replaceable material.

L.198.3. Controls for engine operation should be closely grouped within the operator's compartment. These controls should include separate master run switch and start switch or button. The run switch should be a four-position rotary switch with the following functions:

L.198.3.1. OFF - All electrical systems off, except power available for the passenger interior lighting, stoplights, turn lights, hazard lights, radio, silent alarm, horn, fare box, fire detection equipment, engine compartment lights, auxiliary heater if provided and electronic equipment that require continuous energizing. If the bus is not operated for a period of 3 days, the total electric load due to devices that require continuous energizing should not cause the battery to be discharged below the level necessary to start the engine. Electrical loads resulting from the Procurement Agency's devices such as fare box, GPS, radio, etc., should not exceed 1.5 amps with the master run switch in the OFF position.

L.198.3.2. CL/ID - All electrical systems off, except those listed in OFF and power to destination signs, interior lights, and marker lights.

L.198.3.3. RUN - All electrical systems and engine on, except the headlights, parking lights and marker lights. Daytime running lights (DRL), if provided, should be on.

L.198.3.4. NITE/RUN - All electrical systems and engine on.

L.198.4. The door control, kneel control, windshield wiper/washer controls, and run switch should be in the most convenient operator locations. They should be identifiable by shape, touch, and permanent markings. Doors should be operated by a single control, conveniently located and operable in a horizontal plane by the operator's left hand. The setting of this control should be easily determined by position and touch. Turn signal controls should be floor-mounted, foot-controlled, waterproof, heavy-duty, momentary contact switches.

L.198.5. All panel-mounted switches and controls should be marked with easily read identifiers and should be replaceable, and the wiring at these controls should be serviceable from the vestibule or the operator's seat. Switches, controls, and instruments should be dust- and water-resistant

L.199. DOOR CONTROL

L.199.1. Doors should open or close completely in not more than 3.5 seconds from the time of control actuation and should be subject to a safe closing force as to not cause injury. The door control should be a lever that rotates around a vertical staff. The lever should be located on the street side of the operator's area approximately 16 inches to the street side of the operator's seat centerline, forward of the seat, and approximately 23 inches above the floor in the operator's area. The front door should remain in commanded state position even if power is removed or lost.

L.199.2. Operation of, and power to, the passenger doors should be ultimately controlled by the operator. Passenger push-to-exit is an acceptable option.

L.199.3. A control or valve in the operator's compartment should 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 should close the doors, deactivate the door control system, release the interlocks, and permit only manual operation of the doors.

L.199.4. To preclude movement of the bus, an accelerator interlock should lock the accelerator in the closed position and a brake interlock should engage the service brake system when the rear door control is activated. The braking effort should be adjustable with hand tools. Rear doors should not open until bus speed is below 2 m.p.h.

L.199.5. An accelerator interlock should lock the accelerator in the closed position whenever front doors are open.

L.200. INSTRUMENTATION

L.200.1. The speedometer, air pressure gauge(s), and certain indicator lights should be located on the front cowl immediately ahead of the steering wheel. The steering wheel spokes or rim should not obstruct the operator's vision of the instruments when the steering wheel is in the straight-ahead position. Illumination of the instruments should be simultaneous with the marker lamps. Glare or reflection in the windshield, side window, or front door windows from the instruments, indicators, or other controls should be minimized. Instruments and indicators should be easily readable in direct sunlight. Indicator lights immediately in front of the operator are identified in the following table.

<u>Visual Indicator</u>	<u>Audible Alarm</u>	<u>Condition</u>
Back-Up	Back-Up Alarm	Reverse Gear is Selected
Hazard	Click	Four-Way Flashers Activated
DRL	None	Daytime Running Lights
High Beam	None	Headlamp High Beams Activated
Left Turn Signal	Click	Left Turn Signal Activated
Parking Brake	None	Parking Brake is Activated
Rear Door	None	Rear Passenger Door is not Closed and Locked
Rear Turn Signal	Click	Right Turn Signal Activated
Stop Lights	None	Brake Lights Operational
Stop Request	Chime	Passenger Stop Request has been Activated
Wheelchair Request	Double Chime	Passenger Wheelchair Stop Request has been Activated

L.200.2. The instrument panel should include an electronic speedometer indicating no more than 80 mph and calibrated in maximum increments of 5 mph. The speedometer should be a rotating pointer type, with a dial deflection of 220 to 270 degrees and 40 mph near the top of the dial. The speedometer should be sized and accurate in accordance with SAE Recommended Practice J678.

L.200.3. The speedometer should be equipped with an odometer with a capacity reading no less than 999,999 miles.

L.200.4. The instrument panel should also include air brake reservoir pressure gauge(s) with indicators for primary and secondary air tanks and voltmeter(s) to indicate the operating voltage across the bus batteries. The instrument panel and wiring should be easily accessible for service from the operator's seat or top of the panel. Wiring should have sufficient length and be routed to permit service without stretching or chafing the wires.

L.201. ON-BOARD DIAGNOSTICS

L.201.1. The bus should be equipped with an on-board diagnostic system that will indicate conditions that require immediate action by the operator to avoid an unsafe condition or prevent further damage to the bus. This diagnostic system should have visual and audible indicators. The diagnostic indicator lamp panel should be located in clear sight of the operator but need not be immediately in front of him. The intensity of indicator lamps should permit easy determination of on/off status in bright sunlight but should not cause a distraction or visibility problem at night. All indicators should have a method of momentarily testing the operation of the lamp. The audible alarm should be tamper resistant and should have an outlet level between 80 and 83 dBA when measured at the location of the operator's ear. Wherever possible, sensors should be of the closed circuit type, so that failure of the circuit and/or sensor should activate the malfunction indicator. Malfunction and other indicators listed in the following table should be supplied on all buses.

L.201.2. Space should be provided on the panel for future installation of 5 additional indicators as the capability of on-board diagnostic systems improves.

<u>Visual Indicator</u>	<u>Audible Alarm</u>	<u>Condition</u>
ABS	None	ABS System Malfunction
A/C Stop	None	Compressor stopped due to High/Low Pressure or Loss of Refrigerant
Check Engine	None	Engine Electronic Control Unit detects a Malfunction
Check Transmission	None	Transmission Electronic Control Unit detects a Malfunction

Fire	Bell	Over-Temperature Condition in Engine Compartment
Generator Stop	None	Loss of Generator Output
Hot Engine	Buzzer	Excessive Engine Coolant Temperature
Low Air	Buzzer	Insufficient Air Pressure in either Primary or Secondary Reservoirs
Low Oil	Buzzer	Insufficient Engine Oil Pressure
Low Coolant	Buzzer	Insufficient Engine Coolant Level
Wheelchair Ramp	Beeper	Wheelchair Ramp is not Stowed and Disabled
Methane Gas Detection	Bell	Significant Level of Methane Gas Detected
Low Fuel	None	Less than 500 psi Fuel Pressure

L.202. WINDSHIELD WIPERS

L.202.1. The bus should be equipped with a variable speed windshield wiper for each half of the windshield, with separate controls for each side. If powered by compressed air, exhaust from the wiper motors should be muffled or piped under the floor of the bus. No part of the windshield wiper mechanism should be damaged by manual manipulation of the arms. At 60 mph, no more than 10 percent of the wiped area should be lost due to windshield wiper lift. Both wipers should park along the edges of the windshield glass. Windshield wiper motors and mechanisms should be easily accessible for repairs or service from inside or outside the bus and should be removable as complete units. The fastener that secures the wiper arm to the drive mechanism should be corrosion resistant.

L.203. WINDSHIELD WASHERS

- L.203.1.** The windshield washer system should deposit washing fluid on the windshield and, when used with the wipers, should evenly and completely wet the entire wiped area. If powered by compressed air, all fluid should be purged from the lines after each use of the washers.
- L.203.2.** The windshield washer system should have a minimum 3-gallon reservoir, located for easy refilling from outside of the bus and protected from freezing. Reservoir pumps, lines, and fittings should be corrosion-resistant, and the reservoir itself should be translucent for easy determination of fluid level.

L.204. OPERATOR'S LIGHTING

L.204.1. The operator's area should have a light to provide general illumination and it should illuminate the half of the steering wheel nearest the operator to a level of 10 to 15 foot-candles. This light should be operator controlled through a switch on the front or side console.

L.205. OPERATOR'S SEAT

L.205.1. Dimensions

L.205.1.1. The operator's seat should be comfortable and adjustable so that persons ranging in size from the 95th-percentile male to the 5th-percentile female may operate the bus. The operator's seat cushion should have a minimum width of 18 inches, a length of 16 to 18 inches, and rearward slope of 0 to 10 degrees (non-adjustable.) The operator's seat back height, measured from the point of intersection of the uncompressed seat cushion with the seat back to the top of the back, should be 20 ±2 inches. The angle formed between the seat back and the seat cushion should be adjustable in the range of 95 to 110 degrees. Height of the seat should be adjustable so that the distance between the top of the uncompressed seat cushion and the floor may vary between 17 and 21 inches. The seat should be adjustable forward and rearward for a minimum travel of 7.5 inches. While seated, the operator should be able to make all of these adjustments by hand without complexity, excessive effort, or being pinched. Adjustment mechanisms should hold the adjustments and should not be subject to inadvertent changes.

L.206. STRUCTURE AND MATERIALS

- L.206.1.** The operator's seat should be contoured to provide maximum comfort for extended period of time. Cushions should be fully padded with at least 3 inches of neoprene foam, or material with equal properties, in the seating areas at the bottom and back. Upholstery should be ventilated, transportation grade vinyl.
- L.206.2.** The operator's seat should be cushioned supplementally by an air cylinder or air diaphragm. These devices may also provide the seat height adjustments. Damping should be provided as required.
- L.206.3.** All visually exposed metal on the operator's seat, including the pedestal, should be unpainted aluminum or stainless steel.
- L.206.4.** Seat belts should be provided across the operator's lap and diagonally across the operator's chest. The operator should be able to use both belts by connecting a single buckle on the right side of the seat cushion. The belts

should be fastened to the seat and/or the bus structure so that the operator may adjust the seat without resetting the seat belt. Seat belts should be stored in automatic retractors.

L.206.5. Seat belts should be extended length to accommodate operators of all sizes.

L.206.6. The seat and seatbelt assemblies as installed in the bus should withstand static horizontal forces as required in FMVSS 207 and 210. The seat should withstand 10,000 impacts of a 40-pound sandbags dropped from a height of 12 inches without visible deterioration. The seat should be tested in the lowest vertical position and repeated with the seat in the top vertical position.

L.206.7. Two 40-pound sandbags should be suspended on a 36-inch pendulum and should strike the seat back 10,000 times each from distances of 6, 8, 10, and 12 inches. Seat cushions should withstand 100,000 randomly positioned 3-1/2-inch drops of a squirming, 150-pound, smooth-surfaced, buttocks-shape striker with only minimal wear on the seat covering.

L.206.8. The Contractor should provide a certified test report fully documenting compliance with all the requirements defined above upon request. The test report should contain a record of all testing activities, test diagrams, testing equipment, as well as test data related to loads, deflections and permanent deformation of the seat assembly.

L.207. MIRRORS

L.207.1. Exterior Mirrors

L.207.1.1. The bus should be equipped with a corrosion-resistant, outside rearview mirror on each side of the bus. Mirrors should permit the operator to view the highway along both sides of the bus, including the rear wheels. The curbside rearview mirror should be mounted so that its lower edge is no less than 80 inches above the street surface.

L.207.1.2. The operator should be able to adjust the curb-side mirror remotely while seated in the driving position. The control for remote positioning of the mirror should be a single switch or device.

L.207.1.3. All exterior mirrors should be electrically heated. The heaters should be energized whenever the operator's heater and/or defroster is activated.

L.207.1.4. Mirrors should be firmly attached to the bus to prevent vibration and loss of adjustment, but not so firmly attached that the bus or its structure is damaged when the mirror is struck in an accident. Mirrors should retract or fold sufficiently to allow bus washing operations.

L.207.1.5. Additional details on external mirrors, including size, location and mounting, are contained in Attachments to Part 5: Technical Specifications.

L.208. INTERIOR MIRRORS

L.208.1. Mirrors should be provided for the operator to observe passengers throughout the bus without leaving his seat and without shoulder movement. With a full standee-load, including standees in the vestibule, the operator should be able to observe passengers in the front/entrance and rear/exit areas, anywhere in the aisle, and in the rear seats. Inside mirrors should not be in the line of sight to the right outside mirror.

L.208.2. Additional details on external mirrors, including size, location and mounting, are contained in Attachments to Part 5: Technical Specifications.

L.209. RADIO

L.209.1. AM/FM/CD/AUX radio shall be provided and configured in a manner that does not transmit to the passenger compartment speakers, only the speakers in the driver's area should be connected to this system

L.210. WINDOWS

L.210.1. GENERAL

L.210.1.1. Buses that are 30 foot in length should have a minimum of 6,000 square inches of window area, including driver's and door windows, should be required on each side of the standard configuration bus.

L.210.1.2. Buses that are 35 foot in length should have a minimum of 8,000 square inches of window area, including driver's and door windows, should be required on each side of the standard configuration bus.

L.211. WINDSHIELD

L.211.1. The windshield should permit an operator's field of view as referenced in SAE Recommended Practice J1050. The vertically upward view should be a minimum of 15 degrees, measured above the horizontal and excluding any shaded band. The vertically downward view should permit detection of an object 3-1/2 feet high no more than 2 feet in front of the bus. The horizontal view should 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 should not exceed 10 degrees of binocular obscuration. The windshield should be designed and installed to minimize external glare as well as reflections from inside the bus.

- L.211.2.** The windshield should be easily replaceable by removing zip-locks from the windshield retaining moldings. Bonded-in-place windshield should not be used. The windshield glazing material should have a 1/4-inch or 6-mm nominal thickness laminated safety glass conforming to the requirements of ANSI Z26.1 Test Grouping 1A and the Recommended Practices defined in SAE J673. The glazing material should have single density tint. The upper portion of the windshield above the operator's field of view should have a dark, shaded band with a minimum luminous transmittance of 6 percent when tested in accordance to ASTM D-1003.

L.212. OPERATOR'S SIDE WINDOW

- L.212.1.** The operator's side window should open sufficiently to permit the seated operator to easily adjust the street side outside rearview mirror. This window section should slide rearward in tracks or channels designed to last the service life of the bus. The operator's side window should not be bonded in place and should be easily replaceable. The glazing material should have a single density tint.
- L.212.2.** The operator's side window glazing material should have a 1/4-inch nominal thickness laminated safety glass conforming with the requirements of ANSI Z26.1 Test Grouping 2 and the Recommended Practices defined in SAE J673.

L.213. SIDE WINDOWS

L.213.1. Configuration

- L.213.1.1.** All side windows, except windows in passenger doors and those smaller than 500 square inches, should have window panels that are openable by passengers. Openable window panels should be equipped with latches that secure the window in the fully open and fully closed positions. The requirements for stops limiting the window opening travel and the window opening area are defined in Attachment to Part 5: Technical Specifications.
- L.213.1.2.** Each openable side window should consist of two full-height horizontally sliding panels.
- L.213.1.3.** All side windows should be easily replaceable without disturbing adjacent windows and should be mounted so that flexing or vibration from engine operation or normal road excitation is not apparent.
- L.213.1.4.** The windows should be designed and constructed to enable a 3M mechanic to remove and replace two windows in less than 10 minutes.

L.214. MATERIALS

- L.214.1.** Side windows glazing material should have a 1/4-inch nominal thickness tempered safety glass. The material should conform to the requirements of ANSI Z26.1 Test Grouping 2 and the Recommended Practices defined in SAE J673
- L.214.2.** Windows on the bus sides and in the rear door should be tinted a neutral color, complementary to the bus exterior. The maximum solar energy transmittance should not exceed 37 percent, as measured by ASTM E-424, and the luminous transmittance should be no less than 16 percent as measured by ASTM D-1003. Windows over the destination signs should not be tinted.

L.215. HEATING VENTILATING AND AIR CONDITIONING

L.215.1. CAPACITY AND PERFORMANCE

- L.215.1.1.** The Heating, Ventilation and Air Conditioning (HVAC) climate control system should be capable of maintaining the interior of the bus at the temperature and humidity levels defined in the following paragraphs.
- L.215.1.2.** The HVAC unit may either be roof- or rear-mounted.
- L.215.1.3.** Accessibility and serviceability of components should be provided without requiring maintenance personnel to climb-up on the roof of the bus.
- L.215.1.4.** 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 should maintain an average passenger compartment temperature within a range between 65o and 80o F, while controlling the relative humidity to a value of 50 percent or less. The system should maintain these conditions while subjected to any outside ambient temperatures within a range of 10o to 95o F and at any ambient relative humidity levels between 5 and 50 percent.
- L.215.1.5.** When the bus is operated in outside ambient temperatures of 95o to 115o F, the interior temperature of the bus should be permitted to rise one degree for each degree of exterior temperature in excess of 95o.
- L.215.1.6.** When bus is operated in outside ambient temperatures in the range of -10o to +10o F, the interior temperature of the bus should not fall below 55o F while bus is running on the Design Operating Profile.
- L.215.1.7.** System capacity testing, including pulldown/warm-up, stabilization and profile, should be conducted in accordance to the APTA Recommended Instrumentation and Performance Testing for Transit Bus Air

Conditioning System. Temperature measurements should be made in accordance to this document with the following modifications:

- L.215.1.8.** The three primary locations used for temperature probes are (1) 6 inches aft of front wheelhousing, (2) centered between the two axles and (3) 6 inches aft of rear wheelhousing. At each primary location, the nine (9) temperature sensing devices should be (A) 72 inches above floor level, (B) 6 inches above top surface of seat cushion and (C) 6 inches above floor.
- L.215.1.9.** The recommended locations of temperature probes are only guidelines and may require slight modifications to address actual bus design. Care must be taken to avoid placement of sensing devices in immediate path of air duct outlet. In general, the locations are intended to accurately represent the interior passenger area.
- L.215.1.10.** Additional testing should be performed as necessary to ensure compliance to performance requirements stated herein.
- L.215.1.11.** The test procedure as described in Section 8 of the APTA document, "Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System" should be used for the purposes of the following pulldown requirements. The air conditioning portion of the HVAC system should be capable of reducing the passenger compartment temperature as defined in the referenced test procedure from 110° to 70°F ± 3° F in less than 30 minutes after start-up of A/C system. A greater variance may be allowed for the sensor closest to the return air vent.
- L.215.1.12.** During the cool-down period the refrigerant pressure should not exceed safe high-side pressures and the condenser discharge air temperature, measured 6 inches from the surface of the coil, should be less than 45 F above the condenser inlet air temperature. No simulated solar load should be used. There should be no passengers on board, and the doors and windows should be closed.
- L.215.1.13.** Additional HVAC system and performance requirements are contained in Attachments to Part 5: Technical Specification. The air conditioning system should meet these performance requirements using HFC R134a.
- L.215.1.14.** The climate control blower motors and fan should be designed such that their operation complies with the interior noise level requirements as specified in this document.

L.216. CONTROLS AND TEMPERATURE UNIFORMITY

- L.216.1.** The HVAC system excluding the driver's heater/defroster should be centrally controlled with an advanced electronic/diagnostic control system with provisions for extracting/reading data.
- L.216.2.** After manual selection and/or activation of climate control system operation mode, all interior climate control system requirements for the selected mode should be attained automatically to within ±2 F of specified temperature control set-point.
- L.216.3.** The climate control system should have the provision to allow driver to adjust the temperature control set-point at a minimum of between 68 and 72F. From then on, all interior climate control system requirements should be attained automatically, unless re-adjusted by driver.
- L.216.4.** The operator should have full control over the defroster and operator's heater. The driver should be able to adjust the temperature in his area through air distribution and fans. The interior climate control system should switch automatically to the ventilating mode if the refrigerant compressor or condenser fan fails.
- L.216.5.** Interior temperature distribution should be uniform to the extent practicable to prevent hot and/or cold spots. After stabilization, the temperatures between any two points in the passenger compartment same vertical plane, and 6 inches to 72 inches above the floor, should not vary by more than 5 F with doors closed. The interior temperatures, measured at the same height above the floor, should not vary more than ± 5oF, 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 ± 5oF will be allowed for limited, localized areas provided the majority of the measured temperatures fall within the specified requirement.

L.217. AIR FLOW

L.217.1. Passenger Area

- L.217.1.1.** The cooling mode of the interior climate control system should introduce air into the bus at or near the ceiling height at a minimum rate of 25 cubic feet per minute (cfm) per passenger based on the standard configuration bus carrying a number of passengers equal to 150 percent of the seated load. Airflow should be evenly distributed throughout the bus with air velocity not exceeding 100 feet per minute on any passenger. The ventilating mode should provide air at a minimum flow rate of 20 cfm per passenger.
- L.217.1.2.** Airflow may be reduced to 15 cfm per passenger (150 percent of seated load) when operating in the heating mode. The fans should not activate until the heating element has warmed sufficiently to assure at least 70oF air outlet temperature. The heating air outlet temperature should not exceed 120oF under any normal operating conditions.

L.218. OPERATOR'S AREA

L.218.1. The bus interior climate control system should deliver at least 100 cfm of air to the operator's area when operating in the ventilating and cooling modes. Adjustable nozzles should permit variable distribution or shutdown of the airflow. Airflow in the heating mode should be reduced proportionally to the reduction of airflow into the passenger area. The windshield defroster unit should meet the requirements of SAE Recommended Practice J382, Windshield Defrosting Systems Performance Requirements, and should have the capability of diverting heated air to the operator's feet and legs. The defroster or interior climate control system should maintain visibility through the operator's side window.

L.219. AIR FILTRATION

L.219.1. Air should be filtered before discharge into the passenger compartment. The filter should meet the ASHRAE requirement for 5 percent or better atmospheric dust spot efficiency, 50 percent weight arrestance, and a minimum dust holding capacity of 120 gram per 1,000 cfm cell. More efficient air filtration may be provided to maintain efficient heater and/or evaporator operation. Air filters should be easily removable for service.

L.219.2. Air filters should be of disposable type.

L.220. ROOF VENTILATORS

L.220.1. Two roof ventilators should 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.

L.220.2. Each ventilator should be easily opened and closed manually by a 50th percentile female. If roof ventilator(s) cannot be reached by a 50th percentile female, then a tool should be provided to allow this. When open with the bus in motion, this ventilator should provide fresh air inside the bus. Ventilator should cover an opening area no less than 425 square inches and should be capable of being positioned as a scoop with either the leading or trailing edge open no less than 4 inches, or with all four edges raised simultaneously to a height of no less than 3-1/2 inches. An escape hatch should be incorporated into the roof ventilator. Roof ventilator(s) should be sealed to prevent entry of water when closed.

L.221. MAINTAINABILITY

L.221.1. Manually controlled shutoff valves in the refrigerant lines should allow isolation of the compressor and dehydrator filter for service. To the extent practicable, self-sealing couplings utilizing O-ring seals should 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 should be located to efficiently transfer heat to the atmosphere, and should 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 should preclude its obstruction by wheel splash, road dirt or debris. HVAC components located within 6 inches of floor level should be constructed to resist damage and corrosion.

L.222. ENTRANCE/EXIT AREA HEATING

L.222.1. Heat should be supplied to the entrance and exit areas to prevent accumulation of snow, ice, or slush with bus operating under design profile and corresponding to door opening cycle.

L.223. FLOOR LEVEL HEATING

L.223.1. Sufficient floor level heaters should be provided that evenly supply heated forced air through floor ducts across the length of bus. Floor ducts may be discontinued at the upper level but additional provisions to prevent cold floor and ensure temperature uniformity should be included. Control of the floor level heating should be through the main heating system electronic control.

L.224. SIGNAGE AND COMMUNICATION

L.224.1. EXTERIOR ROUTE DISPLAYS

L.224.2. Destination Signs

L.224.2.1. An automatic electronic destination sign system shall be furnished on the front and on the right side near the front door. Display areas of destination signs should be clearly visible in direct sunlight and/or at night. The sign system should provide optimum visibility of the message display units for passengers and should meet applicable ADA requirements defined in 49 CFR, Part 38.39. Destination signs should be installed in such a manner as to facilitate easy access for replacement of the entire sign assembly, or components such as fluorescent lamps/LED's and electronic control modules, from inside the bus within 30 minutes by a 3M mechanic. Lamps and associated parts should be commercially available.

L.224.2.2. Destination messages, route designations, and public relations messages should be independently selectable via a single Operator's Control Panel (OCP) which should include a display monitor. The rear route number sign should be controlled by the same OCP that operates the destination signs. The OCP display monitor readout should show the exact information displayed on the destination signs and route

number sign. The OCP should be conveniently located for the bus operator and mounted in such a manner that will not pose any safety hazard. The OCP should utilize a durable weatherproof keypad with tactile feel for destination message control functions.

- L.224.2.3.** The destination sign system should be capable of programming 10,000 message lines. The number of public relations messages should be limited only by the remaining number of message lines not used for destination purposes. Sign displays should have alternating message capability with programmable blanking time between message lines as may be required. Variable blanking times should be programmable between 0.5 to 25 seconds in duration. Each line message or blanking time for each message should be individually programmable. The message display units should incorporate an automatic blanking feature that will cause the display area to blank within 30 seconds of the bus master power switch being turned off.
- L.224.2.4.** An emergency message should be initiated by the closure, or opening, of a dry contact switch or relay. The emergency message should be displayed on the exterior of the bus only. The OCP should not display the emergency message. The destination sign should automatically resume normal operation when the remote emergency switch is returned to its normal position.
- L.224.2.5.** Destination Sign Programming: The electronic sign system should be programmable via an integral connector located in the front destination sign area. Software should be furnished for programming the sign system via an IBM-compatible, laptop computer. Software should be capable of providing a high degree of flexibility to create, or select preprogrammed, fonts and graphic displays. The sign should have the capability of being programmed in the field using a PC or field programmer. Message program information should be transferable to and/or from the field programmer device as specified by the agency in attachments to Part 5: Technical Specifications.
- L.224.2.6.** The front destination sign should be full color and have no less than 1,792 LED dot pixels, 16 rows by 112 columns, with a message display area of not less than 8 inches high by not less than 56 inches wide.
- L.224.2.7.** The side destination sign should be full color and have no less than 648 LED dot pixels, having at least 9 rows and 72 columns with a message display area of not less than 2.7 inches high by not less than 36 inches wide.
- L.224.2.8.** The bus "Master Run" switch should control power to the sign system. The sign system should be operable in all switch positions except "Off".
- L.224.2.9.** The destination sign compartments should be designed to prevent condensation and entry of moisture and dirt. Additional provisions should be included, if necessary, to prevent fogging of both destination sign compartment window and glazing on unit itself. Access should be provided to allow cleaning of inside of destination sign compartment window and unit glazing.
- L.224.2.10.** A complete listing of destination sign readings for initial sign programming by the manufacturer are provided at a later date.

L.225. PASSENGER INFORMATION AND ADVERTISING

L.225.1. Interior Displays

- L.225.1.1.** Provisions should be made on the rear of the operator's barrier for a frame to retain information that is sized 11 inches wide and 17 inches high, such as routes and schedules. Advertising media 11 inches high and 0.09 inches thick should be retained near the juncture of the bus ceiling and sidewall. The retainers may be concave and should support the media without adhesives. The media should be illuminated by the interior fluorescent light system.

L.226. PASSENGER STOP REQUEST/EXIT SIGNAL

- L.226.1.** A passenger "Stop Requested" signal system that complies with applicable ADA requirements defined in 49 CFR, Part 38.37 should be provided. The system should consist of a heavy-duty pull cable, chime, and interior sign message. The pull cable should be located the full length of the bus on the sidewalls, at the level where the transom is located. If no transom window is required, height of pull cable should approximate this transom level and should be no greater than 63 inches as measured from floor surface. It should be easily accessible to all passengers, seated or standing. Pull cable(s) should activate a solid state or magnetic proximity switch(es). At each wheelchair parking position and priority seating positions additional provision should be included to allow a passenger in a mobility aid to easily activate "Stop Requested" signal.
- L.226.2.** An auxiliary passenger "Stop Requested" signal should be installed at the rear door to provide passengers standing in the rear door/exit area convenient means of activating the signal system. The signal should be a heavy-duty push button type located above rear door on the rear door actuator compartment access panel. Button should be clearly identified as "Passenger Signal."
- L.226.3.** A heavy-duty "Stop Request" signal button should be installed on modesty panel stanchion immediately forward of rear door and clearly identified as "Passenger Signal."

- L.226.4.** Exit signals located in the wheelchair parking area should be no higher than 4 feet above the floor. Instructions should be provided to clearly indicate function and operation of these signals
- L.226.5.** A single "Stop Requested" chime should sound when the system is first activated. A double chime should sound when the system is first activated from wheelchair passenger areas.
- L.226.6.** A "Stop Requested" message in red letters should be illuminated when the passenger "Stop Requested" signal system is activated. The "Stop Requested" message should remain visible until one or both passenger doors are opened. The message should be visible to the seated operator and seated passengers. The operator should be able to deactivate the signal system from the operator's area. A green light should be mounted above the rear door, approximately on center of the rear door actuator compartment access panel, to indicate when the rear doors have been unlocked.

L.227. RADIO COMMUNICATION SYSTEM

- L.227.1.** Motorola XPR2500 or approved equivalent should be installed at a location convenient to the operator. The location should conform to SAE Recommended Practice J287 "Driver Hand Control Reach." Provisions for attaching an antenna to the roof and routing an antenna lead to the radio compartment should include a 3/4-inch inside diameter conduit with a pull wire. The antenna mounting and lead termination should be accessible from the bus interior. A compartment should be provided to accommodate a communication system. It should be located within 8 feet of the operator's seat and should be connected to the operator's area by waterproof, 2-1/4 inch inside diameter, metallic conduit. The radio area should be supplied with a 30-amp, 12-volt, DC, protected service with positive and negative leads.

L.228. PUBLIC ADDRESS SYSTEM

- L.228.1.** A public address system should be provided that complies with the ADA requirements of 49 CFR, Part 38.35 and enables the operator to address passengers either inside or outside the bus. Inside speakers should broadcast, in a clear tone, announcements that are clearly perceived from all seat positions at approximately the same volume level. A speaker should be provided so announcements can be clearly heard by passengers standing outside the bus near the front door. An operator-controlled switch should select inside or outside announcements. A separate volume control should be provided for the outside system if volume adjustment would otherwise be necessary when switching from inside to outside. The system should be muted when not in use. The microphone should be vandal resistant, mounted on a heavy-duty, flexible gooseneck, which is secured with tamper-proof fasteners and will allow the operator to comfortably speak into it without using his hands. A provision should be provided to secure the microphone in a stored position when not in use. An input jack and mounting clip should be provided in the operator's area for a hand held microphone.

L.229. SECURITY CAMERAS

- L.229.1.** The bus should be equipped with an 8 Channel DVR unit with 8 cameras, three exterior and 5 interior. The DVR should be Mobile DVR X11-8CH or approved equal.

L.230. ELECTRICAL SYSTEM

L.230.1. GENERAL REQUIREMENTS

- L.230.1.1.** The bus should be equipped with a programmable logic control system that is computer based and completely modular. The programmable logic control collects information received from input devices throughout the bus and then communicates with its system components or other output devices in remote areas of the bus through multiplex wiring system. The entire system will reduce the amount of wiring over a conventional wiring/harness electrical system. Versatility and future expansion should be provided for by expandable system architecture. The system components should be capable of operating in an environment of between -20°F and 170°F while encountering mobile shock and vibrations. The system should store and retrieve data for the mechanical and electrical functions of the bus. All components in the system will be interchangeable. The multiplex power source should be isolated to avoid any ground noise.
- L.230.1.2.** The electrical system should provide and distribute power to ensure satisfactory performance of all electrical components. The system should supply a nominal 12 and/or 24 volts of direct current (DC), and employ alternating current up to 220 volts that does not present an electrical shock hazard. Electrical power provided for the fare collection device and the radio compartment should be 12 and/or 24 volts DC as specified in attachments to Part 5: Technical Specifications. Precautions should be taken to minimize hazards to service personnel. Transient voltages above 220 volts may be used in the fluorescent lighting system. The power generating system should be rated sufficiently higher than the total possible electrical load to maintain the charge on the batteries at all operating conditions including the engine at idle. All circuits, except for those involved in propulsion system start-up, should be protected by circuit breakers or fuses. Fuses should be used only where it can be demonstrated that circuit breakers are not practicable, and they should be easily accessible for replacement.
- L.230.1.3.** Redundant grounds should be used for all electrical equipment, except where it can be demonstrated that redundant grounds are not feasible or practicable. One ground may be the bus body and framing.

Grounds should not be carried through hinges, bolted joints (except those specifically designed as electrical connectors), or power plant mountings. Electrical equipment should not be located in an environment that will reduce the performance or shorten the life of the component or electrical system. To the extent practicable, wiring should not be located under the bus floor. Wiring and electrical equipment necessarily located under the bus should be insulated from water, heat, corrosion, and mechanical damage.

L.231. MODULAR DESIGN

- L.231.1.** Design of the electrical system should be modular so that each major component, apparatus panel, or wiring bundle is easily separable with standard hand tools or by means of connectors. Each module, except the main body wiring harness, should be removable and replaceable in less than 1 hour by a 3M mechanic. Power plant wiring should be an independent wiring module. Replacement of the engine compartment wiring module(s) should not require pulling wires through any bulkhead or removing any terminals from the wires.

L.232. WIRING AND TERMINALS

- L.232.1.** All wiring between electrical components and terminations, should have double electrical insulation, should be waterproof, and should conform to specification requirements of SAE Recommended Practice J1127 and J1128. Except as interrupted by the master battery disconnect switch, battery and starter wiring should be continuous cables, grouped, numbered, and/or color-coded with connections secured by bolted terminals; and should conform to specification requirements of SAE Standard J1127-Type SGT or SGX and SAE Recommended Practice J541. Wiring harnesses should not contain wires of different voltages unless all wires within the harness are sized to carry the current and insulated for the highest voltage wire in the harness.
- L.232.2.** Double insulation should be maintained as close to the terminals as possible. The requirement for double insulation should be met by wrapping harnesses with plastic electrical tape or by sheathing all wires and harnesses with non-conductive, rigid or flexible conduit. Strain-relief fittings should be provided at points where wiring enters all electrical components. Grommets of elastomeric material should be provided at points where wiring penetrates metal structures outside of electrical enclosures. Wiring supports should be protective and non-conductive at areas of wire contact and should not be damaged by heat, water, solvents, or chafing.
- L.232.3.** All wiring harnesses over 5 feet long and containing at least 5 wires should include 10 percent excess wires for spares that are the same size as the largest wire in the harness excluding the battery cables. This requirement for spare wires does not apply to data links and/or communication cables. Wiring length should allow end terminals to be replaced twice without pulling, stretching, or replacing the wire. Except for large wires such as battery cables, terminals should be crimped to the wiring and may be soldered only if the wire is not stiffened above the terminal and no flux residue remains on the terminal. Terminals should be corrosion-resistant and full ring type or interlocking lugs with insulating ferrules. T splices may be used when there is less than 25,000 circular mills of copper in the cross section and a mechanical clamp is used in addition to solder on the splice; the wire supports no mechanical load in the area of the splice; and the wire is supported to prevent flexing.
- L.232.4.** All cable connectors should be locking type, keyed, and watertight, unless enclosed in watertight cabinets. Pins should be removable, crimp contact type of the correct size and rating for the wire being terminated. Unused pin positions should be sealed with sealing plugs. Adjacent connectors should either use different inserts or different insert orientations to prevent incorrect connections.

L.233. JUNCTION BOXES

- L.233.1.** All relays, controllers, flashers, circuit breakers, and other electrical components should be grouped according to voltage; and mounted in easily accessible junction boxes. The boxes should be sealed to prevent moisture from normal sources, including engine compartment cleaning, from reaching the electrical components and should prevent fire that may occur inside the box from propagating outside the box. The components and circuits in each box should be identified and their location permanently recorded on a schematic drawing glued to or printed on the inside of the box cover or door. The drawing should be protected from oil, grease, fuel, and abrasion. The front junction box should be completely serviceable from the driver's seat, vestibule, or from outside. A rear start and run control box should be mounted in an accessible location in the engine compartment.

L.234. ELECTRICAL COMPONENTS

- L.234.1.** All electrical components, including switches, relays, flashers, and circuit breakers, should be heavy-duty designs. These components should be longest lasting, commercially available, and should be replaceable in less than 5 minutes by a 3M mechanic. Sockets of plug-in components should be polarized where required for proper function and the components should be positively retained. Any manually resettable circuit breakers critical to the operation of the bus should be mounted in a location convenient to the driver and provide visible indication of open circuits. All electric motors, except cranking motors, should be heavy-duty brushless type, with a constant duty rating of no less than 40,000 hours. Electric motors should be located for easy replacement and except for the cranking motor should be replaceable in less than 15 minutes by a 3M mechanic. Electronic circuit protection for the cranking motor should be provided to prevent engaging of the motor for more than 30 seconds at a time to prevent overheating.

L.235. MULTIPLEX WIRING SYSTEM

- L.235.1.** The components of the multiplex system should be of modular design, thereby providing for ease of replacement by maintenance personnel. The modules should be easily accessible for troubleshooting electrical failures and performing system maintenance. Each module should be shielded to prevent interference by EMI and RFI; and should utilize LEDs to indicate circuit integrity and assist in rapid circuit diagnostics and verification of the load and wiring integrity. In conjunction with relays if necessary, each circuit should be capable of providing a current load of up to 10 Amperes. The internal controls should be a solid state device, providing an extended service life. Wiring for data bus and node module power should consist of three, 22 gage or larger, UL approved, shielded, twisted pairs.
- L.235.2.** Ten percent (10%) spare input and output should be provided at each I/O location. Wiring used for the multiplexing should be stamped with the address of the corresponding I/O location.
- L.235.3.** Protection to each individual circuit should be provided. An automatic test system, integral to the multiplexing, should be provided. The system should be hosted on an IBM-compatible personal computer as well as a hand held field diagnostic unit capable of reading the network data, control function and address data, or function code. The mechanic should be able to use either unit to check bus wire function.

L.236. BATTERIES

- L.236.1.** Batteries should be easily accessible for inspection and service from only the outside of the bus. The batteries should be securely mounted on a stainless steel tray that can accommodate the size and weight of the batteries. The battery tray should pull out easily and properly support the batteries while they are being serviced. The tray should allow each battery cell to be serviced and filled with either manual or automatic equipment. A positive lock should retain the battery tray in the stowed position.
- L.236.2.** Two 8D battery units conforming to SAE Standard J537 should be provided. Each battery should be fitted with threaded stud terminals and have a minimum of 1150 cold cranking amps. Each battery should have a purchase date no more than 60 days from date of release for shipment to the agency.
- L.236.3.** Positive and negative terminal ends should have different size studs to prevent incorrect installation. The battery terminal ends and cables should be color-coded with red for the primary positive, black for negative, and another color for any intermediate voltage cables. Battery terminals should be located for access in less than 30 seconds with jumper cables. Battery cables should be flexible and sufficiently long to reach the batteries with tray in the extended position without stretching or pulling on any connection and should not lie directly on top of the batteries. Battery cables must be of sufficient size to carry the load required by the starting motor.
- L.236.4.** A jump-start connector should be provided in the engine compartment equipped with dust cap and adequately protected from moisture, dirt and debris.

L.237. MASTER BATTERY SWITCH

- L.237.1.** A master switch on the battery positive (+) should be provided in the battery compartment near the batteries for complete disconnecting from all bus electrical systems except for safety devices such as fire suppression system and other systems as specified. The location of the master battery switch should be clearly identified on the access panel and be accessible in less than 10 seconds for activation. The master switch should be explosion proof and capable of carrying and interrupting the total circuit load. Any equipment that requires power without reference to the master battery switch should be listed in attachments to Part 5: Technical Specifications. Opening the master switch with the power plant operating should not damage any component of the electrical system. The location of the master battery switch should prevent corrosion from fumes and battery acid when the batteries are washed off.

L.238. FIRE SENSING AND SUPPRESSION SYSTEMS (FSS)

- L.238.1.** A Fire Sensing and Suppression System (FSS) should be provided to monitor the engine compartment and (optional) auxiliary area(s) where a significant fire hazard exists. Upon detection, the system will alert the operator with visual and audible signals and initiate automatic engine shutdown, fuel shut-off, and extinguisher discharge sequences.

L.239. FIRE DETECTION

- L.239.1.** Fire detectors can sense radiant or heat energy from a fire. Heat energy is detected thermally by immersion in hot air, such as in close proximity to a fire. Radiant energy is detected optically at some distance from the fire. Thermal fire detectors should be installed.
- L.239.2.** The thermal fire detectors should be spot (one-dimensional detection) or linear (two-dimensional detection) designed for use in engine compartments. Thermal fire detectors must be in close proximity to the fire in order to detect. Their mounting locations must be chosen per the installation instruction, certified by the manufacturer, and typically mounted so that airflow will act to move a fire in the protected area toward them. The thermal detector should respond to being immersed in a fire in less than thirty seconds. The thermal detection system in the engine compartment will be comprised of at least two each spot detectors or one linear detector of suitable length.

L.240. SYSTEM ACTION

L.240.1. The FSS will detect fires in the protected areas. Upon detection, the system will alert the operator with visual and audible signals and initiate automatic engine shutdown, fuel shut-off, and extinguisher discharge sequences.

L.241. ALARM INDICATION

L.241.1. Upon detection of a fire, the system will provide a visual and audible fire alarm to the operator.

L.242. SYSTEM STATUS AND TROUBLE INDICATION

L.242.1. The status of the FSS should be verified by inspection during maintenance.

L.243. AUTOMATIC ENGINE SHUT-DOWN

L.243.1. After a fire is detected, the FSS should cause fuel flow to cease, and the engine to shut down.

L.244. EXTINGUISHER DISCHARGE

L.244.1. The system should provide a means for manually discharging the extinguisher with the control located in the driver's area. The installation should be certified by the manufacturer of the suppression system

L.244.2. Operator Over-Ride of Automatic Engine Shut-Down and Extinguisher Discharge

L.244.3. The FSS should offer provision for the operator to over-ride the automatic action of the system. The over-ride will prevent the engine shutdown from occurring. The over-ride delay should require active input from the operator.

L.245. SYSTEM RESET

L.245.1. After a fire alarm and complete system sequence, the FSS should have provision to be reset after the system is reconfigured per the instructions provided by the manufacturer.

L.246. FIRE SUPPRESSION SYSTEM

L.246.1. The fire suppression system should be pre-engineered and designed for vehicle applications. The system should have a minimum capacity of 20 pounds of BC or ABC dry chemical agent. System cylinder should have a minimum service pressure of 350 psi and be DOT rated. Nozzles and distribution should be installed in accordance with the installation manual. Stored pressure type extinguishing units should be provided with a gauge that can be visually inspected for pressure condition.

L.247. METHANE DETECTION SYSTEM (MDS)

L.247.1. A Methane Detection System (MDS) should be provided to monitor the engine compartment, each separate fuel storage area(s), and other areas where a leak is possible or gas may accumulate. See below for Methane Detection System details

L.248. METHANE DETECTION

L.248.1. GENERAL

L.248.1.1. The sensing technology selected should be configured for use in the protected area, e.g. the engine compartment, and allow for the required maintenance schedule.

L.249. SYSTEM ACTION

L.249.1. The MDS will detect potentially dangerous gas leaks in the protected areas. Upon detection, the system will alert the operator with visual and audible signals. If required, the MDS should (optionally) initiate engine shutdown and fuel shutoff sequences.

L.250. ALARM INDICATIONS

L.250.1. The MDS should automatically activate visible and audible alarms in the operator area when a significant leak is detected. The significant leak threshold should correspond to a maximum of 50% Lower-Explosive Limit (LEL) of methane. Optionally, a trace (20%) or moderate (30%) leak should be indicated visually and/or audibly.

L.251. SYSTEM STATUS AND TROUBLE INDICATION

L.251.1. The MDS should provide an active visual indication of the system status. An immediate visual Trouble indication will be provided if a fault occurs in any portion of the MDS circuit. An Indicator Test function should be provided at the panel.

L.252. METHANE DETECTION SYSTEM (MDS) CALIBRATION

L.252.1. Standard requirement for a MDS not requiring field calibration.

L.253. ENGINE SHUT-DOWN FROM MDS

L.253.1. After a significant level gas leak is detected, the MDS should cause the fuel flow to cease, and the engine to shut down. An optional automatic delay between the gas leak alarm and engine shutdown should not exceed 30 seconds

L.254. Operator Engine Shut-Down Override

L.254.1. When the system is configured so that engine shut-down occurs after a pre-set delay following a significant gas leak alarm, the MDS provides for the operator to over-ride the automatic action of the system, further delaying the engine shutdown. The override delay should require active input from the operator.

L.255. RESET

L.255.1. After a gas leak alarm and complete system sequence, the MDS should reset automatically once the gas level has returned to a normal level. Once activated, the engine shut-down feature must be manually reset by input by qualified personnel.

L.256. RADIO NOISE ATTENUATION

L.256.1. Proper suppression equipment should be provided in the electrical system to eliminate interference with radio and television transmission and reception. This equipment should not cause interference

M. SPECIFICATIONS FOR 45' DIESEL COMMUTER COACH

M.1. DELIVERY

- M.1.1.** Vehicle must be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following
- M.1.2.** The vehicle must have a full tank of fuel when delivered.
- M.1.3.** Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
- M.1.4.** All parts added, as part of the modification process shall be new.
- M.1.5.** Headlights properly aligned
- M.1.6.** Engine Tuned
- M.1.7.** All accessories properly adjusted
- M.1.8.** Electrical, braking and suspension systems inspected
- M.1.9.** Both batteries Charged
- M.1.10.** Front-end aligned, all wheels balanced, including spare
- M.1.11.** All lubricants checked, and greased if needed
- M.1.12.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
- M.1.13.** Warranty papers and owner's guide
- M.1.14.** Exterior and interior cleaned and washed.
- M.1.15.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.
- M.1.16.** Under no circumstances are tow vehicles to be attached to any buses.
- M.1.17.** Each vehicle must be delivered to the agency submitting the P.O.

M.2. CERTIFICATE OF ORIGINS

- M.2.1.** Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order five business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery is not acceptable.
- M.2.2.** Vendor shall notify buyer of vehicle delivery ten business days prior.

M.3. CLASSES OF FAILURES

- M.3.1.1.** Class 1: Physical Safety. A failure that could lead directly to passenger or driver injury and represents a severe crash situation.
- M.3.1.2.** Class 2: Road Call. A failure resulting in an en route interruption of revenue service. Service is discontinued until the coach is replaced or repaired at the point of failure.
- M.3.1.3.** Class 3: Coach Change. A failure that requires removal of the coach from service during its assignments. The coach is operable to rendezvous point with a replacement coach.
- M.3.1.4.** Class 4: Bad Order. A failure that does not require removal of the coach from service during its assignments but does degrade coach operation. The failure shall be reported by driver, inspector, or hostler.

M.4. LEGAL REQUIREMENTS

- M.4.1.** The coach shall meet all applicable Federal Motor Vehicle Safety Standards and regulations as established by the U.S. Department of Transportation.
- M.4.2.** The manufacturer shall comply with all applicable Federal and State regulations. In event of any conflict between the requirements of this Specification and any applicable legal requirement, then the legal requirement shall prevail.

M.5. OVERALL REQUIREMENTS

M.5.1. DIMENSIONS

M.5.2. PHYSICAL SIZE

M.5.3. With the exceptions of exterior mirrors, marker and signal lights, bumpers, flexible portions of the bumper, fender skirts, and rub rail, the coach shall have the following overall dimensions.

LENGTH	45' (+0/-1 IN)	14 - +0/-25.4MM
WIDTH	8'6" (+0/-1 IN)	2.6M – +0/-25.4MM
HEIGHT	137" MAXIMUM LOADED OR UNLOADED	3.5 M
FIRST STEP HEIGHT	15.5" MAXIMUM	394 MM

M.6. UNDERBODY CLEARANCES

M.6.1. The coach provided shall meet the following underbody clearances:

APPROACH ANGLE	9.50°
BREAKOVER ANGLE	7.20°
DEPARTURE ANGLE	6.20°
GROUND CLEARANCE	10.00 IN (254MM)
AXLE CLEARANCE	6.50 IN (165MM)

M.7. WEIGHT AND AXLE LOADING

M.7.1. Each vehicle, at a capacity load, shall not exceed the gross vehicle weights or maximum axle weights specified. In no case shall the axle weight exceed 22,500 pounds on any axle. In the interest of economy in construction and operation it shall be the goal to manufacture the coach as light as possible without degradation of structure, performance, appearance, comfort and reliability. Total vehicle weight shall not exceed the gross vehicle weight rating nor axle weight rating at ground as specified. GVWR shall not exceed 50,000 pounds for a 45-foot bus. Combined load capacity weight on the drive and tag axles shall not exceed 36,500 pounds.

M.8. CAPACITY

M.8.1. Rated passenger capacity of the coach shall be as outlined below. Provisions to secure two wheelchair passengers shall also be provided. The overall seating capacity may be reduced when the securement positions are being utilized.

45'/102" BUS	57 SEATS
45'/102" BUS WITH LAVATORY	55 SEATS

M.9. SERVICE LIFE AND MAINTENANCE

M.9.1. SERVICE LIFE

M.9.1.1. The coach shall be designed to operate in commuter service for at least 12 years or 500,000 miles (804,672 km) of revenue service whichever comes first.

M.10. MAINTENANCE AND INSPECTION

M.10.1. Scheduled maintenance tasks shall be related and shall be grouped in maximum mileage intervals. Routine scheduled maintenance actions, such as filter replacement and adjustments, shall not be required at intervals of less than 6,000 miles (9,656 km), except for routine daily service performed during the fueling operations. Higher levels of scheduled maintenance tasks shall occur at even multiples of mileage for lower level tasks.

M.10.2. The manufacturer shall provide a preventive maintenance schedule covering all components upon delivery of the first production vehicle. Each schedule shall be complete and shall adhere to frequency intervals considered normal industry standards.

M.11. MEAN MILEAGE BETWEEN FAILURES

M.11.1. The following are design goals for mean mileage between failures by failure class, provided that all specified preventive maintenance procedures are followed:

M.11.1.1. Class 1: Physical Safety. Mean mileage shall be greater than 1,000,000 miles (1,609,344 km).

M.11.1.2. Class 2: Road Call. Mean mileage shall be greater than 20,000 miles (32,187 km).

M.11.1.3. Class 3: Coach Change. Mean mileage shall be greater than 16,000 miles (25,750 km).

M.11.1.4. Class 4: Bad Order. Mean mileage shall be greater than 10,000 miles (16,093 km).

M.12. ACCESSIBILITY

M.12.1. All systems or components serviced as part of periodic maintenance or whose failure may result in Class 1 or Class 2 failures shall be readily accessible for service and inspection. Removal or physical movement of components unrelated to the specific maintenance and/or repair tasks involved shall be minimized

M.13. INTERCHANGEABILITY

M.13.1. Components with identical functions shall be interchangeable with the exception of windows and baggage bay doors. Components with non-identical functions shall not be, or appear to be, interchangeable.

M.14. OPERATING ENVIRONMENT

M.14.1. The coach shall achieve normal operation in temperature ranges of -10 to 110 degrees F (-23° to 43° C), at relative humidity between 5 percent and 100 percent and at altitudes up to 5,000 feet (1,524 m) above sea level. Degradation of performance due to atmospheric conditions shall be minimized at temperatures below -10 degrees F (-23° C) and above 110 degrees F (+43° C) or at altitudes above 5,000 feet (1,524 m). Special equipment or procedures may be employed to start the coach after a 12 hour or more exposure to temperatures below +30 degrees F (-1° C) without the engine in operation.

M.14.2. Speed, gradability, and acceleration performance requirements shall be met at, or corrected to, 85 degrees F (29 C), 29.00 inches (737 mm) Hg, dry air. Performance degradation at conditions other than the test standard shall not exceed 1 % for each 3 degrees F/C and 4 % for 1,000 feet (305 m) of altitude above the standard.

M.15. MATERIALS AND CONSTRUCTION

M.15.1. For economy in maintenance, it is essential that parts and units be arranged so that rapid assembly and disassembly will be possible for the coach being provided. The dimensions of all parts, unless particularly specified, will be in accordance with current standards of the Society of Automotive Engineers, or the metric equivalents. All units or parts not specified shall be Manufacturer's standard units or parts and shall conform in material, design and workmanship to industry standards and shall meet or exceed all Federal and State motor vehicle safety standards. During the manufacturing of the coaches all parts shall be new and in no case will used, reconditioned or obsolete parts be accepted. No advantages shall be taken by the Manufacturer in the omission of any parts or details that make the coach complete and ready for service, even though such parts or details are not mentioned in these specifications.

M.15.2. Workmanship throughout shall conform to the high standard of commercially accepted practice for the class of work and shall result in a neat and finished appearance. All exposed surfaces and edges shall be smooth, free from burrs and other projections, and shall be neatly finished. Exposed metal surfaces, prior to paneling or covering shall be properly prepared and coated with protective material to insure against corrosion or deterioration.

M.15.3. All lubrication points, unless otherwise specified, shall be capable of accepting a high pressure grease gun operated on fittings that permit grease to travel into the lubrication point but does not permit the grease to escape and designed so that when the grease gun is withdrawn, there is a positive barrier preventing dirt from entering the fitting. These fittings shall be of one manufacture and shall be accessible for a grease gun while the vehicle is being serviced on either a lift or a pit.

M.16. BODY

M.16.1. DESIGN

M.16.1.1. The coach shall have a clean, smooth, simple design, primarily derived from coach performance requirements and passenger service criteria. Body construction shall not be of a body on chassis type. The exterior and body features, including grilles and louvers, shall be shaped to allow complete and easy cleaning by automatic bus washers without snagging washer brushes. The retention of water and dirt in or on any of the body features or the freezing or bleeding out of this dirt and water after leaving the washer shall be minimized. 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 coach.

Accumulation of spray and splash on any window of the coach generated by its wheels on a wet road shall be minimized. The undercarriage of the coach shall be sealed off to the maximum extent practicable to significantly reduce the intrusion of road spray.

M.17. MATERIALS

M.17.1. Body materials shall be selected and the body fabricated to reduce maintenance, extend durability, and provide consistency of appearance throughout the life of the coach. Detailing shall be kept simple; add-on devices and trim shall be minimized and, where necessary, integrated into the basic design.

M.17.2. Fabric material used for sidewalls, ceiling, parcel rack, and entrance area shall be Holdsworth Aura or approved equal.

M.18. FINISH AND COLOR

M.18.1. All exterior surfaces shall be smooth and free of wrinkles and dents. Exterior surfaces to be painted shall be properly cleaned and primed as appropriate for the paint used, prior to application of paint to assure a proper bond between the basic surface and successive coats of original paint for the service life of the coach.

M.18.2. Paint utilized shall be DuPont Imron Elite SS white N5793EA polyurethane enamel or approved equal, that exhibits excellent color and gloss retention, chip, abrasion, stain and mar resistance, chemical and solvent resistance and excellent cleaning characteristics per industrial standards. Paint shall be applied smoothly and evenly with the finished surface free of dirt, runs, sags, "orange peel" type pebbled surface, and other imperfections.

M.18.3. All exterior finished surfaces shall be impervious to diesel fuel, gasoline, and commercial cleaning agents such as soaps, detergents and degreasing compounds. Finished surfaces shall not be damaged by controlled applications of commonly used graffiti-removing chemicals.

M.18.4. Vendor shall provide buyer options of available paint colors for the exterior three color paint scheme.

M.19. NUMBERING AND SIGNING

M.19.1. Monograms, numbers and other signing shall be applied to the inside and outside of the coach as required. Signs shall be durable and fade, chip, and peel-resistant; they may be decals, or pressure-sensitive appliques. Emergency exit information shall be provided in both English and Spanish.

M.20. PEDESTRIAN SECURITY

M.20.1. Exterior protrusions greater than 0.250 inch (6.0 mm) and within 80 inches (203 cm) of the ground shall have a radius no less than the amount of the protrusion. The left and right side rear view mirrors, windshield washer nozzles and required lights and reflectors are exempt from the protrusion requirement. Grilles, doors, bumpers and other features on the sides and rear of the coach shall be designed to minimize the ability of unauthorized riders to secure footholds or handholds.

M.21. STRUCTURE

M.21.1. STRENGTH AND FATIGUE LIFE

M.21.1.1. The structure shall be of a sufficiently strong and efficient design to withstand the conditions of commuter service throughout the service life of the coach.

M.22. DISTORTION

M.22.1. The coach at GVWR and under static conditions, shall not exhibit deformation or deflection that impairs operation of doors, windows, or other mechanical elements. Static conditions include the vehicle at rest with any one wheel or dual set of wheels on a 6 inch (152 mm) curb or in a 6 inch (152 mm) deep hole.

M.23. RESONANCE

M.23.1. All structure, body, and panel-bending mode frequencies, including vertical, lateral, and torsion modes, shall be sufficiently removed from all primary excitation frequencies to minimize audible, visible, or sensible resonant vibrations during normal service.

M.24. MATERIAL

M.24.1. Reinforced fiberglass and plastic materials shall be excluded from structural body construction, except for replaceable panels or doors and for non-load bearing front and rear roof caps and the front lower panel below the windshield and the A-pillar covers and transom panels.

M.25. CORROSION

- M.25.1.** The coach shall resist corrosion from atmospheric conditions and road salts. It shall maintain structural integrity and nearly maintain original appearance throughout its service life, provided it is maintained in accordance with the procedures specified in the service manual. All exposed body panels above and below the floor line shall be aluminum or stainless steel except for the front end upper and lower panels, the rear end upper panels and the upper sidewall panel which are made of fiberglass or galvanized steel. Materials exposed to the elements and all joints and connections of dissimilar metals shall be corrosion-resistant and shall be protected from galvanic corrosion. All frame members below the passenger floor that are subject to road splash and are less than 0.06 inch (1.5 mm) shall be stainless steel for maximum corrosion protection. All other frame members exposed to splash are to be High Strength Low Alloy steel and are to be 0.06 inch (1.5 mm) thick minimum and shall be coated with Tectyl undercoating or approved equal, on all surfaces exposed to road splash for maximum corrosion protection.
- M.25.2.** Floor supports in the passenger and drivers area, the sidewall structures and roof structures that are not exposed to road spray shall be High Strength Low Alloy and primed prior to incorporation into the coach assembly.
- M.25.3.** Outer sidewall panels above the passenger floor and below the windows shall be galvanized steel, pre-primed. The roof panels shall be pre-primed aluminum both sides and the front and rear roof caps fiberglass.
- M.25.4.** The upper rear engine door and louvers may be fiberglass panels mounted to stainless steel frames with powder coated aluminum screens. The upper side corner panels may be fiberglass with powder coated aluminum screens.
- M.25.5.** The upper wheelchair lift door may be made of an aluminum frame or other acceptable lightweight material and aluminum exterior panel.
- M.25.6.** Non-structural underbody panels used for baggage bay floors and to retain insulation in other areas, shall be Tectyl or approved equal undercoated aluminum or stainless steel for maximum corrosion protection. In the wheel well areas, non-structural closeout panels shall be stainless steel.
- M.25.7.** Before assembling, all metal body parts must be given a thorough anti-corrosion treatment. Joints between dissimilar metals shall be properly insulated with an inert plastic tape to avoid corrosion due to electrolytic action. All nuts, bolts, clips, washers, clamps, and like parts shall be zinc plated, phosphate coated, black oxide coated, stainless steel, or nylon to prevent corrosion. All exterior joints and seams must be sealed.
- M.25.8.** Dissimilar metals must be separated by a non-conductive barrier.
- M.25.9.** Non-Conductive Barriers may consist of one of the following:
- M.25.9.1.** Black elastic compound tape
 - M.25.9.2.** Mylar tape
 - M.25.9.3.** Double-sided structural adhesive tape
- M.25.10.** Where tape barriers are not feasible an appropriate sealant shall be used to provide a protective barrier and a water tight seal. This sealer must be used on all panels and assemblies that are susceptible to water leaks.

M.26. TOWING

- M.26.1.** Towing devices shall be provided and be permanently mounted on the front and rear of the coach. The coach may be towed from the front only, but can be recovered from the rear. Recovery shall mean to move the bus into the clear so it can be hooked up and towed from the front. Lift and tow is not required.
- M.26.2.** Front towing device shall withstand, without permanent deformation, tension loads up to 1.2 times the curb weight of the coach within 20° of the longitudinal axis of the coach. Towing device shall accommodate a crane hook with a 1-inch throat. A minimum of two steel rear skid plates measuring approximately 15.2 x 3.3 inches (386 x 84 mm) shall be welded to the underside of the engine rails. Skid design shall be durable construction to adequately protect mechanical or other body components from damage due to the coach bottoming out.

M.27. JACKING & HOISTING

- M.27.1.** It shall be possible to safely jack up the bus, at curb weight, with an 8.5 inch (216 mm) high hydraulic hand jack or a 10-ton (9,072 kg) floor jack when a tire or dual set is completely flat and the bus is on a level hard surface. Jacking from a single point shall permit raising the bus sufficiently high enough to remove and reinstall any wheel and tire assembly. The bus shall be fitted with jacking pads for each tire/wheel locations and shall permit easy and safe jacking with the flat tire or dual set on a 3.5-inch (89 mm) high run-up block not wider than a single tire. The bus will withstand such jacking at any one or any combination of wheel locations without permanent deformation or damage. The bus axles or jacking plates

shall accommodate the lifting pads of a post hoisting system. Jacking plates shall be approximately 2.00 inches (51 mm) square, with a turned- down flange not less than 0.5 inch (13 mm) deep on each side. Other pads shall be provided to support the bus on jack stands independent of the hoist.

M.28. FIRE SUPPRESSION

- M.28.1.** An Amerex or approved equal modular vehicle fire suppression and overheat warning system will be provided to detect and extinguish fires in the engine compartment. The system will be electrically controlled. A 25-lb. (11-kg) dry-chemical extinguisher cylinder will be installed in the #3 baggage compartment. Three thermostats and four extinguisher nozzles will be installed in the engine compartment in strategic locations. If the thermostats detect excessive heat, then the cylinder will discharge a dry chemical agent into the engine compartment. A button at the end of the left-hand console will trigger the extinguisher. A control panel above the driver will monitor the system. Normally a green LED indicating "System OK" will be illuminated on the front of the monitor. When a fire is detected a red LED and buzzer on the control panel will warn the driver. When the fire has been extinguished the green LED will light again.
- M.28.2.** The fire suppression system will be powered by the coach's electrical system, but an internal rechargeable back-up battery will be provided in case the coach's electrical system is interrupted.

M.29. FIRE PROTECTION

- M.29.1.** The passenger and engine compartments shall be separated by a bulkhead(s) which shall, by utilization of fire resistant materials in its construction, be a firewall. This firewall shall preclude or retard propagation of an engine compartment fire into the passenger compartment. Only necessary openings shall be allowed in the firewall, and these shall be fire resistant. Any passageways for climate control system air flow shall be separated from the engine compartment by fire resistant material. Piping through the center tunnel bulkhead shall be copper, steel, nylon air brake tubing (for air and fuel), PVC (closed conduit) or brass and shall be sealed with fire-resistant material at the firewall. Wiring may pass through the bulkhead only if connectors or other means are provided to prevent or retard fire propagation through the firewall. The conduit and bulkhead connectors shall be sealed with fire resistant material at the firewall. Engine access panels in the firewall shall be fabricated of fire resistant material and secured with fire resistant fasteners. These panels, their fasteners, and the firewall shall be constructed and reinforced to minimize warping of the panels during a fire that will compromise the integrity of the firewall. The coach body shall be adequately sealed to prevent the intrusion of smoke, fuel, and fumes into the coach interior.

M.30. LEAK DETECTION SYSTEM

- M.30.1.** A mobile gas leak detection system manufactured by Amerex Corporation or approved equal shall be provided when applicable. Methane detection capability shall be provided in the follow areas:
- M.30.2.** Engine compartment one detector minimum Fuel storage area - as required.
- M.30.3.** Detectors are to be designed to prevent vandalism or damage from external sources.
- M.30.4.** The AMGADS III system, or approval equal, shall detect and quantify airborne concentrations of methane from 0 % LEL to 100 % LEL and shall continue to give the indication of the presence of gas at concentrations above 100 % LEL.
- M.30.5.** The system shall be integrated with the engine stop override system to permit the operator more time, if required, to stop the vehicle. The system shall be powered through the battery insulation switch(es) and be in full time sampling mode any time the master control switch is in the "on" position. The system shall be self-restarting following power interruption or have backup batteries to prevent interruption of function.
- M.30.6.** The system shall be capable of operating normally without failure from -65 degrees F to +185 degrees F, and at relative humidity levels from 0% to 99 %. Components operating within the engine compartment shall operate in temperatures up to 250 degrees F. Any single failure of a detection device shall cause an indicator light on the control panel to illuminate.
- M.30.7.** The system shall operate at supply voltages from 9 to 30 VDC as produced by the coach electrical system, and be designed to withstand positive and negative voltages spikes of 500 VDC, and electrostatic discharge of 15000 volts without failure. Total current draw of the system under normal operating conditions shall not exceed 750 mA. System design shall comply with SAE J1211 criteria for automotive electronic equipment as a minimum.

M.31. ALARM LEVELS

- M.31.1.** The system shall generate audible and visual alarms at two non-adjustable concentration levels. The system shall also supply one user assignable auxiliary shift relay for such functions as alarms and signal light actuation, fuel valve shut off and ignition interruption. Alarms shall provide audible notification of detector activation inside the coach.

M.32. CALIBRATION REQUIREMENTS

M.32.1. The system shall register and report zero drift as a dangerous situation requiring attention. Drifts in calibration at other than the zero level shall either always be such as to produce a failsafe (false high) reading or shall give notification of a reading as a dangerous situation requiring attention (false low).

M.33. MONITOR PANEL

M.33.1. The system shall have a supervision monitoring panel located in the operator's area. The monitor panel shall indicate operational status of the sensors, harness, and calibration with visual indicators provided on the operators indicator panel.

M.34. EXTERIOR AND APPLIED PANELS

M.34.1. Roof Panels

M.34.1.1. Front roof cap and rear crown panels shall be nominal 0.13 inch (3.17 mm) thick fiberglass-reinforced, molded plastic incorporating molded indentations for the marker, clearance and identification lights. Main roof panels shall be 16 gauge, nominal 0.05 inch (1.29 mm), high tensile primed aluminum. Roof panels shall be bonded to the roof structure with adhesive.

M.34.2. Front Panels

M.34.2.1. The front body panel below the windshield shall be of one-piece molded fiberglass. A fiberglass trim fascia shall be provided under the windshield. It shall include molded housings for the headlamp, turn signal and clearance lamp assemblies.

M.35. STRENGTH AND INSTALLATION

M.35.1. Exterior panels above and below the rub rail may be structural components. Panels shall be secured to structural members and shall have a smooth finish with no sharp edges.

M.36. REPAIR AND REPLACEMENT

M.36.1. Exterior panels below the rub rail shall be divided into sections that are repairable or replaceable by a mechanic. Baggage doors shall be two part with the joint at or below the rub rail.

M.37. RAIN GUTTERS

M.37.1. Gutters shall be provided to minimize water flowing from the roof onto the side windows and passenger doors.

M.38. LICENSE PLATES

M.38.1. A recessed mounting area shall be provided to mount a standard size U.S. license plate on the rear of the coach. This provision shall recess the license plate so that automatic coach washing equipment brushes will not catch on the license plate. Four fasteners shall be utilized to retain the license plate. The license plate shall be mounted to the left of the coach center. Provision shall be made to illuminate the surface of the rear license plate.

M.39. RUBRAILS

M.39.1. Rub rails shall have a minimum height dimension of 2.50 inches (64 mm) and shall be composed of flexible, resilient material to protect both sides of the coach body from damage caused by minor sideswipe accidents. The rub rail may be discontinued at doorways and the condenser intake grille. A damaged portion of the rub rail shall be replaceable without requiring removal or replacement of the entire rub rail.

M.40. MOLDINGS

M.40.1. Sash Moldings

M.40.1.1. Painted aluminum sash moldings shall be installed along the bottom length of the passenger windows.

M.40.2. Belt Moldings

M.40.2.1. Painted aluminum belt moldings shall be installed along the left and right hand belt lines of the coach.

M.41. PARCEL RACKS

M.41.1. A minimum 10 module parcel rack without dividers and compartment doors shall be furnished over all two-passenger seating positions except in the wheelchair door area. Retention cords shall run the length of the rack housing except where air conditioning components are housed. These compartments will have

dividers locking doors. The parcel rack edge, running along the full length of the aisle, shall incorporate a handhold for use by standees. Passenger headroom measured from the rack end to the top of the seat headrest, shall be a minimum 17 Inches (432 mm). Interior window post caps shall be ABS, thermo formed plastic, off-white in color to provide a clean finished appearance. The interior of the rack shall be vinyl covered aluminum to complement the interior. Parcel racks shall be supported by polycarbonate glass filled hangers spaced approximately 40 inches (1,016 mm) apart. Total capacity shall be a minimum 109 ft.³ (3 m³) to allow for ample storage space for carry-on items.

M.41.2. Passenger service modules mounted on the underside of the parcel rack shall include individually controlled and adjustable LED passenger reading lights, and an exit signal push button, red in color and individual air distribution outlets receiving air from the parcel rack HVAC system. These outlets shall be adjustable from fully closed to full open position. A minimum of twenty-six speakers shall also be provided in the cluster panels for the driver controlled public address system. Speakers shall broadcast, in a clear tone, announcements that are clearly perceived from all seat positions at approximately the same volume level. Passengers utilizing the securement systems shall be provided identical amenities as provided for all other passengers except that the parcel rack shall be deleted in the area of the wheelchair lift door. Separate and independent notification will be provided on the dashboard indicator panel for stop request notification from securement positions.

M.41.3. Parcel racks shall have air conditioning.

M.42. UNDERFLOOR BAGGAGE COMPARTMENTS

M.42.1. Full width under floor baggage compartments shall be provided between the front and rear axles. Each compartment shall be separated by an aluminum panel except the front and rear bulkheads shall be stainless steel. The compartment doors shall be a two part with the joint at or below the rub rail, fully sealed vertical lift pantograph type. Each door shall include an aluminum or composite frame with an aluminum outer panel. Doors shall be spring counter balanced for ease of operation.

M.42.2. The no. 1 right hand, curbside baggage door shall have a key lock. All other baggage doors shall be equipped with air locks. Each baggage door shall have a 4.0 x 10 inch (102 x 254 mm) flush mounted breakaway type latch handle located with a center point approximately 38 inches (965 mm) off the ground.

M.42.3. Each under floor compartment shall be pressurized and illuminated with two LED lamps when the doors are opened. The lamp fixtures shall be sealed to preclude the intrusion of dust and moisture into the fixture. The floor of the baggage compartments shall be corrugated aluminum.

M.43. INTERIOR

M.43.1. HEADROOM

M.43.1.1. Headroom above the aisle shall be no less than 78 inches (1,981 mm). If an engine brake is to be provided, then a "hump" ahead of the rear cross seat will decrease headroom to approximately 74 Inches (1,880 mm).

M.44. DRIVER'S BARRIER

M.44.1. A barrier or bulkhead between the driver and street side front passenger seat shall be provided. The barrier shall eliminate glare and reflections from interior lighting in the windshield directly in front of the barrier during night operation.

M.44.2. The driver's barrier shall be constructed of opaque .472 inch (12 mm) thick acrylic glazing. The barrier shall be a shatter-proof acrylic sheet that meets AS standards AS-4 or AS-5. The glazing shall be indelibly marked with the manufacturer's name and type of material.

M.44.3. The drivers barrier shall extend from below the level of the passenger or driver seat cushion, whichever is lower, to above the level of the seated driver's head and shall fit within 1.5 inches (38 mm) from the coach side window/wall to prevent passengers from reaching the driver or his/her personal effects. The barrier design shall accommodate a minimum of 9.05 inch (230 mm) fore and aft travel of the specified operator's seat.

M.44.4. On the aisle side, the barrier shall be cut out from the vertical stanchions to permit passengers to use the stanchion as a handhold. Any panels above and below the glazing shall be complementary in color to the sidewall material.

M.44.5. All controls, including the driver's dimmer switch for first two rows of reading lights will be relocated to the LH Console and the RH. Console deleted.

M.45. MODESTY PANELS

M.45.1. Sturdy modesty panels constructed of durable, unpainted, corrosion-resistant material complementing the interior trim shall be provided at the rear of the step well. The modesty panel and its mounting shall withstand normal kicking, pushing, and pulling loads of 200-pound (91 kg) passengers without permanent visible deformation.

M.46. REAR BULKHEAD

M.46.1. The rear bulkhead paneling shall be contoured to fit the ceiling, side walls and seat.

M.47. CONSTRUCTION

M.47.1. Interior panels may be integral with, or applied to, the basic coach structure. They shall be decorated in accordance with and compliment the interior specified. Use of moldings and small pieces of trim shall be minimized, and all parts shall be functional. Panels shall be of backed melamine, vinyl-clad aluminum or vinyl-clad steel. Front and rear closures shall be fiberglass with color molded in, and there shall be no painted surfaces. The lower sidewall shall be Melamine covered panels or approved equal, sectionalized for ease of repair.

M.48. FASTENING

M.48.1. Interior panels shall be attached so that there are no exposed edges or rough surfaces. Panels and fasteners shall not be easily removable by passengers. Interior trim fasteners, where required, shall be rivets, Phillips, or tamper-proof screws.

M.49. FLOOR

M.49.1. STRENGTH

M.49.1.1. The floor deck may not be integral with the basic structure but shall be mounted on the structure securely to prevent chafing or horizontal movement. Sheet metal screws shall not be used to retain the floor. All floor fasteners shall be secured and protected from corrosion for the service life of the coach. 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 0.375 inches (10 mm) from the normal plane. The floor shall withstand the application of 3.0 times gross load weight without permanent detrimental deformation.

M.50. EDGES

M.50.1. The floor shall be essentially a continuous flat plane, except at the step well. Where the floor meets the walls of the coach, the surface edges shall be blended with a circular section of radius not less than .5 inch and a molding or cover shall prevent debris accumulation between the floor and wall. Interior flooring shall be flat throughout except for an 8 ft. (2.4 m) long welded ramp in the aisle section at the front which is sloped 5.35 degrees and has a 3 inch (76 mm) riser under the #1 RH and #1 LH passenger seats except for a "hump" in front of the rear cross seat (when engine brakes are provided). The floor is attached to the underframe with adhesive and rivets. Wheel housings may not extend above floor line.

M.50.2. Access openings in the floor shall be sealed to prevent entry of fumes and water into the coach interior. Flooring material shall be flush with the floor and shall be edge-bound with stainless steel to prevent the edges from coming loose. Access openings may be symmetrical if the fasteners are arranged to ensure alignment of the flooring. Fasteners shall be flush with the floor when secured.

M.50.3. Rubber flooring adhesion procedure includes butt cut type edges that are securely bonded to the plywood floor with a waterproof adhesive. Flooring areas which are edge-bound with stainless steel shall include the sidewall on each side, the ramp in the center aisle, the base of rear cross seat, the step up under the number 1 seat, the driver's modesty panel and the RH front passenger's modesty panel.

M.51. FLOOR PROTECTION

M.51.1. The floor, as assembled, including the sealer, attachments, and covering, shall be waterproof, non-hygroscopic, resistant to heat, dry rot, mold growth, and impervious to insects. Plywood shall be no less than one half-inch thick 5 ply water resistant Douglas Fir per CSA 0121-M1978 or PS1-95 (APA) and shall be installed with all edges sealed. The floor in the aisle shall be no less than an overall thickness of one half-inch water resistant Douglas Fir per CSA 0121-M1978 or PS1-95 (APA).

M.52. STEPS AND STEPWELL

M.52.1. STEPS

M.52.1.1. There shall be no more than 4 steps and no step shall be located between the vestibule and passenger compartment. A ramp shall be provided in this area with the rate of rise not to exceed 0.75 inch (19 mm) per foot with a maximum vertical rise of 9.0 inches (229 mm).

M.52.1.2. All step treads shall be of uniform depth no less than 11 inches (279 mm) and a uniform height of no less than 9.5 inches (241 mm). Except for the first step, the plane of the step treads shall be parallel to the plane of the floor. Treads shall be covered with RCA flooring or approved equal that shall remain effective in all weather conditions. Color of the tread covering shall match the vestibule flooring. The edge of the vestibule floor shall have no overhang at the step riser. The edge of the vestibule floor and the edge of each of the step treads shall have a bright, contrasting white band, 2 inches (51 mm) wide, the width of the step. This band shall be uniform in width across the entire step and vestibule edge.

M.53. STEPWELL CONSTRUCTION

M.53.1. Step well shall be constructed entirely of stainless steel. The steps shall simultaneously support 300 pound (136 kg) loads evenly distributed over the center half of each step tread without permanent deformation and with elastic deflection of no more than 0.0625 inches (1.6 mm). Each step tread shall support a load of 500 pounds (227 kg) evenly distributed over the center half of the tread without permanent deformation. A minimum 1.0 inch (25.4 mm) thick Tuf-Coat or approved equal, self-adhesive insulation shall be provided behind the step well area for added control of interior temperature variances and to minimize road noise.

M.54. WHEEL HOUSING

M.54.1. CONSTRUCTION

M.54.1.1. Wheel housings shall be constructed of stainless steel. Wheel housing, as installed and trimmed, shall withstand impacts of a 2-inch (51 mm) steel ball with at least 200 foot-pounds (271 Nm) of energy without penetration.

M.55. CLEARANCE

M.55.1. Sufficient clearance and air circulation shall be provided around the tires, wheels, and brakes to preclude overheating. Interference between the tires and any portion of the coach shall not be possible in maneuvers up to the limit of tire adhesion with weights from wet to GVWR.

M.56. FENDER SKIRTS

M.56.1. Front and rear wheel wells shall be fully skirted with rubber to minimize spray and splash. The fender skirts shall be damage resistant and easily replaceable. They shall be flexible if they extend beyond the allowable body width. Wheels and tires shall be removable without disturbing the fender skirts.

M.57. SPLASH APRONS

M.57.1. Splash aprons, composed of 0.25 inch (6 mm) minimum composition or rubberized fabric or 0.188 inch (5 mm) nylon reinforced rubber, shall be installed behind all wheels and shall extend downward. Apron widths shall be no less than tire widths. Splash aprons shall be bolted to plates which are welded to the coach understructure. The plates shall support the splash apron across its entire width. Splash aprons and their attachments shall be inherently weaker than the structure to which they are attached. Splash aprons and their attachments shall not be included in the road clearance measurements. Other splash aprons shall be installed where necessary to protect coach equipment.

M.58. PASSENGER ENTRANCE DOOR

M.58.1. An electrically controlled, air-operated, power bi-fold door with keyed lock, will be located forward of the right front wheel. The non-symmetrical door will have a clear opening width of 30 inches (762 mm) up to a height of 44 inches (1117 mm). The clear door opening height will be 84.5 inches (2,146.3 mm).

M.58.2. The door shall be of composite material construction with a stainless steel kick panel for the lower portion. A molded fiberglass-reinforced panel shall be on the interior of the door. Upper and lower hinge assemblies shall be cast, with a stainless steel lower hinge pin pivoting inside a spherical bearing

M.58.3. An upper – primary and lower – secondary window shall be installed in the entrance door. The primary double-glazed window in the upper half of the door shall be of AS-2 laminated heat- absorbing safety glass. The secondary window, located in the lower section of the door, shall be of 0.5-inch (12.7 mm) acrylic.

M.58.4. Door control shall be provided by a momentary switch, located to the left of the steering wheel. An exterior remote external control switch shall also be located in a side-wall pocket by the entrance door,. The door shall have positive automatic air lock with overrule. The air lock will be automatically actuated by a micro switch when the door is in the closed position.

M.58.5. An entrance door key lock shall be provided on each coach along with two spare keys.

M.59. SERVICE COMPARTMENTS AND ACCESS DOORS

M.59.1. INTERIOR

M.59.1.1. Access for maintenance and replacement of equipment shall be provided by panels and doors that appear to be an integral part of the interior. Removal of fixtures or equipment unrelated to the repair task to gain access shall be minimized. Access doors, if hinged, shall be hinged with props, as necessary, to hold the doors up and out of the mechanic's way with the exception of the destination sign box door which hinges down and is held by straps in the open position. Panel fasteners shall be standardized so that only two tools are required to service all special fasteners within the coach. These fasteners shall be captive in the panel except for the engine compartment and antenna access hatches. Access doors for the door actuator compartments shall be secured with hand screws or latches, and shall be sealed to prevent entry of mechanism lubricant into the coach interior. All hinges and props must be designed to preclude accidental closure when the panels are opened.

M.59.2. EXTERIOR

M.59.2.1. Vertically 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. The upper engine radiator/C.A.C. compartment door shall be vertically hinged with a locking latch located behind the engine compartment doors. Access to these compartments shall be from outside the coach. 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 be capable of withstanding severe abuse throughout the life of the coach. They shall close flush with the body surface. All service/maintenance doors, excluding baggage compartment 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 coach washing operations. Doors with top hinges shall have props stored behind the door or on the door frame. All access doors (except vertically hinged access doors) shall be sufficiently retained in the open position by props or counterbalancing, as with baggage compartment doors. Springs and hinges shall be corrosion-resistant and shall last throughout the service life of the coach. Latch handles shall be sized to provide an adequate grip for opening. Large access doors shall hinge up and out of the way or fold flat against the coach body and shall be easily operable by one person. These doors, when opened, shall not restrict access for servicing other components or systems. Retention devices utilized to hold the engine compartment access doors in the open position shall be heavy duty and designed to last the service life of the coach.

M.60. LOCKED COMPARTMENTS

M.60.1. Vendor will provide the option to have vehicle locked compartments to be keyed alike or different key to access each locked compartment.

M.61. OPERATING COMPONENTS

M.61.1. DOORS

M.61.2. CONTROL

M.61.2.1. Operation of, and power to, the passenger door shall be completely controlled by a switch located in close proximity to the driver to the left of the steering wheel. A control or valve in the driver's compartment shall shut off the power to, and/or dump the air from the front door mechanism to permit manual operation of the front door with the coach shut down. A toggle switch on the exterior of the coach shall permit opening of the front door. The switch shall be concealed behind an unmarked flip up cover. The door switch cover shall be spring loaded so as to be held in the closed position and be located rearward of the entrance door.

M.62. ACTUATORS

M.62.1. The nominal door opening and closing speed shall be in the 3-5 second range. The maximum door opening and closing speeds will be regulated using fixed, maintenance free orifices and airline sizes. If required, door speeds can be decreased with the addition of a flow-restricting device. Actuators and the complete door mechanism shall be concealed from passengers, but shall be easily accessible for servicing.

M.63. MANUAL OPERATION

M.63.1. In the event of an emergency, it shall be possible to open the door manually from inside the coach

after actuating an unlocking device. The nameplate for the entrance door air dump valve shall say: "Emergency Only – To manually open entrance door push knob." All references shall detail the "manual" operation of the door.

M.64. WINDSHIELD WIPERS AND WASHERS

M.64.1. WINDSHIELD WIPERS

M.64.1.1. The coach shall be equipped with three speed electric windshield wipers for each half of the windshield. Both wipers shall park along the center vertical edges of the windshield glass. Windshield wiper motors and mechanisms shall be easily accessible for repairs or service from outside the coach only and shall be removable as complete units. Mounting shall preclude cracking or damage to the windshield frame. Power supply to the wiper motors shall be provided through a dedicated circuit.

M.64.1.2. An intermittent operation feature for each wiper shall be provided with a variable time delay. After each pause, the wiper shall make one complete cycle across the windshield surface and return to the park position automatically.

M.65. WINDSHIELD WASHERS

M.65.1. The windshield washer system shall deposit washing fluid on the windshield and, when used with the wipers, shall evenly and completely wet the entire wiped area. Two separate washer pumps are to be provided.

M.65.2. The windshield washer system shall have a 3.9 gallon (15 liter) translucent reservoir, located for easy refilling. Reservoir pumps, lines and fittings shall be corrosion-resistant, and the reservoir itself shall be translucent for easy determination of fluid level. The windshield washer system shall be protected with an anti-freeze washer solution to -20°F (-29°C), regardless of season of delivery. The protected solution shall be tinted to provide easy visual indication that anti-freeze is present.

M.66. LIGHTING, CONTROLS, INSTRUMENTS

M.66.1. EXTERIOR LIGHTING

M.66.1.1. All exterior lighting systems shall be nominal 12V or 24V. The use of LED lamp assemblies shall be maximized to the extent practicable. All exterior lighting fixtures shall be sealed to prevent entry and accumulation of moisture or dust and each lamp shall be replaceable in less than 5 minutes by a mechanic. Lamps, lenses and fixtures shall be interchangeable to the extent practicable, and fixtures shall be corrosion resistant with sockets to be brass or stainless steel or plastic housings. Lamps at the rear of the coach, except the license plate lamp, shall be visible from behind when the engine service doors are opened. Sockets shall comply with SAE Standard J576C.

M.66.1.2. Visual and audible warnings shall inform following vehicles or pedestrians of reverse operation. Visual reverse operation warning shall conform to SAE Standard J593. Audible reverse operation warning shall conform to SAE Recommended Practice J994-Type C or D. Daytime running lights are to be provided.

M.66.1.3. Two light installation housings shall be located on each side of the coach front containing a single round halogen headlamp, a round LED daytime running light inboard of each headlight and an amber clearance/turn signal light located outboard of each headlight.

M.66.1.4. Amber colored turn signal lamps shall be provided on both the front and rear of the coach. All lighting shall meet Federal standards (including amended 49 CFR Part 571 effective December 26, 1984). The front right lamp shall be near the front wheel well, above the rub rail line and no higher than the wheel well. The front left side lamp shall be located at the same height and forward position as the right. The side signal lamps shall be of the armor protected type with unobstructed amber lens. The rear side signal lamps shall be generally located in the vicinity of the rear wheel well and shall have amber lenses.

M.66.1.5. LED roof marker lamps shall be provided at each end of the coach with amber front and red rear lens being provided. Intermediate LED marker lamps with amber lenses shall be provided on each side of the roof line at the center of coach.

M.66.1.6. Reflectors on the sides and rear of coach shall be provided. The front and center side reflectors shall be amber. The rear side and rear reflectors shall be red. The reflectors shall be permanently affixed to the coach; glue on or pressure sensitive mountings are not acceptable.

M.67. SERVICE AREA LIGHTING

M.67.1. Four lamps shall be provided in the engine compartment to generally illuminate the area for night emergency repairs or adjustments. The lamps shall be controlled by a switch located near the rear start controls in the engine compartment. These lamp assemblies shall be adequately sealed to prevent the intrusion of moisture or debris during coach operation or normal servicing operations such as steam cleaning. Necessary lights, also sealed, shall be located in other service compartments, and shall be provided with maintain contact switches on the light fixture or convenient to the light.

M.68. FLUSH MOUNTED CURB LIGHTS

M.68.1. Flush-mounted curb lights shall be installed on the right hand curbside of the coach. One light shall be installed in the no.1 baggage bay door, two shall be installed on the wheelchair lift door and one shall be mounted in the right hand rear engine service door.

M.68.2. The curb lights shall illuminate the curbside area the coach when the entrance door is opened, activated through the door control relay.

M.68.3. The lights shall extinguish automatically approximately 10 seconds after closing the entrance door. The curb light in the no. 1 baggage bay door shall extinguish when the baggage bay door is opened.

M.69. DRIVER'S LIGHTING

M.69.1. The driver's area shall have a lamp to provide general illumination of the driver's area and shall illuminate the half of the steering wheel nearest to the driver. This lamp shall be controlled by a switch that is conveniently located for access by the driver.

M.70. PASSENGER INTERIOR LIGHTING

M.70.1. Indirect interior illumination of the coach shall be provided by a minimum total of twenty-one (21) fluorescent tubes controlled by a switch on the driver's left hand control panel. Lighting intensity, measured at a vertical plane 24 inch (610 mm) above the seat cushion, shall be a minimum 15 foot-candles. LED lighting providing equivalent illumination may also be used.

M.70.2. All passenger seats except for center seat of rear cross seat shall have a flush mounted adjustable LED light. A minimum of 6 candlepower will be provided by each reading light cluster to insure adequate visibility with a button for passenger control. A switch to test the function of the reading lamps shall be provided and be labeled "Test." This switch shall be wired so as to override the function of all passengers reading lamp switches and illuminate all reading lamps when it is moved to the test position.

M.70.3. A minimum of six blue LED aisle lights shall be provided on the underside of the street side passenger seats. These lamps shall be mounted in such a manner so as to prevent passengers from damaging the light's when they are illuminated.

M.70.4. Additional general lighting required to illuminate the interior for passenger exits and shall be interlocked to activate only when the passenger door is opened.

M.70.5. A step well lighting system shall be wired to illuminate when the front door is opened. The system shall provide no less than 2 foot-candles of illumination of the step treads with the doors open. These lights shall not glare in the passengers' eyes. Lamp fixtures shall be totally enclosed, splash- proof, designed to provide ease of cleaning as well as lamp and housing removal, and shall not be easily removable by passengers. Step well lamps shall be protected from damage caused by passengers kicking lenses or fixtures and shall not be a hazard to passengers.

M.70.6. Three lamps shall be provided; a dome at the top of the step well, one on each side of the step well with the bottom one to also provide illumination of the ground area located inside and above the entrance door.

M.71. DRIVER CONTROLS

M.71.1. All switches and controls necessary for the operation of the coach shall be conveniently located in the driver's area and shall provide for ease of operation. Switches and controls shall be essentially within the hand reach envelope described in SAE Recommendation Practice, J287, Driver Hand Control Reach. Controls shall be located so that boarding passengers may not easily tamper with control settings.

M.71.2. The door control, kneel control, windshield wiper/washer controls, and run switch shall be in the most convenient driver locations. They shall be identifiable by shape, touch, and markings. The passenger entrance door shall be operated by a single control, conveniently located by the driver's left hand on the control console. The location of this control shall be easily determined by position and touch.

M.71.3. All switches and controls shall be marked with easily read identifiers. All panel-mounted switches and controls shall be replaceable, and the wiring at these controls shall be serviceable from the vestibule or the driver's seat.

M.71.4. A momentary engine overrule switch shall be provided on the driver control console to permit the driver to move the coach off the road. All labeling of controls shall be permanent.

M.71.5. A rotary ignition selector switch shall be provided.

M.72. LEFT HAND CONTROL CONSOLE

M.72.1. A control console shall be located immediately to the driver's left and directly under the driver's window. The console shall house the rotary master/run control switch, outside mirror touchpad controls, engine override switch, auxiliary heater switch, hazard light switch, entrance door switch, kneeling switch, engine brake switch, passenger chime switch, and hazard switch. All switches shall be multiplexed and LED back-lit wherever possible.

M.73. TRANSMISSION SHIFT SELECTOR CONTROL

M.73.1. The Allison Transmission Gen IV shift selector control shall be located on the left hand control console. Shifting is totally automatic using the touch pad on the shift selector control module. Fault codes are also displayed on the shift selector to identify potential problems detected by the transmission's built-in diagnostics.

M.74. ACCELERATOR, BRAKE PEDALS AND ENGINE CONTROLS

M.74.1. These controls shall be designed for ankle motion. Foot surfaces of the pedals shall be faced with wear-resistant, nonskid, replaceable material that is either slipped or glued for grip. Controls for engine operation shall be closely grouped within the driver's compartment.

M.75. INSTRUMENTATION

M.75.1. The speedometer, air pressure gauge(s), and certain indicator lights shall be located on the front dash panel immediately ahead of the steering wheel. The steering wheel spokes or rim shall not obstruct the driver's vision of the instruments when the steering wheel is in the straight-ahead position. Instrument panel gauges and switches shall be illuminated when the exterior marker lamps are turned on. Glare or reflection in the windshield, side window, or front door windows from the instruments, indicators, or other controls shall be minimized. Instruments and indicators shall be easily readable in direct sunlight.

M.75.2. Indicators/telltale immediately in front of the driver shall at a minimum include:

M.75.2.1. Headlamp High Beam

M.75.2.2. Right Turn

M.75.2.3. Left Turn

M.75.2.4. Hazard Warning

M.75.2.5. Parking Brake applied

M.75.2.6. Service Brakes applied (may be common with parking brake indicator – Tell Tale labeled "Stop Lights.")

M.75.3. The instrument panel shall include a speedometer indicating no less than 80 mph (130 kph) and calibrated in maximum increments of 5 mph (5 kph). The speedometer shall be a rotating point type, with a dial deflection of 240° to 120° and 45 mph (73 kph) near the top of the dial. The speedometer shall be sized and accurate in accordance with SAE Recommended Practice J678. A programmable electronic speedometer, or approved equal with odometer indicating vehicle speed in miles per hour, between 0 mph and 80 mph, shall be supplied. Speedometer speed and odometer mileage readings must be accurate within limits of plus nothing to minus 2% when coaches are equipped with new tires. The speedometer shall be equipped with an odometer with a capacity reading no less than 999,999 miles or kilometers.

M.75.4. The instrument panel shall also include air brake reservoir pressure gauge(s) with indicators for front and rear air tanks and voltmeter(s) to indicate the operating voltage across the coach batteries. The instrument panel and wiring shall be easily accessible for service from the driver's seat or top of the panel. Wiring shall have sufficient length and be routed to permit service without stretching or chafing the wires.

M.76. VISUAL AND AUDIBLE WARNING DISPLAY

M.76.1. Critical systems or components shall be monitored with a built-in diagnostic system. This diagnostic system shall have visual and audible indicators. The diagnostic indicator lamp panel shall be located in clear sight of the driver and shall incorporate LED telltale lights. The intensity of indicator lamps shall permit easy determination of on/off status in bright sunlight but shall not cause a distraction or visibility problem at night. An audible alarm shall sound when certain malfunctions are detected by the diagnostic system. The audible alarm shall be loud enough for the driver to be aware of its operation. Malfunction warnings and other indicators listed in Figure 2 shall also be supplied on the coach. Space

shall be provided in the telltale clusters for future additions of no less than 4 indicators as the capability of onboard diagnostic systems improves.

M.76.2. Figure 2

BACK-UP INDICATOR (A)	BACK-UP ALARM
CHECK ENGINE INDICATOR	NONE
CHECK TRANSMISSION INDICATOR	NONE
ANTILOCK CONDITION LAMP	NONE
NOT GENERATING	NONE
HAZARD INDICATOR	CLICK
HEADLIGHT HIGH BEAM INDICATOR HOT	NONE
ENGINE INDICATOR (B)	BUZZER
KNEEL INDICATOR	SONALERT
LEFT TURN SIGNAL INDICATOR	CLICK
LOW AIR INDICATOR	BUZZER
LOW OIL PRESSURE INDICATOR (B)	BUZZER
LOW COOLANT INDICATOR (B)	NONE
PARKING BRAKE INDICATOR RIGHT	NONE
TURN SIGNAL INDICATOR STOP	CLICK
ENGINE INDICATOR	NONE
STOP REQUEST INDICATOR	CHIME
WHEELCHAIR LIFT INDICATOR WHEELCHAIR	BUZZER/ALARM
STOP REQUEST INDICATOR	CHIME
REAR RISE INDICATOR	SONALERT

M.77. INTERIOR TRIM

M.77.1. GENERAL REQUIREMENTS

M.77.1.1. The interior trim shall be generally pleasing, simple, modern, and free from superficial design motifs. It shall have no sharp depressions or inaccessible areas and shall be easy to clean and maintain. To the extent practicable, all interior surfaces more than 10 inches (254 mm) 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. Handholds, lamps, air vents, armrests, and other interior fittings shall appear to be part of the coach interior design. There shall be no sharp, abrasive edges and surfaces and no unnecessary hazardous protuberances. All plastic and synthetic materials used inside the coach shall be fire-resistant.

M.77.1.2. Materials shall be selected on the basis of maintenance, durability, appearance, flammability, and tactile qualities. Trim and attachment details shall be kept simple and unobtrusive. Materials shall be strong enough to resist everyday abuse and vandalism; they shall be resistant to scratches and markings. Interior trim shall be secured to avoid resonant vibrations under normal operational conditions.

M.78. TRIM PANELS

M.78.1. Interior side trim panels and driver's barrier shall be textured stainless steel, anodized aluminum, plastic, melamine type material, vinyl-clad aluminum or fiberglass reinforced plastic. The material shall permit easy removal of paint, greasy fingerprints, and ink from felt tip pens. Panels shall be easily replaceable and tamper resistant. They shall be reinforced, as necessary, to resist vandalism and other rigors of commuter coach service. Interior mullion trim, molding, and trim strips shall be textured stainless steel, vinyl-clad aluminum, anodized aluminum or vacuum formed plastic.

M.78.2. The lower sidewall interior trim shall be fabric covered aluminum panels or approved equal, with fabric patterns running horizontally. Panels shall be sectionalized for ease of repair and joined by aluminum extrusion. Ceiling panels shall be vinyl-clad aluminum or approved equal.

M.79. HEADLINING

M.79.1. 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 frame members. Molding and trim strips, as required to make the edges tamper-proof, shall be stainless steel, aluminum, or plastic, colored to compliment the ceiling material. The access panel for the antenna base does not require to be hinged but shall be mounted with tamper-proof screws. Materials for the headlining shall typically be vinyl clad aluminum; the front interior cap shall be gray fiberglass or ABS.

M.80. FRONT END

M.80.1. The entire front end of the coach shall be sealed to prevent debris accumulation behind the dash and to prevent the driver from kicking or fouling wiring and other equipment with his feet. The front end shall be free of protrusions that are hazardous to passengers standing or walking in the front of the coach during rapid decelerations. Formed metal dash panels shall be painted and finished to exterior quality or may be ABS, fiberglass or vinyl-clad. All parts forward of the driver's barrier shall be finished with a dull matte surface. Colors shall match or coordinate with the balance of the coach interior.

M.81. REAR END

M.81.1. The rear bulkhead and rear interior surfaces shall be paneled with fiberglass reinforced plastic, trimmed with stainless steel, aluminum, vinyl-clad aluminum, or approved equal.

M.82. PASSENGER SEATS

M.82.1. ARRANGEMENTS

M.82.1.1. Passenger seats shall be arranged in a transverse, forward facing configuration. Ambulatory passenger capacity shall accommodate 57 seats. An option for a lavatory and lavatory retention tank shall be provided, the lavatory should not displace more than 2 passenger seats. Both configurations will need an attached floor plan.

M.82.1.2. No more than twelve seated positions shall be lost on any bus configuration to accommodate two wheelchair passengers occupying the securement positions.

M.82.1.3. Each transverse, forward facing seat, except the rear seats, shall accommodate two adult passengers. Floor seat tracks shall be stainless steel and shall be welded to the coach frame and be nearly flush with the finished floor. The wall tracks shall be stainless steel or aluminum and shall be bolted or riveted to the sidewall.

M.82.1.4. The vendor shall provide the buyer with an option for self-retracting footrest.

M.83. STRUCTURE AND DESIGN

M.83.1. Seats shall be American Seating Model W2005SQ reclining seats or approved equal. Seat frames shall be constructed of high strength, fatigue resistant, welded steel with a durable powder coated, corrosion resistant colored finish which complements the coach interior. The seat frame shall be wall mounted with heavy gauge steel brackets and shall be attached to the coach floor with a heavy duty stainless steel T pedestal. The seat back shall recline five (5) inches (127 mm) maximum with an infinite number of stops. The reclining seat backs shall be provided with a dress up feature to facilitate coach cleaning. Seat width shall be nominal 40.50 inches (1,029 mm). Aisle shall not be less than 14 inches (356 mm) wide.

M.83.2. Seat cushions shall be supported by steel serpentine springs. Seat covering shall be Holdsworth, Lantal, or similar high quality wool fabric. Typical seat covering weight shall be 24 ounces (680 g)/square yard. Overall composition shall typically be 54% wool, 9% nylon and 37% cotton. Pile composition shall typically be 85% wool and 15% nylon. Backing composition shall typically be 100% cotton. Abrasion from a 28 ounce (794 g) loading shall not affect appearance with 60,000 rubs. The front face of the seat upright and side boxing of cushions shall be covered with Holdsworth, Lantal or other similar wool fabric to compliment the seat cushion. Backrest fabric shall be rugged carpet material. Seat armrest shall be dark gray in color.

M.83.3. Seat foam padding shall be polyurethane. Seat upholstery shall utilize zippers or Velcro which allows them be removed from the seat cushions for cleaning/replacement purposes.

M.84. DRIVER'S SEAT

M.84.1. DIMENSIONS

M.84.1.1. The driver's seat shall be an air ride Recaro Ergo Metro or approved equal. The driver's seat shall be adjustable and shall have up to 9.05 inches (230 mm) of fore and aft adjustment. The

seat back and cushion shall be adjustable. The seat shall have cushion depth adjustment, height adjustment (5.5 inches (140 mm) maximum), seat back adjustment, rear cushion adjustment and lumbar adjustment so that operators ranging in size from the 98th percentile male to the 5th percentile female may operate the coach. The suspension control shall be ergonomically designed so that the operator can adjust the seat without looking. The suspension height adjustment and lumbar switches shall be operated with a rocker switch, no rotating knobs are acceptable. The seat suspension shall be capable of dampening varying frequencies that are transmitted through the vehicle caused by varying road conditions. The seat shall be cushioned by a dual shock absorber design. One shock shall be adjustable to allow the operator to control the ride settings. A rubber bumper is required to prevent bottoming out of the seat.

M.84.1.2. A rubber boot shall be provided to cover the suspension to eliminate the potential for pinching. All air lines are to be 0.25 inch (6 mm) diameter and have a quick disconnect at the back of the seat.

M.84.1.3. The suspension shall have a minimum of 15 degrees of seat cushion tilt (rake adjustment). The rake adjustment shall be dual-sided and be accomplished without leaving the seat. The seat cushion shall adjust from 18-20 inches (457 – 508 mm) for varying size drivers. Double locking seat tracks with stainless steel bearings shall be provided. The seat tracks shall be located below the seat cushion and above the pneumatic suspension to enhance track durability and improve rearward travel. The seat shall come equipped with an air track release and a manual center release. All controls are to be on the right-hand side of the seat.

M.84.1.4. The seat shall be equipped with manual dual recliner gears. The seat back shall be adjustable with dual sided hand controls and include a 24.5 degree recline stop. Recline stop is to prevent the seat from interfering with the driver's barrier. The seat back shall be infinitely adjustable from 90 to 114.5 degrees. The seat back shall come with a full protective plastic back shell.

M.84.1.5. The back structure shall be constructed of steel and include a one piece stamped steel shell. The seat back shall be ergonomically designed and adjustable to provide exactly the right support to match the S-shaped curve of the operators back. The seat back foam shall be fully supported, no wires or spring support is to be provided. Solid steel bolster adjustment supports are required to provide strong lateral supports. Lateral supports will help hold the driver in place and reduce muscle fatigue while driving.

M.84.1.6. The seat cushion shall be adjustable in length and rake to accommodate operators of various heights. The seat cushion shall have a two inch extension for taller operators. To accommodate shorter operators, the front of the seat cushion shall rake down and retract.

M.84.1.7. A three cell air lumbar with right hand controls shall be provided for lower back support. Each air bag shall be individually controlled. Switch design and layout shall be positioned so that the operator can adjust without looking. A four way adjustable headrest with six position vertical adjustment shall be provided. The seat shall be provided with a two point 72 inch (1.8 m) seat belt that is stored in plastic anti-cinch automatic retractors mounted on the left side of the seat. The seat belt buckle shall be located on the right hand side of the seat for easy access.

M.85. STRUCTURE AND DESIGN

M.85.1. The driver's seat cushion shall be made of polyurethane foam. The foam shall be constructed to provide lateral support to provide better operator stability in curves and turns. All exposed metal on the driver's seat, including the pedestal, shall be unpainted aluminum or stainless steel. Required seat belts shall be fastened to the seat so that the seat may be adjusted by the driver without resetting the seat belt. Seat belts shall be stored in automatic, inertia locking type retractors that do not tighten up during operation. The retractor shall be located to the left of the driver; the latch mechanism shall be located on the right. The seat belt shall be designed to allow the operator to "set" the tension on the belt. The belt shall be designed to not creep, making the belt tighter or loose. The seat belt shall be long enough to secure a 98% male driver.

M.85.2. Driver's seat covering weight shall be 24 ounces/square yard. Overall composition shall be 54% wool, 9% nylon and 37% cotton. Pile composition shall be 85% wool and 15% nylon. Back composition shall be 100% cotton. Seat cushions shall withstand 100,000 randomly positioned 3.50 inch (89 mm) drops of a squirming, 150 pound (68 kg), smooth surfaced, buttocks-shaped striker with only minimal wear on the seat covering.

M.86. FLOOR COVERING

M.86.1. VESTIBULE

M.86.1.1. The floor in the vestibule shall be covered with RCA flooring or approved equal. The floor covering shall remain effective in all weather conditions for a minimum of seven years. The floor covering as well as transitions of floor material to the main floor and to the step well area, shall be smooth and present no tripping hazards. The standee line shall be white and 2.0 inches (51 mm) wide and shall extend across the coach ramp aisle in line with the driver's barrier. The width of this line shall be uniform in width across its entire length. This line shall be white, same color as the edge of the steps. Color shall be consistent throughout the floor covering.

M.86.1.2. Flooring shall be smooth in driver area, isle and under seats

M.87. DRIVER'S COMPARTMENT

M.87.1. The floor in the driver's compartment shall be easily cleaned and shall be arranged to prevent debris accumulation. Floor covering material, dimensions and color shall match the vestibule area of the bus.

M.88. PASSENGER AREA

M.88.1. The floor covering in the passenger area shall be the same material, dimensions and color specified for the vestibule. Flooring shall be installed to minimize the quantity of seams. A one-piece aisle center strip shall extend from the rear cross seat running between the rows of transverse seats to the edge of the center ramp. The ramp will include a separate piece of flooring with a standee line imbedded next to the driver's modesty panel. The floor under the seats shall closely fit to the sidewall panels.

M.89. WINDOWS

M.89.1. WINDSHIELD

M.89.1.1. The windshield shall be designed and installed to minimize external glare as well as reflections from inside the coach. When the coach is operated at night with the passenger interior lighting on, essentially no reflections shall be visible in the windshield immediately forward of the driver's barrier. Reflections in the remainder of the windshield shall be minimized, and no reflection of any part of the coach interior behind the driver's barrier shall be visible in the windshield.

M.89.1.2. The windshield shall be easily replaceable by removing zip-locks from the windshield retaining moldings. Bonded windshields shall not be used. The glazing material shall have single density tint.

M.90. DRIVER'S SIDE WINDOW

M.90.1. The driver's side window section shall be divided vertically and the rearward section shall slide fore and aft in tracks or channels designed to last the service life of the coach. The driver's side window shall not be bonded in place and shall be easily replaceable. The glazing material shall be nominal 0.25 inch (6 mm) laminated, tempered glass with single density tint, the same as the windshield. The side window shall be rated AS-2.

M.90.2. Driver/Entrance door shall be double glazed on sash area

M.91. PASSENGER SIDE WINDOWS

M.91.1. Eight large rectangular passenger side windows shall be provided on each side of the 45 foot coaches. The glazed panel outside dimension size will be 36.125 x 57.625 inch (918 x 1466.5 mm) x .188-inch (4.76-mm) thick. The windows will have a nominal 32 x 52-inch (813- x 1,321-mm) clear opening within the inner support frame structure. The side passenger windows will be single- glazed construction, hermetically sealed, AS-3 laminated float, 76% heat-absorbing laminated safety glass with light and solar transmittance of 24%. A painted aluminum sash molding will be installed along the bottom length of the passenger side windows.

M.91.2. All windows shall be top hinged with push out at the bottom, with the exception of the wheelchair lift door and lavatory windows which do not open. All top-hinged windows shall be emergency escape type and include a single motion release bar running the entire width of the window at the lower edge to permit emergency egress. Emergency operating instructions printed on metal plates shall be provided at each seat position for operating the push-out window.

M.91.3. Vendor shall provide to buyer an option and variety of blinds for passenger windows. An option for window lights shall be provided also.

M.92. INSULATION

M.92.1. MATERIAL

M.92.2. PROPERTIES

M.92.3. The insulating materials may be of differing thicknesses and materials to achieve thermal insulating properties and low interior noise levels. These are described following:

- M.92.3.1.** Roof: 2.0 inch (51 mm) thick, compressed at installation, resin coated, medium density non bagged fiberglass
- M.92.3.2.** Sidewall: Rigid molded polyurethane foam of varying thickness.
- M.92.3.3.** Driver's area: Minimum 0.50 inch (13 mm), high-density fiberglass under the floor in the driver's area.
- M.92.3.4.** Step well area: 1-inch thick urethane foam insulation with stretched polyester film to minimize interior temperature variances during severe external climatic conditions and for sound deadening.
- M.92.3.5.** Below windshield: 2.0 inch (51 mm) thick, high density fiberglass
- M.92.3.6.** Complete rear lounge seat area shall be heavily insulated with fiberglass blankets and sound- dampened panels for both noise and heat protection as follows:
- M.92.3.7.** Behind the rear cross-seat riser and rear cross seat back and cushion are a minimum total of 1.50 inch (38 mm) thick high-density fiberglass blankets.
- M.92.3.8.** An additional 0.625 inch (16 mm) fiberglass blanket is added behind the rear cross seat back to further impede engine noise propagation to coach interior.
- M.92.3.9.** Sound barrier with 0.250 inch (6 mm) urethane foam layered on either side of a 0.125 inch (3 mm) urethane elastomer loaded with barium sulfate.
- M.92.3.10.** Cover panel behind rear cross-seat is 1.0 inch (25.4 mm) thick foamed polyurethane with stretched polyester film facing.
- M.92.3.11.** Area behind and below this rear area is 2.0 inch (51 mm) medium density fiberglass with a 0.75 inch (19 mm) thick heavy density fiberglass batting cemented to the inner face of the fiberglass rear panel.

M.93. THERMAL INSULATION

- M.93.1.** The combination of inner and outer panels on the sides, roof, and ends of the coach, and insulating materials shall provide a thermal insulation sufficient to meet the interior temperature requirements. The coach body shall be thoroughly sealed so that drafts cannot be felt by the driver or passengers during normal operations with the passenger doors closed.

M.94. SOUND INSULATION

- M.94.1.** 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 coach shall have a sound level of 60 dBA or less at any point inside the coach. These conditions shall prevail with all openings, including doors and windows, closed and with the engine and accessories switched off.
- M.94.2.** Bus generated noise level experienced by a passenger at any seat location in the coach shall not exceed 80 dBA and the driver shall not experience a noise level of more than 70 dBA under the following test conditions. The coach shall be empty except for test personnel, not to exceed 4 persons, and the test equipment. All openings shall be closed and all accessories shall be operating during the test. The coach shall accelerate at full throttle from a standstill to 35 mph on level commercial asphalt or concrete pavement in an area free of large reflecting surfaces within 50 feet of the coach path. During the test, the ambient noise level in the test area shall be at least 10 dB lower than the coach under test. Instrumentation and other general requirements shall conform to SAE Standard J366. If the noise contains an audible discrete frequency, a penalty of 5 dBA shall be added to the sound level measured.

M.95. REAR SEAT INSULATION

- M.95.1.** Special design consideration shall be given to insulation in the area above the engine compartment. Fiberglass or other suitable material shall be applied, together with adequate ventilation, to provide temperatures consistent with the remainder of the coach.
- M.95.2.** Seat cushions and seat backs shall be suitably insulated to prevent elevated temperature of the seat itself and no cushion or back shall be measurably hotter as compared to any other seat in the coach.

M.96. ANCILLARY FEATURES

M.96.1. DRIVER'S AREA

M.96.2. VISORS

- M.96.2.1.** Three roller type sunscreens shall be provided at the right and left hand windshield and at the driver's side window. Guide rods shall be located at each end of each screen to allow for

infinite positioning. The sunscreens shall be shaped to minimize light leakage between the sunshades and windshield pillars. The sunscreens shall not obstruct air flow from the climate control system or obstruct the operation of other equipment such as the radio handset or the destination sign control. Sunscreen adjustments shall be made easily by hand.

M.97. STOP REQUEST SIGN

M.97.1. A passenger chime signal audible to the driver and to passengers anywhere inside the coach shall be provided. The chime shall be a push button convenient to seated passengers. A driver-controlled switch shall deactivate the chime system. A stop request sign shall be located in the front center of the coach and fastened to the coach ceiling to permit viewing by all passengers. The sign shall be illuminated when the passenger chime sounds and go off when the entrance door is opened. The passenger chime shall sound once when the sign's light comes on but will not sound again until after the system has been reset by the opening of the entrance door. A passenger chime circuit ON / OFF switch shall be provided in the drivers area.

M.98. DRIVERS STORAGE

M.98.1. A hook shall be provided for the drivers' coat in the driver's area.

M.99. MIRRORS

M.99.1. OUTSIDE MIRRORS

M.99.1.1. The coach shall be equipped with corrosion resistant, heated remote controlled outside rear view mirrors, on each side of the coach. The mirrors shall be mounted so as to permit the driver to view the highway along both sides of the coach, including the rear wheels. Mirrors shall be firmly attached to the coach to prevent vibration and loss of adjustment, but not so firmly attached that the coach or its structure is damaged when the mirror is struck in an accident. Outboard maximum overall mirror width dimension shall not exceed 122 inches while providing maximum visibility to the operator.

M.99.1.2. The roadside mirror shall be a corrosion-resistant, remote outside rear view mirror, adjustable from the driver's seat. Mirrors shall be split view flat and convex glass integrated in the same housing, overall measurement 10 inches by 13 inches (254 x 330 mm). Mirrors shall permit operator view of road surface as well as the rear wheels. Connections on mirror harness shall be Cannon Sure Seal all weather connectors or approved equal. Mirror head shall be attached to arm with ball/collet adjustment, for positive head location. Mirror arm shall be made to breakaway if struck in an accident or to eliminate damage in bus wash. Mirror arm shall be hollow aluminum for concealing wire.

M.99.1.3. The curbside mirror shall be a corrosion-resistant remote outside rear view mirror. Mirrors shall be integral flat and convex with overall measurements of 10 inches by 13 inches (254 x 330 mm) and permit driver view of roadway as well as coach rear wheels. Mirror arm shall be spring loaded to break away, should impact occur. Mirror arm shall be made to break away if struck in an accident or to eliminate damage in bus wash. Mirror arm shall be hollow aluminum for concealing wire. A mechanical stop shall be provided which prevents contact between the mirror arm and the entrance door. Mirror arm shall also have a five inch convex spot mounted on it to provide a clear view of the front of the coach.

M.99.1.4. Both mirrors in both housings shall be heated. A switch shall be provided. The switch shall control both mirrors and be provided with pigtail connectors to interface with the wiring harnesses of both remote mirrors. The switch shall be installed in a location that is within easy reach of the operator.

M.100. INSIDE MIRRORS

M.100.1. A mirror shall be provided for the operator to observe passengers throughout the coach without leaving his seat and without shoulder movement. With a full standee-load, including standees in the vestibule, the operator shall be able to observe passengers in the rear of the coach and anywhere in the aisle. Inside mirror shall be 6.0 inches x 10.50 inches mounted just below the destination sign box and above the driver's line of sight.

M.101. PASSENGER ASSISTS

M.101.1. GENERAL REQUIREMENTS

M.101.1.1. Passenger assists in the form of full grip, vertical stanchions or handholds shall be provided for the support and stability 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 coach, a horizontal assist shall be provided at the aisle side of the luggage rack that runs the full length of the luggage rack so that a 5th-percentile female passenger may easily move the length of the aisle using one hand and then the other without losing support. Excluding those mounted on the luggage racks, the assists shall be between 1.25 and 1.50 inches (32 x 38 mm) in diameter or width with radii no less than 0.25 inches (6 mm). All passenger assists except for the luggage rack nosing shall permit full hand grip with no less than 1.50 inches of knuckle clearance around the assist.

M.102. FRONT DOORWAY

M.102.1. Front doors, or the entry area, shall be fitted with assists no less than 0.75 inches (19 mm) in width. Assists shall be as far outward as practicable, but shall be no further than 6 inches (152 mm) from the outside edge of lower step tread 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 on the front modesty panel.

M.103. VESTIBULE

M.103.1. The aisle of the driver's barrier panel shall be fitted with vertical passenger assists that are functionally continuous with the overhead assists that extend to within 36 inches (91 cm) of the floor. These assists shall have sufficient clearance from the barrier to prevent inadvertent wedging of a passenger's arm and shall be in complete compliance with ADA requirements.

M.103.2. A horizontal passenger assist shall be located in the front of the coach adjacent to the driver's area. The horizontal passenger assist maximum will be no more than 35 inches (89 cm).

M.103.3. The assists at the front of the coach shall be arranged to permit a 5th percentile female passenger to easily reach from the front door assist to the horizontal assist, then to the vertical assist.

M.104. PASSENGER INFORMATION SYSTEMS

M.104.1. DESTINATION SIGNS

M.104.1.1. The displays shall consist of Full Colored LED's. All Full Color LED's used for the destination signs shall be rated for a 50,000-hours. The entire display area of all signs shall be clearly visible and readable both in direct sunlight and at night with a viewing angle of at least 140 degrees. The characters formed by the LED's shall meet the requirements of the Americans with Disabilities ACT (ADA) of 1990 Reference 49 CFR Section 38.39. The software will give the end user the capability to select from a vast selection of custom fonts, pre-programmed fonts and the Microsoft TrueType Directory fonts for display on the LED Signs for the most customization possible to the desire of the end user's riding public.

M.104.1.2. All destination signs shall be supplied with an ambient light detection sensor that controls the LED intensity according to the exterior light conditions. This adjustment shall be continuously linear, not stepped, from 10-100% output.

M.105. FRONT DESTINATION SIGN

M.105.1. Front Sign shall consist of a minimum matrix of 160 Columns by 17 Rows and shall be full color LED. The sign should be readable from at least 250' with a viewing angle of not less than 140°.

M.106. CURB SIDE DESTINATION SIGN

M.106.1. Not required

M.107. SYSTEM CONTROL AND PROGRAMMING

M.107.1. All system control and drive PC boards shall be enclosed in either the sign housings or in the System Control Console. The various destination signs can be programmed to display either one common message or each sign can display an independent message. The System Control Console shall incorporate a flexible keypad with no moving parts.

M.107.2. The system control console shall be used to view display messages and contain the destination sign database. The driver console shall utilize a tactile membrane keypad. The system control console shall be equipped with an LCD display.

M.107.3. Sign system shall be capable of sequentially displaying a minimum of one pre-selected destination message and one public relations message. The operator shall be able to quickly change between pre-selected destination messages without re-entering a message code. Public relations messages shall be capable of being displayed alternately with the regular destination.

- M.107.4.** The Master Coach Run Switch shall control power to the sign system. The signs shall operate in all positions of this switch except off. The signs shall be internally protected against voltage transients and RFI interference to ensure proper operation in a bus environment.
- M.107.5.** The system control console shall be used to view and update display messages. The system control console shall utilize a multiple function keyboard with tactile feel, designed especially for the harsh transit environment. The system control console shall contain an LCD display. The system control console shall continuously display the complete message associated with the selected destination code. Diagnostics and/or maintenance and test features that indicate any sign defects shall be included.
- M.107.6.** The system shall be capable of integrating to on-board computer devices for message listing program via any one of several possible protocols, including but not limited to J1708, RS485, RS232, RS422 or IBIS. The sign system shall be capable of wireless upload capability for receiving the messaging database. The sign system shall be reprogrammable through the system control console by either a standard USB Thumb Drive or via a 9-pin "D" type keyfob memory device.

M.108. EMERGENCY MESSAGE DISPLAY

- M.108.1.** A pre-programmed emergency message may be activated using a customer-selected switch located in the driver area. This message shall be displayed on signs facing outside the vehicle, while signs inside the vehicle, including the driver console, remain unchanged. Removing the emergency signal or entering a new destination shall cancel this message.

M.109. SYSTEM LEVEL DIAGNOSTICS

- M.109.1.** The system control console shall provide, at a minimum, visual indication of system level errors with the destination signs. This shall include detection of communication failure, power supply failure on a particular sign and display board failure on a particular sign.
- M.109.2.** A multiplex system with diagnostic shall be provided.

M.110. PROGRAMMING

- M.110.1.** A PC-based software package will be furnished for creating the destination sign messages. The character shape and size shall be programmable and the software should allow the creation of personalized fonts. These may vary in pixel height and comprise single, double and triple stroke typeface. The program will allow an unlimited amount of special characters, logos or fonts to be displayed.
- M.110.2.** A programming software package shall be furnished to generate message lists for the destination sign system. It shall be a Windows compatible software package, using drop down menus and help screens. The software shall not require a standalone computer or a computer of a specific make or model. The software will allow, at a minimum, individual font selection, shape and choice of fonts, font creation and import, destination display management (right or left route numbers, pre-defined text fields, alternating screens and scrolling), as well as full system previews are available for all signs. The software shall also offer utilization of the TrueType font directory for programming. Graphic capabilities are available to allow personal logo creation as well as selection from pre-programmed pictograms.
- M.110.3.** The programming software shall use techniques that require minimal operator training and are intended for use by operators that are not trained in complex computer operations.

M.111. WARRANTY & SPARES

- M.111.1.** All full color signs and components of the sign system shall be covered by a 5-year warranty. Free spare parts, (whole components), shall be provided to the end user free of charge for storage and use at the end users selected facility. The number of spares to be provided will be commensurate with the number of original systems purchased and shall be agreed to by all parties at the execution of a contract.

M.112. LIFT

- M.112.1.** A Braun model number NUVL855RM24 dedicated access extended travel lift, or approved equal with two forward facing mobility device securement areas to accommodate a maximum 30.0 inches (762 mm) wide mobility device shall be provided. The lift assembly shall comply with all current ADA and FMVSS 403 and 404 requirements. The lift shall be installed below the floor line at the number 2 right-hand luggage bay on the curbside of the coach.
- M.112.2.** The lift shall be controlled by a dash mounted toggle switch and a rear lift area toggle switch, and operated by up/down switches on a pendant mounted to the lift support bracket inside the number 2 baggage bay. The lift Restraint Belt must be buckled before the lift can be raised or lowered. The safety interlock circuit can be energized to operate the lift only if: the transmission is in neutral, the park brake is applied, engine Fast Idle is ON, the dash-mounted Master Switch is ON, the lift Secondary Switch is ON and the lift restraint belt is buckled.

M.112.3. The wheelchair loading system shall provide safe, comfortable and rapid ingress and egress for applicable passengers from the street level or a curb. When not in use, the lift shall stow in the luggage bay. The lift mechanism shall include a Threshold Warning device to provide "passenger on platform" information and prevent stowing the lift platform when a passenger is sensed. The outer barrier shall be automatically controlled and shall be such that it cannot be overridden by the loading system operator. A dash mounted indicator light shall be provided and shall be illuminated when the loading system is activated. The interlock shall apply, the bus shall not move and the engine throttle shall be disabled whenever the wheelchair loading system is activated. If the lift door is open or ajar, the interlock shall remain engaged. Brackets, clamps, screw heads and other fasteners used on the passenger assists shall be anodized aluminum or stainless steel and shall be flush with the surface and free of rough edges.

M.112.4. A manual wheel chair door shall be provided.

M.112.5. The lift control mounted on the lift structure shall have push button Up / Down switches. The toggle electrical supply switch shall be located in close proximity to the controller. This toggle switch must be turned "ON" prior to the lift operation. All lift control switches shall be permanently labeled. Decals shall not be permitted. The stow guard switch shall be red in color and the Stow / Deploy switch shall be black in color. These switches shall be incorporated in a hand held pendant

M.112.6. The Braun NUVL855RM24 or approved equal lift shall include the following specifications:

M.112.6.1. Lifting capacity (main platform) -700 pounds (317 kg)

M.112.6.2. Vertical travel - 63" (1,600 mm) maximum

M.112.6.3. Platform width (chair capacity) -30" (762 mm) minimum

M.112.6.4. Platform depth (chair capacity) - 48" (1,219.2 mm) minimum

M.112.6.5. Platform side height - 1.50" (38 mm)

M.112.6.6. Handrail height - two (2) - 30" (762 mm) minimum

M.112.6.7. Cassette stowed dimension (depth) - 72.25" (1835 mm) total

M.112.6.8. Cassette Width & Height - 43.5" x 8.375" (1105 x 213 mm)

M.112.6.9. Operating controls - 3 pushbutton

M.112.6.10. Power Source - Electro- hydraulic

M.112.6.11. Voltage -24 volts

M.112.6.12. DC Back up system - Emergency hand pump

M.112.6.13. Construction - Steel and aluminum

M.112.6.14. Stow level to ground cycle time - 12 seconds at 70 degrees (21° C) no load

M.112.6.15. Ground to floor level cycle time - 12 seconds at 70 degrees (21° C) – no load

M.112.6.16. Hydraulic system fluid capacity - 1.0 quart (1 liter)

M.112.6.17. Hydraulic system operating pressure - 2500 psi (17,238 kPa) minimum

M.113. DEPARTMENT OF TRANSPORTATION REGULATIONS 49 CFR 38

M.113.1. The lift shall include a hinged platform to bridge the coach floor to the lift platform. Bridge shall be hinged and locked in an upward position to act as a barrier when the lift is in use. Bridge shall also allow the lift passenger to ingress/egress easily from the platform. Lift travel speeds and lift operation shall be adjusted to the lift manufacturer's specifications upon completion of the lift installation into each coach and before coach delivery. The individual handrails shall incorporate a visual aid to insure that they are folded in the proper order.

M.113.2. The lift shall include an emergency system in case of driver operation malfunction. Should an emergency situation occur, the lift operator shall release the pushbutton switch on the controller to immediately stop the lift operation. Loss of electrical power shall also stop the lift operation regardless of switch position. An emergency auxiliary hydraulic hand pump shall be used to complete the lift cycle. The emergency hand pump handles and pump shall be located in an enclosed box at the rear wall of the number 1 right-hand baggage bay to prevent the accumulation of dust and dirt. The pump shall be easily accessible through baggage bay door. The handle shall be stored adjacent to the pump to allow immediate usage.

M.114. LIFT DOOR

M.114.1. The lift door shall be a single leaf design that operates in a sliding track mounted both above and below the door leaf. The door shall open by sliding to the rear of the coach and shall remain on a horizontal

plane throughout the opening and closing process. No pin hinged doors shall be provided. The transmission must be in neutral and the parking brake activated for the lift to operate. The accelerator shall be automatically disabled and the fast idle system activated when either the lift master switch is turned "ON" or the lift door is open in order to provide maximum safety and security. These features shall be wired to the lift master switch to allow activation only when the transmission is in neutral. The coach directional (Hazard) lights will also flash on/off. After the lift operation is completed, the lift shall be properly stored and secured, with the access door closed and the lift master switch at the dash in the "OFF" position in order to move the coach.

M.114.2. The lift door shall have a window in line with the other passenger windows and shall not detract from the appearance of the coach. The door latch mechanism shall be located in the lower section of the door so that operators in the 5th percentile female range can operate the lift door.

M.114.3. The lift storage door shall not block the visual observation of the lift assembly while utilizing the manual override mode of the lift. A lift door design consisting of a horizontally hinged lift platform egress door mounted within a vertical motion pantograph baggage door is a preferred design.

M.115. LIFT INSTALLATION

M.115.1. The installation of the lift to the coach structure as well as the installation of the lift door into the sidewall of the coach shall not affect the structural integrity of the coach.

M.115.2. The parcel rack module above the wheelchair lift platform area shall be permanently removed to provide additional headroom. The modified rack shall be professionally finished at all ends.

M.115.3. A Threshold Warning module with a red warning light and acoustic sensor shall be mounted in the ceiling structure above the wheelchair lift entrance doorway.

M.115.4. The heating and air ducts shall be rerouted around the lift area to ensure proper interior air conditioning/heating airflow and distribution.

M.115.5. A passenger chime tape switch shall be mounted on the sidewall at the two (2) wheelchair securement positions.

M.115.6. Each coach shall have adequate information decals installed which details the proper lift operation in both the normal and manual modes of operation.

M.116. LIGHTING REQUIREMENTS

M.116.1. Lighting for the lift areas shall be designed to exceed ADA and FMVSS 404 standards. Lighting shall be provided to effectively illuminate the lift area. Light shall be wired through the lift master toggle switch on the driver's dash and shall automatically illuminate when this switch is in the "ON" position. The lighting design shall minimize the effect of glare on passengers entering the bus through the wheelchair lift door. During lift operation, the street surface shall be illuminated to a minimum of six candlepower a distance of 3 feet (.91 cm) beyond the external dimensions of the lift platform once deployed and lowered. Additional lighting shall be provided to insure illumination of the instruction placard and the manual override pump when it is in use.

M.117. SECUREMENT SYSTEM

M.117.1. The vehicle interior shall permit the securement of two (2) forward facing wheelchair passengers in which the primary position shall be on the street side of coach directly across from lift. Securement areas shall be a minimum 30 x 48 inches (762 x 1,219 mm) as required by ADA. Securement devices shall be QRT Deluxe Slide and Click or approved equivalent.

M.117.2. A separate three-point belt securement shall be provided to effectively secure wheelchair passengers.

M.117.3. To further secure the passenger during the lift operation, a retractable seat belt strap shall be provided at the ingress / egress area of the lift platform. This seat belt strap must be buckled to disengage the lift electrical interlocks to allow lift operation. A minimum 10.5 inches (267mm) high barrier shall also be provided at the rear of lift area for additional passenger protection.

M.118. ROOF VENTILATORS/ESCAPE HATCHES

M.118.1. Two roof ventilators shall be provided and designed to perform as escape hatches. One ventilator/escape hatch shall be located in the roof at the front of the coach, another in the roof at the rear of the coach.

M.119. CHASSIS

M.119.1. PROPULSION SYSTEM

M.119.2. VEHICLE PERFORMANCE

M.119.3. POWER REQUIREMENTS

M.119.3.1. The propulsion system and drive train shall provide power to enable the coach to meet the defined acceleration, top speed, and gradability requirements. Sufficient excess power shall be available to operate all accessories without jeopardizing coach performance or safety parameters.

M.120. TOP SPEED

M.120.1. The coach shall be governed at 72 mph (116 kph) road speed, for emergency and passing maneuvers, on a straight, level road at SLW.

M.121. GRADABILITY

M.121.1. Gradability requirements shall be met on grades with a surface friction coefficient of 0.3 and above at SLW with all accessories operating. The standard configuration power plant shall enable the coach to maintain a speed of 44 mph (71 kph) on a 2-percent grade and 7 mph (11 kph) on a 16-percent grade.

M.122. ACCELERATION

M.122.1. Vehicle shall accelerate from 0 to 20 mph (0 – 32 kph) in nine seconds, with the coach at S.L.W.

M.123. OPERATING RANGE

M.123.1. The operating range of the coach run on the design operating profile shall be at least 400 miles (644 km) on a single fill-up of compressed natural gas fuel.

M.124. OPERATING PERFORMANCE

M.124.1. Speed, gradability, and acceleration performance requirements shall be met at, or corrected to, 85 degrees F (29° C), 29.00 inches (74 cm) Hg, dry air. Performance degradation at conditions other than the test standard shall not exceed 1 % for each 3 degrees F/C and 4 % for 1,000 feet (305 m) of altitude above the standard.

M.125. POWERPLANT MOUNTING AND ACCESSORIES

M.125.1. MOUNTING

M.125.1.1. The power plant shall be mounted in a compartment in the rear of the coach. All power plant mountings shall be mechanically isolated to minimize transfer of vibration to the body structure. Clamps required for securing or supporting lines shall be rubber or plastic coated and properly sized for the line being clamped.

M.126. SERVICE

M.126.1. The power plant shall be arranged so that accessibility for all routine maintenance is assured. No special tools, other than dollies and hoists shall be required to remove the power plant. The power plant shall be mounted on a cradle which can be slid into and out of the coach. Two mechanics shall be able to remove, replace and prepare the engine and transmission assembly for service in less than 25 total combined man-hours.

M.126.2. The muffler, exhaust system, air cleaner, air compressor, starter, turbocharger, alternator, radiator, including charge air circuit, all accessories, and any other components requiring service or replacement shall be installed in or above the engine compartment.

M.126.3. The turbocharger, alternator, air compressor, and starter shall be replaceable without dismounting or removing other coach parts and without gaining access through the coach interior.

M.126.4. The cooling system filler caps shall be removable from the filler neck and be held closed with spring pressure or positive locks. The transmission filler tube shall employ a combination dipstick and cap and shall be the minimum length permissible to make fluid checking easier. All fluid fill locations shall be properly labeled to help ensure correct fluid is added and all shall be easily accessible with standard funnels, pour spouts, and automatic dispensing equipment. All lubricant sumps shall be fitted with drain plugs of a standard size except for the transmission which uses a recessed square socket type plug. The power plant shall be equipped with digital, computerized diagnostic capability using laptop or PC-based available diagnostic software for displaying engine and transmission data.

M.126.5. The engine and transmission shall be equipped with sufficient heavy-duty fluid filters for efficient operation and to protect the engine and transmission between scheduled filter changes. To the extent practicable, the filters shall be of the spin-on, disposable type. All filters shall be easily accessible and the filter bases shall be plumbed in a manner so as to assure correct reinstallation.

M.126.6. CNG fuel lines within the engine compartment shall be rigidly supported and shall be composed of stainless steel tubing where practicable. Flexible fluid lines shall be kept at a minimum and shall be as

short as required. CNG fuel lines shall be routed or shielded so that failure of a line shall not allow CNG fuel to be released, spray, or drain onto any component operable above the auto-ignition temperature of natural gas.

M.126.7. Flexible lines shall be individually supported and shall not touch one another or any part of the coach.

M.127. AIR CLEANER

M.127.1. The air cleaner shall be a dry type, horizontally mounted. Airflow through the filter element shall be from the outside in. To service the filter shall take less than 5 minutes, disconnecting an engine air intake duct, air compressor intake duct, or filter housing shall not be necessary. The access cover of the air filter assembly shall be retained to the filter housing with a single wing nut. A Filter Minder air filter restriction indicator, part number 135501-00920, manufactured by Engineered Products Co. or approved equal, shall be provided and calibrated to 20 inches (51 cm) of water/vacuum.

M.128. ACCESSORIES

M.128.1. Powertrain accessories shall be unit mounted for quick removal and repair. These accessories shall be driven at speeds sufficient to assure adequate system performance during extended periods of operation. The power steering pump and air compressor shall be flange mounted and gear driven from engine. The power steering reservoir shall be remotely mounted to the bus chassis and shall not be mounted on the drivetrain. Alternators shall be Leece Neville or approved equal. Only the 24 volt alternators, A/C compressor and cooling system fans may employ belt drives. Tension on the belt driven A/C compressor shall be maintained by an automatic tensioner. The alternator and the fan drive shall be automatically tensioned as well.

M.129. HYDRAULIC DRIVE

M.129.1. Hydraulic system service tasks shall be minimized and scheduled not more frequently than scheduled tasks for other major coach systems. All elements of the hydraulic system shall be easily accessible for service or unit replacement. All lines shall be compatible with the hydraulic fluid and maximum pressures of the system. Flexible lines shall be minimized in quantity and length. Lines of the same size and with the same fittings as those on other piping systems of the coach, but not interchangeable, shall be tagged or marked for use on the hydraulic system only. Hydraulic lines shall be individually and rigidly supported to prevent chafing damage, fatigue failures, and tension strain on the lines and fitting. Hydraulically driven radiator and charge air cooler fan drive systems are not acceptable.

M.129.2. The hydraulic system shall be configured and/or shielded so that failure of any flexible line shall not allow hydraulic fluid to spray or drain onto any component operable above fluid auto-ignition temperature.

M.130. POWERPLANT

M.130.1. ENGINE

M.130.1.1. The engine shall consist of Cummins ISX 12L 425HP, 1450ft/lb torque EPA engine with Cummins engine brake or approved equal.

M.130.1.2. The engine shall come with an engine block heater.

M.130.1.3. The engine shall come with a pro heat or equivalent engine heater.

M.131. COOLING SYSTEM

M.131.1. The cooling system shall be sized to maintain fluids at safe, continuous operating temperatures during the most severe operations possible with the coach loaded to GVWR and with ambient temperatures up to 110 degrees F (43 C). Sufficient reserve capacity shall be provided by the cooling system to provide efficient cooling for the coolant and engine charge air in a degraded condition. Radiator(s) shall be Modine, or approved equal. Radiator(s), complete with charge air cooling circuit shall be provided, mounted above the engine compartment. The charge air cooler and the radiator shall be mounted at least 60 inches (1.50 m) above the road surface. The physical size and heat rejection capacity of the radiator along with the charge air cooling capacity shall be tested and approved by the engine manufacturer for this application. The radiator system shall be easily serviced through the rear doors. The radiator and charge air cooler shall not be stacked in front of one another. Door shall include hinges which hold the doors in the open position.

M.131.2. The charge air cooler (CAC) / radiator assembly shall be primarily of durable corrosion-resistant aluminum construction. Heat exchanger fin spacing shall not exceed 14 fins per inch. Necessary hoses shall be premium, silicone rubber type that are impervious to all coach fluids. All coolant hoses shall be secured with constant tension hose clamps. Fan speed shall be regulated to minimize fan noise. No

heat producing components or climate control system components shall be mounted between the engine cooling air intake aperture and the heat exchangers. All cooling system fittings are to be cast iron, brass or copper.

- M.131.3.** A single fan, belt driven from the engine shall pull outside air through an exterior panel and across the radiator / charge air cooler at a minimum rate approved by the engine manufacturer for maximum cooling efficiency. Belt tension shall be maintained by an automatic belt tensioner to minimize belt slippage and ensure longer belt life. A Linnig fan clutch or approved equal shall control fan operation.
- M.131.4.** Radiator surge tank shall be made of heavy-duty steel. A sight glass to determine satisfactory engine coolant level shall be provided and shall be accessible by opening the radiator access doors. A spring-loaded radiator cap shall also be provided to safely release pressure or vacuum in the cooling system. An engine alarm system will be included in the engine electronic control. Cooling fan logic shall be controlled electronically through the engine control system. An automatic coolant recovery system will also be provided.
- M.131.5.** Engine thermostats shall be easily accessible for replacement. The engine cooling system shall be equipped with a properly sized or approved equal cooling system filter with a spin-on, disposable element. The engine coolant shall be extended life Power Cool Plus using Organic Acid Technology (OAT) or approved equal. Shutoff valves shall be provided on the coolant filter base which allows filter replacement without coolant loss. Quarter turn valves shall also be provided and installed in the entire cooling system which permits complete shutoff of both lines for the heating and defroster units.
- M.131.6.** All low points in the water-based cooling system shall be equipped with drain cocks. Air vent lines shall be fitted at high points in the cooling system. Oil and water temperature gauges will be provided in the engine compartment

M.132. TRANSMISSION

- M.132.1.** The transmission shall be an Allison B500 six speed transmission, equipped with Allison Transmission Electronic Controls (Gen. IV) or approved equal. Maximum input horsepower shall be 550 horsepower. Maximum input torque capability shall be 1650 pound feet of torque. The transmission shall have a one stage, three element, polyphase torque converter and a lock up clutch with a torsional damper. The transmission shall be fully automatic with six forward gear ratios. Shift calibration shall be set so that shifts shall be smooth under all operating conditions. The transmission shall only have one maintenance dipstick, and no other secondary service lane dipsticks. The transmission will also include a Probalyzer, or approved equal, brass Mini-gauge plug to permit transmission fluid analysis sampling.
- M.132.2.** If an Allison B500 Gen IV transmission is equipped it shall be filled with synthetic transmission fluids that meet Allison TES-295 specification and have a TES-295 approval number and the Allison approval logo. Mobil Delvac Synthetic Automatic Transmission Fluid can be used or Allison TES-295 approved equals such as Castrol Transynd. Allison Transmission extended warranty plans require synthetic transmission fluids meeting the TES-295 specification with an approval number and the Allison approval logo to be used.
- M.132.3.** Transmission shall be warrantied for five years.
- M.132.4.** The gearing shall be of the constant mesh, helical, planetary type with the following ratios:

RANGE	RATIO
FIRST	3.51:1
SECOND	1.91:1
THIRD	1.43:1
FOURTH	1.00:1
FIFTH	0.74:1
SIXTH	0.64:1
REVERSE	4.80:1

- M.132.5.** A function of the electronic controls shall be provided to prevent premature engagement and operation of the automatic transmission reverse gear.
- M.132.6.** The transmission shall be governed by electronic controls, which contain a programmable read-only memory (PROM) that will provide basic transmission control functions. All cabling and electronic devices utilized by the electronic transmission control system shall be adequately shielded against interference.
- M.132.7.** The transmission electronic module shall be capable of communicating with the engine electronic module to maintain maximum efficiency. The control module shall be equipped with a self- diagnostic system. A

failure shall be retained by the control module for evaluation by garage personnel using a Allison DOC software and J1939 / RS232 translation device or approved equal.

M.132.8. Modified diagnostics shall provide timely information on transmission oil and filter change requirements and transmission rebuild timeframes.

M.132.9. The electronic controls shall be completely sealed from the environment. The transmission electronic control unit shall be located in a weatherproof box that is protected from environment or potential damage from under floor baggage.

M.133. ELECTRIC STARTER

M.133.1. A Mitsubishi 105P70 24 volt starter motor, or approved equal shall be provided as a basic installation. Planetary gear reduction drive technology produces greater starting torque, rotating the armature at a higher rpm. The starter will have "Soft Start" positive pinion gear meshing technology, which will engage the pinion gear into the ring-gear before the starter begins to turn. The starting system shall be inoperable whenever the master control is in the OFF position, and whenever the emergency shut-off switch is activated or the engine is running. A starter interlock shall be provided that shall prevent the starter motor from engaging the flywheel after the engine is started.

M.134. ALTERNATOR

M.134.1. A 24-volt, 270 amp, brushless, oil-cooled, self-rectifying alternator will be mounted on the engine at the curbside of the coach. The alternator will be belt-driven off an engine-mounted accessory drive pulley. An automatic tensioner will maintain the required belt tension adjustment.

M.134.2. Alternator output at various engine speeds will be: idle (700 rpm) - 210 amperes, fast idle (950 rpm) - 240 amperes, full speed (2,100 rpm) - 270 amperes.

M.135. BOOST PUMP

M.135.1. A MP Boost Pump, or approved equal shall be provided as the basic coolant boost pump for coach heating requirements. The pump motor shall be a magnetic drive coupled pump operating at 24 volts DC. Coolant flow rate shall be a minimum of eight (8) gallons (30 liters) per minute. The pump operates on demand according to the driver's heat control valve.

M.136. EMISSIONS

M.136.1. MOTOR VEHICLE POLLUTION REQUIREMENTS

M.136.2. The manufacturer shall provide in writing that:

M.136.2.1. The engine being provided complies with the Clean Air Act when operated on diesel fuel.

M.136.2.2. The horsepower of the vehicle is adequate for the speed, range and terrain in which it will be required to operate, and also to meet the demands of all auxiliary power equipment.

M.137. EXHAUST SYSTEM

M.137.1. A stainless steel exhaust system shall be provided. The system shall be located at the left hand (roadside) rear corner of the coach under structure and shall be accessed through the left rear service door. Exhaust piping shall not restrict underbody clearances. The muffler tailpipe shall direct exhaust gasses downward, toward the road surface and not up through a stack in the body of the coach.

M.137.2. The exhaust system shall include a DPF (Diesel Particulate Filter), designed to reduce particulate emissions. The DPF accumulates soot and residual engine oil, which are the product of combustion. A telltale light shall illuminate when the DPF needs cleaning. A "Regen" (Regeneration) switch located in the right rear corner service bay, accessed through the right rear corner service door, shall activate an internal element within the DPF that burns off the trapped soot and engine oil ash.

M.138. FINAL DRIVE

M.138.1. GENERAL REQUIREMENTS

M.138.1.1. The two rear axles shall have a load rating sufficient for the coach loaded to GVWR. Transfer of gear noise to the coach interior shall be minimized.

M.139. DRIVE AXLE

M.139.1. The drive axle shall be a Meritor World Axle or approved equal rated at 22,500 lbs (10,206 kg). The bearing journals on each spindle shall be induction hardened for greater durability. Ring gear shall be bolted to case. The drive axle hub end wheel bearings shall be oil lubricated. Default rear axle ratio shall be 3.42:1.

M.139.2. The drive axle shall be equipped with disc brakes.

M.140. TAG AXLE

M.140.1. A tag axle shall be located behind the drive axle. The tag axle will be a solid beam type with fixed steering. The tag axle shall have single tires the same size as the tires on the front and drive axles. Tag axle weight shall not exceed 14,000 pounds. With full passenger seating capacity, load on any axle shall not exceed 22,400 pounds. Combined load capacity weight on the drive and tag axles shall not exceed 36,500 pounds.

M.140.2. Vendor shall provide an option for steerable tag axle.

M.140.3. A tag axle unloading feature will allow full or partial unloading, or dumping of air from the tag axle air spring bellows. This feature enables weight to shift to the drive axle for more traction. Manual unloading valves are located inside the RH rear curbside service door.

M.140.4. The tag axle shall be equipped with disc brakes.

M.141. Mud Flaps

M.141.1. Mud Flaps should be placed between the drive axle and tag axle.

M.142. HUBS

M.142.1. The front and tag axle hubs shall feature unitized wheel ends (UWE) complete with factory pre-load bearing/hub assemblies, lubricant and seals.

M.142.2. The drive axle shall have nodular cast iron hub assemblies incorporating Pre-Set tapered roller bearings lubricated by differential oil at each axle end.

M.143. DRIVE SHAFT

M.143.1. The drive shaft shall be a minimum 3 inches (76 mm) outside diameter, heavy-duty type Meritor 1810 series or approved equal. The drive shaft shall be guarded to prevent it from striking the floor of the coach or the ground in the event of a tube or universal joint failure. U-joint end cap retaining bolts shall be retained by metal locking plates. Both half-round yoke ends shall be attached using self-locking bolts.

M.144. SUSPENSION

M.144.1. GENERAL REQUIREMENTS

M.144.1.1. The front and rear axle suspension shall be pneumatic and equipped with straight side lobe air suspension bellows. Four suspension bellows shall be provided on the drive axle and two suspension bellows on the front axle. The tag axle shall be equipped with two straight side lobe type air springs, 9.5 inch (241 mm) nominal in diameter. Pressure in the tag axle suspension shall be automatically adjusted as required by the load-sharing system. Manual air dump valves for unloading the tag axle air suspension bellows shall also be provided in the engine compartment.

M.144.1.2. The basic suspension system exclusive of bellows, height control valves, bushings and shock absorbers, shall last the life of the coach without major overhaul or replacement. Four (4) heavy-duty rubber bushed silent block sleeve type radius rods shall be provided at both the front and rear drive axles to control lateral, longitudinal, and torsional movement. Radius rod bushings shall be Clevite or approved equal. One transverse stabilizing rod shall be provided on front axle for additional support during coach lane changing or turning of corners. The coach shall be equipped with a sway bar designed to reduce body lean and increase bushing life. Items such as bushings and air springs shall be easily and quickly replaceable. Adjustment points shall be minimized and shall not be subject to a loss of adjustment in service. Necessary adjustments shall be easily accomplished without removing or disconnecting the components.

M.145. SPRINGS AND SHOCK ABSORBERS

M.145.1. TRAVEL

M.145.1.1. The suspension system shall permit a minimum wheel travel of 3.5 inches (89 mm) in jounce and 3 inches (76 mm) in rebound. 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.

M.146. KNEELING

M.146.1. A driver-actuated kneeling device shall lower the coach floor 3.0 to 6.0 inches during loading or unloading operations regardless of load to a floor height of 42 inches (1.07 m) measured at the longitudinal

centerline of the front door. The park brake shall prevent movement when the coach is kneeled. The coach shall kneel and rise at a maximum rate of 1.5 inches per second at essentially a constant rate. A flashing indicator visible to the driver shall be illuminated until the coach is raised to a height adequate for safe street travel. An audible warning device that operates with the kneeling system shall be provided. A visual indicator meeting ADA requirements shall be provided on the curbside of the coach and shall activate during the kneeling operation. This indicator shall be appropriately marked and visible to the boarding passenger.

M.147. DAMPING

M.147.1. 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 4 cycles or less after hitting road perturbations. Shock absorbers shall maintain their effectiveness for at least 50,000 miles (80,467 km) in normal service. The coach shall be equipped with four shock absorbers on the drive axle and two on each side of the front axle and one on each end of the tag. Shock absorbers shall be interchangeable on each axle, side to side.

M.148. LUBRICATION

M.148.1. All elements of steering, suspension, and drive systems requiring scheduled lubrication shall be provided with grease fittings conforming to SAE Standard J534. These fittings shall be located for ease of inspection, and shall be accessible with a standard grease gun without flexible hose end from a pit or with the coach on a hoist. Each element requiring lubrication shall have its own grease fitting with a relief path. Lubricant specified shall be standard for all elements on the coach serviced by standard fittings. All fittings shall be standard pipe thread.

M.149. UNDERCOATING

M.149.1. Tectyl undercoating, or approved equal, shall be applied to the underside of the body, frame, and wheel wells. Undercoating overspray on the exterior of the coach shall be removed prior to delivery. Underbody components such as air suspension bellows and height control valves, shock absorbers, lubrication fittings, air brake system valves, brake lining, muffler and exhaust system components, drive shaft, and engine and transmission sumps shall be protected from undercoating overspray.

M.150. STEERING

M.150.1. STRENGTH

M.150.1.1. Fatigue life of all steering components shall exceed 1,000,000 miles (1,609,344 km). No element of the steering system shall fail before suspension system components when one of the tires strikes a severe road hazard. Inadvertent alternations of steering as a result of striking road hazards are steering failures. The steering column shall be manufactured by TRW or approved equal and shall provide both tilt and telescope features. The steering wheel shall be a wrapped, molded polypropylene. Finger grips shall be provided on the wheel, down and away from the driver. Steering systems that utilize an intermediate shaft to connect the main axle mounted steering box to the steering column shall utilize intermediate steering shafts manufactured by Dana Corporation or approved equal.

M.150.1.2. The front axle shall be rated at 16,000 pounds (7,257 kg) and shall be equipped with disc brakes and brake chambers with a load rating sufficient for the coach loaded to GVWR. Front axle shall be a standard, drop center type. Kingpins shall be the low friction, "Easy Steer" type for longer maintenance intervals.

M.151. TURNING EFFORT

M.151.1. The steering wheel shall be not less than 18 inches (457 mm) in diameter and shall be shaped for firm grip with comfort for long periods of time and shall not be padded. The steering wheel shall be removable with a standard or universal puller. Hydraulically assisted power steering shall be provided. The steering gear shall be an integral type with flexible lines eliminated or the number and length minimized. Steering torque applied by the driver shall not exceed 10-foot-pounds (13.6 Nm) with the front wheels straight ahead to turned 10 degrees. Steering torque may increase to 70-foot-pounds (95 Nm) when the wheels are approaching the steering stops. Steering effort shall be measured with the coach at SLW, stopped with the brakes released and the engine at normal idling speed on clean, dry, level, commercial asphalt pavement and the tires inflated to recommended pressure. Power steering failure shall not result in loss of steering control. With the coach in operation, the steering effort shall not exceed 55 pounds (25 kg) at the steering wheel rim and perceived free play in the steering system shall not materially increase as a result of power assist failure.

M.151.2. 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.

M.152. BRAKES

M.152.1. SERVICE BRAKE

M.152.1.1. Service brakes shall be controlled and actuated by an air system. Force to activate the brake pedal control shall be an essentially linear function of the coach deceleration rate. The angle of the pedal shall be ergonomically designed to minimize fatigue. At least 6.0 inches (152 mm) of slack in the airlines shall be available to allow for change out of the brake treadle valve and pedal assembly. The brake pedal shall be slightly higher than the accelerator. Provisions at the front shall be made to activate the brakes from the towing vehicle. Release of the emergency/parking brake shall require one full application of the service brake once the emergency/parking brake release valve is depressed.

M.153. FRICTION MATERIAL

M.153.1. Brake pads shall be non-asbestos, and must be designed and approved for use on the vehicle being proposed. Brake pads must provide optimum performance with the brake system being used and shall minimize brake noise under all weather conditions.

M.154. ANTILOCK BRAKE SYSTEM

M.154.1. The coach shall be equipped with a Meritor Wabco or approved equal antilock brake system or approved equal electronic controller assembly that will provide full vehicle wheel control braking for the coach. The system shall utilize an antilock brake system with disc brakes. The design of the digital electronics shall provide a high degree of protection from radio and electromagnetic interference.

M.154.2. The antilock brake system shall provide individual wheel control by using a wheel speed sensor and modulator at the front axle, drive axle and tag axle. The drive axle brakes shall be controlled completely independent of each other and therefore brake application pressure at an individual wheel shall be adjusted solely on the basis of its behavior on the road surface on which it is traveling. Wheel speed sensors shall be provided on the drive axle and will simultaneously control the wheels on the tag axle. A single modulator shall be provided that controls both rear curbside wheels and another modulator shall control the rear roadside wheels.

M.154.3. Inputs to the electronic control unit (ECU) equal shall be generated from a tone ring (exciter) by wheel sensors, which generate a signal, which varies in voltage and frequency as the speed of the wheel increases or decreases. The wheel sensor shall provide wheel speed information at the rate of 100 pulses per wheel revolution. The unit shall simultaneously receive, and individually interpret speed signals from four wheel sensors.

M.154.4. Outputs from the unit shall be provided to Meritor Wabco or approved equal brake modulator. The modulator shall be capable of receiving signals from the ECU and shall be designed to modify operator applied air pressure to the service brakes. The modulator shall be located near the service actuator(s) it controls and shall be the last air valve through which air passes on its way to the brake actuator. A wiring harness shall connect each modulator to the ECU. Solenoid valves contained in the modulator shall provide the electrical interface between the controller electronics and the air brake system. The ECU shall be capable of simultaneously and independently controlling four individual modulator assemblies.

M.154.5. The antilock brake system logic shall be designed to respond to component equipment failure using a conservative fail safe philosophy. Any single electrical failure of a component devoted to antilock braking shall result in simultaneous illumination of the antilock condition lamp on the dash, a disabling of all or part of the antilock system, and reversion to standard braking on wheels no longer under the control of antilock. The ECU is divided into two separate parts, each equally controlling a pair of diagonal brakes. When a failure or damage occurs to one half of the ECU, ABS braking function shall be maintained in the wheels that are controlled by the working part of the ECU.

M.154.6. The wires that carry information and power into and out of the controller shall be terminated with a weatherproof connector with the wiring sealed to the connector with the exception of the ECU connectors. The wire gauge used shall be sized specifically for the task which it is designed to perform. A dashboard mounted antilock condition lamp shall be provided which shall be controlled by the ECU via the multiplex system and shall serve as a means of providing the operator with the operating condition of the antilock brake system. All electrical connections on the antilock system shall be Meritor molded connectors, or approved equal. The ECU shall utilize 4 amp "JUNIOR-POWER-TIMER" series connectors, or approved equal.

M.154.7. The Data Link function shall be provided which enables the ECU to report its operating condition to an external source. The controller data link configuration shall conform to SAE standard J1708 and the coded language used shall conform to SAE J1587. Two connections in the controller shall be provided.

M.155. ELECTRONIC STABILITY CONTROL (ESC)

- M.155.1.** ESC (Electronic Stability Control) shall be integrated with the ABS braking system to provide improved vehicle stability. Sensors within the brake system monitor coach sideways movement and rotation, steering angle and brake application pressure to maintain coach directional stability.
- M.155.2.** The Electronic Control Unit (ECU) containing directional sensors shall be located in baggage compartment #3. A steering angle sensor shall be located in the steering column. These systems feed information that interacts with the ABS system providing directional and braking control.
- M.155.3.** The ESC/ATC telltale shall be located in the driver's instrumentation and control center in the right hand telltale cluster. This telltale, along with the ABS telltale, monitors Electronic Stability Control (ESC) and Automatic Traction control (ATC) functions.
- M.155.4.** Automatic Traction Control (ATC) shall be integrated with the ESC (Electronic Stability Control) to improve traction on slippery surfaces by reducing drive wheel over-spin. ATC shall automatically switch ON and OFF as required by road conditions. If drive wheels spin during acceleration, the ATC telltale will come on, indicating ATC is active. It will go out when the drive wheels stop spinning and traction control is regained.

M.156. ATC MUD/SNOW FEATURE

- M.156.1.** ATC shall include a deep snow and mud feature. This function increases available traction on extra soft surfaces like snow, mud, or gravel by slightly increasing the permissible wheel spin.
- M.156.2.** The deep snow and mud feature is not automatic. A switch shall turn this function ON and OFF. While this feature is selected, the ESC/ ATC telltale blinks continuously. Once the feature is no longer required, the switch shall turn the deep snow and mud feature off and the telltale will extinguish.

M.157. AIR SYSTEM

- M.157.1.** The coach air system shall operate all accessories and the braking system with reserve capacity. The engine drive Wabco SS636 37.4 cfm air compressor, or approved equal shall be sized to charge the air system brake reservoir from 0 psi. to the governor cutoff pressure of 125 psi.±2psi (862 kPa ± 14 kPa) in less than 3 minutes while not exceeding the engines rated speed. The air compressor shall be set to cut in at 105 psi (724 kPa).
- M.157.2.** Regardless of the systems air pressure, idle up to the rated engine speed shall be available to the driver with the transmission in neutral and the parking brake applied.
- M.157.3.** With the air system fully charged and the engine shut off, the reservoir capacity shall be sufficient to permit four full brake applications to maintain 60 psig (414 kPa). The pressure relief valve shall be mounted in the compressor cylinder head. The muffler or ping tank shall be mounted in the engine compartment relative to the air compressor discharge port. A drain mounted on the muffler or ping tank shall be directed or piped so as to discharge below the engine cradle or bulkhead level.
- M.157.4.** Air lines, except necessary flexible lines, shall conform to the installation and material requirements of SAE Standard J844-Type 1 or ASTM B-75 for copper tubing with standard, brass, flared or ball sleeve fittings, or SAE Standard J844-Type 3B for nylon tubing or ASTM
- M.157.5.** D-1248, Type 1, Class C Grade E5 for polyethylene tubing if not subject to temperatures over 200⁰F. Accessory and other noncritical lines may use Type 3A tubing. Nylon tubing shall be installed in accordance with the following color coding standards:
- M.157.5.1. HOSE COLOR AIR SYSTEM INSTALLATION**
- M.157.5.1.1. **Green** Indicates primary brakes and supply
- M.157.5.1.2. **Red** Indicates secondary brakes
- M.157.5.1.3. **Brown** Indicates parking brake
- M.157.5.1.4. **Yellow** Indicates compressor governor signal
- M.157.5.1.5. **Black** Indicates accessories
- M.157.5.1.6. **Blue** Indicates suspension
- M.157.6.** Line supports shall prevent movement, flexing, tension strain, and vibration. Copper lines shall be supported by looms, grommets, or insulated clamps to prevent the lines from touching one another or any component of the coach. 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 consistent with standard automotive practice. Nylon lines may be grouped and shall be continuously supported.

- M.157.7.** The compressor discharge line between power plant and body mounted equipment shall be flexible extruded PTFE tube with stainless steel wire braid, Aeroquip 2807, or approved equal. Other lines necessary to maintain system reliability shall be flexible hose with a braided stainless steel jacket. End fittings shall be standard SAE or JIC brass or steel, flanged, reusable, 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 coach except for the supporting grommets. Flexible lines shall be supported at 2 foot intervals or less. Airlines shall be installed to minimize air leaks. Each coach shall not leak down more than 1.5 psi as indicated on the instrument panel mounted air gauges, within 15 minutes from the point of governor cut-off.
- M.157.8.** All reservoir supply and delivery airlines shall be sloped toward reservoirs and routed to prevent water traps. Grommets shall protect the airlines at all points where they pass through understructure components. Provision shall be made to apply shop air to a convenient location in the engine compartment and at the front of the coach and shall include a standard bore valve. The engine compartment valve shall be located ahead of a quarter turn valve. Air for the compressor shall be filtered through the main engine air cleaner system. All air reservoirs shall meet the requirements of SAE Standard J10 and shall be equipped with clean-out plugs and quarter-turn drain valves. These valves shall be protected from road hazards by major structural members. The air system shall be protected by a pressure relief valve set at 200 psi (1,379 kPa) at the air dryer and 150 psi (1,034 kPa) at the compressor. The air system shall also be equipped with check valves and pressure protection valves to assure partial operation in case of line failures.
- M.157.9.** The main airline check valve located between the air compressor and the first reservoir must be accessible for maintenance. Means shall be provided to establish the check valve to be in working order. A Wabco SS1200 Plus or approved equal air dryer shall be provided and installed according to component manufacturer recommendations.

M.158. GENERAL CHASSIS

M.158.1. WHEELS AND TIRES

M.158.2. WHEELS

- M.158.2.1.** Hub-piloted 9 aluminum Alcoa or approved equal wheels shall be provided. All wheels shall be interchangeable and shall be removable without a puller. Wheels shall be compatible with tires in size and load-carrying capacity. All wheels and tires shall be balanced as an assembly. One spare wheel, complete with mounted tire shall be provided. Hub covers shall be chrome.
- M.158.2.2.** The wheel nuts shall meet all physical property requirements defined in ASTM A 194-2H, ISO and SAE standards. The nut shall be coated for corrosion resistance. The bench testing requirements for the lug nuts shall satisfy MIL-STD 1312 vibration test 7 and the Junkers dynamic test. Front and tag axle lugnuts shall be standard Meritor or approved equal components.

M.159. TIRES

- M.159.1.** The tires shall be supplied by the vehicle manufacturer. Tires, including spare, shall be Firestone FS-400, 315/80R-22.5, 20 ply, load range L or approved equal. Tires shall be suitable for the conditions of commuter service and sustained operation at the maximum speed capability of the coach. Load on any tire at GVWR shall not exceed tire supplier's rating. Tires shall provide the ride, noise, and handling characteristics associated with the demands of commuter service.

M.160. BUMPERST

M.160.1. LOCATION

- M.160.1.1.** Bumpers shall provide impact protection for the front and rear of the coach up to 26 inches above the ground. The bumpers shall wrap around the coach to the extent practicable without exceeding allowable coach width.

M.161. FRONT AND REAR BUMPERS

- M.161.1.** The front bumper assembly, nominally 20 inches (508 mm) high, shall consist of three energy absorbing modules that are self-restoring black urethane with minimum 1700 psi (11,721 kPa) tensile strength, 250 % elongation, and 350 psi (2,413 kPa) tear strength. The hollow ribbed black urethane cover will have excellent resistance to tears, abrasion, salt, hydro-carbons, detergents, sunlight, and will be repairable. An inner support structure constructed of aluminum or high strength steel shall provide a single, full length structural support for bumper the modules. The bumper assembly shall be hinged at the bottom for access to the spare tire, with the bumper release lever located at the top of the front roadside service compartment.

M.161.2. The rear bumper will be aluminum nominally 11 inches high (279 mm) and aluminum inner support structure with a repairable hollow ribbed black urethane cover. The bumper shall be shaped to wrap around the coach rear corners to protect the engine compartment doors and will also incorporate an anti-ride, or pinning feature to prevent unauthorized riders.

M.161.3. The complete assembly will be self-contained, self-restoring and maintenance-free.

M.162. ELECTRICAL SYSTEM

M.162.1. GENERAL REQUIREMENTS

M.162.1.1. The basic coach electrical system shall utilize multiplexed Power Management Modules (PMMs) from Actia, or approved equal. Versatility and future expansion of the system shall be provided for by expandable system architecture. The system shall be SAE J1939 compatible. A gateway used to interface between different communications protocols shall be built directly into the PMMs.

M.162.1.2. The system components shall be capable of reliable operation in an environment of between minus 30C to plus 80C while encountering mobile shock and vibration. Each module shall be adequately shielded to prevent interference by EMI. The multiplex power source shall be isolated, thereby minimizing any ground signal noise. A built in self-test system shall be utilized to check for module communication failures or output feedback problems within the system, and shall display faults on the LCD Diagnostic Interface

M.162.1.3. The components of the multiplex system shall be of modular design thereby providing for ease of replacement by field maintenance personnel. Power management modules will have the ability to be re-programmed from existing PMMs on the coach. Four PMMs shall be distributed throughout the coach (one under the front junction box, one in baggage bay #1, and two in baggage bay #3). Each module shall have 29 programmable inputs and 44 programmable outputs.

M.162.1.4. An optional 7" diagonal color LCD touch screen with 800 x 480 screen resolution shall be incorporated to provide system status and diagnostics.

M.162.1.5. Two Leece Neville 24 volt 140 amp alternators, or approved equal shall be provided. All circuits shall be protected by circuit breakers, fuses or solid state devices. Only the bus body and framing shall be used to attach ground studs. Grounds shall not be carried through hinges, bolted joints (except those specifically designed as electrical connectors), or power plant mountings. Wiring and electrical equipment necessarily located under the coach shall be insulated from water, heat, corrosion, and mechanical damage.

M.162.1.6. Twenty two 110 volt duplex outlets with a total minimum power of 3600 watts shall be provided.

M.163. MODULAR DESIGN

M.163.1. Design of the electrical system shall be modular so that each major component, apparatus panel, or wiring bundle is easily separable with standard hand tools or by means of connectors. Each module, except the main body wiring harness, shall be removable and replaceable in less than 30 minutes by a mechanic. Power plant wiring shall be an independent wiring module. Replacement of the engine compartment wiring module(s) shall not require pulling wires through any bulkhead or removing any terminals from the wires.

M.164. JUNCTION BOXES

M.164.1. All relays, controllers, and other electrical components shall be mounted in easily accessible junction boxes. The boxes shall be sealed to prevent moisture from normal sources, including engine compartment cleaning, from reaching the electrical components and shall prevent fire that may occur inside the box from propagating outside the box. A rear start and run control box shall be mounted in an accessible location in the engine compartment. No electrical controls shall be located where spillover from the surge tank can wash over the electrical controls or enter junction boxes.

M.164.2. Care shall be taken to route electrical harnesses from junction boxes to facilitate troubleshooting and to reduce defects. Terminal strips not blocks shall be used to make connections. Wiring under the coach floor in the baggage area shall be routed in an enclosed trough.

M.165. WIRING AND TERMINALS

M.165.1. All wiring between major electrical components and terminations, except battery wiring, shall be waterproof, and shall meet specification requirements of SAE Recommended Practice J555 and J1128 Type GXL or TXL. All wiring harnesses manufactured for buses purchased under this contract shall be

designed and manufactured for the operation of all sub components installed on the buses. Harnesses shall be properly designed and sized to the bus. Battery wiring shall conform to specification requirements of SAE Standard J1127-Type SGX, SGT or SGR and SAE Recommended Practice J541.

M.165.2. All wiring shall be properly grouped, numbered, and color-coded full length. Numbering shall be stamped at least every two (2.0) inches (50.8 mm). Installation shall permit ease of replacement. All wiring harnesses over 5-feet (1.50 meters) long and containing at least five (5) wires shall include at least 2 or 10 percent excess wires whichever is greater for spares, excluding the battery cables. In addition, twelve (12) spare wires (excluding battery cables) shall be provided between the front and rear junction boxes. Wiring harnesses shall not contain wires of different voltages unless all wires within the harness are sized to carry the current and insulated for the highest voltage wire in the harness.

M.165.3. Wire insulation shall be maintained as close to the terminals as practicable. The requirements for double insulation shall be met by wrapping harnesses with plastic electrical tape or by sheathing all wires and harnesses with nonconductive, rigid or flexible conduit. Grommets of elastomeric materials shall be provided at points where wiring penetrates the metal structure. Wiring supports shall be nonconductive. Precautions shall be taken to avoid damage from heat, water, solvents, or chafing. Wiring length shall allow replacement of end terminals twice without pulling, stretching, or replacing the wire.

M.165.4. Except for those on large wires such as battery cables, terminals shall be crimped to the wiring. Terminals shall be full ring type or interlocking and corrosion-resistant. T-splices may be used when it is less than 25,000 circular mills of copper in cross-section: a mechanical clamp is used in addition to solder on the splice; the wire supports no mechanical load in the area of the splice; and the wire is supported to prevent flexing.

M.166. ELECTRICAL COMPONENTS

M.166.1. GENERAL REQUIREMENTS

M.166.1.1. All electrical components, including switches, relays, and circuit breakers, shall be heavy-duty designs. To the extent practicable, these components shall be designed to last the service life of the coach and shall be replaceable in less than twenty five (25) minutes by a mechanic. Sockets of plug-in components shall be polarized where required for proper function and the components shall be positively retained. Any manual reset circuit breakers critical to the operation of the coach shall be mounted in a location best suited to the application with visible indication of open circuits. The electric motor shall be heavy-duty either wound field type or permanent magnet, as listed below. Electric motors shall be located for easy replacement and except for the cranking motor the brushes shall be replaceable in less than fifteen (15) minutes without removing the motor. Provision shall be made to ensure that the lubrication line for alternator bearing is secured to prevent lubricant leaks.

M.166.1.2. SYSTEM MOTOR TYPE Main Evaporator..... Brushless DC

M.166.1.3. Condenser Motors..... Brushless DC

M.166.1.4. Driver's Heater and Defroster..... Permanent Magnet

M.166.1.5. Windshield Wiper Motor..... Permanent Magnet

M.166.1.6. Windshield Washer Motor..... Permanent Magnet

M.166.2. Dual electric horns shall be provided. Horns shall be positioned to be protected from road hazards and the elements. The horn trumpets shall be down turned to assure drainage of any moisture that may have entered.

M.167. BATTERIES

M.167.1. Batteries shall be easily accessible for inspection and serviceable only from outside the coach. Batteries shall be of premium construction and shall be fitted with threaded stud terminals. Batteries shall be 8D with 1350 cold cranking amp capacity with 450 CCA reserve minimum. Positive and negative terminals shall have different size studs, and the battery terminals and cables shall be arranged to prevent incorrect installation. Battery terminals shall be located for access in less than thirty (30) seconds with jumper cables. No less than two conventional lead-acid batteries conforming to SAE Standard J537-Type 20T8 shall be provided. Battery cables shall be flexible and sufficiently long to reach the batteries in extended positions without stretching or pulling on any connection and shall not lie on top of the batteries. Battery cables are black with red heat shrink on the end for 24V (+), blue heat shrink for 12V (+) and white heat shrink for ground (-). A slave connection to the batteries shall provide a direct connection to the batteries for jump starting.

M.168. MASTER BATTERY SWITCHES

M.168.1. A master battery switch shall be provided near the batteries to provide complete, simultaneous disconnecting of the batteries from all bus 12 & 24 volt electrical systems. The master switch shall be a "rotary" style switch. The master switch shall be located behind a dedicated access door and shall be accessible in less than ten (10) seconds for operation. The master switch shall be capable of carrying and interrupting the total circuit load. Opening the master switch with the engine operating shall not damage any component of the electrical system.

M.169. RADIO NOISE SUPPRESSION

M.169.1. Proper suppression equipment shall be provided in the electrical system to eliminate interference with radio and television transmission and reception. This equipment shall not cause interference with any electronic system on the coach. Suppression shall be in accordance with SAE Practice J1708 and FCC standards.

M.170. INTERIOR CLIMATE CONTROL

M.170.1. CAPACITY AND PERFORMANCE

M.170.1.1. The climate control system shall be highly reliable since most failures are Class 2. Manually controlled shut-off valves shall be installed in the refrigerant lines before and after the filter dryer to allow isolation of the dryer for service. Manually controlled shut-off valves in the refrigerant lines shall allow isolation of the receiver and compressor for service. Self-sealing couplings or manual shut-off valves shall be used to break and seal the refrigerant lines during removal of major components such as the refrigerant compressor or condenser. Condenser and evaporator fans shall have a protective guard to prevent contact between mechanics and rotating fan blades. The appropriate safety warning labels shall be permanently affixed at this location.

M.170.1.2. Interior climate control system shall be provided and operate on refrigerant 134a. It shall maintain the interior of the coach at a level suitable for climate conditions found in the continental United States. The heating, ventilating, and cooling systems shall maintain an average passenger compartment temperature between 60°F (16° C) and 80°F (27° C) with a relative humidity of 50 percent or less. The system shall maintain these conditions in a ambient temperature range of 10°F to 100°F (12° C to 38° C), with a ambient humidity range of 5 to 100 percent while the coach is running. In ambient temperatures of 95°F to 115°F (35° C to 46° C) with relative humidity greater than 50 percent, the system shall maintain a temperature gradient of 20°F (7° C) while the coach is running. In ambient temperatures of 10°F to -10°F (12° C to - 23° C), the average interior temperature shall not fall below 55°F (13° C) when the coach is running with no passengers.

M.170.1.3. The air conditioning (AC) compressor shall be a four cylinder, short stroke – 1.65 inch, 2.76 inch bore, 39.4 cubic inch (.65 liter) displacement with a 500 – 3500 RPM range MCI 003 (Bitzer 4NFC), or approved equal. The compressor head and body shall be of rust proof aluminum construction, providing a light weight, compact and efficient unit. The connecting rods shall be of one piece construction for easy, long-life maintenance. Exchangeable cylinder liners shall be used in the cylinder bores for long service life and easy and efficient maintenance. The compressor shall be belt driven through a bi-directional & maintenance free magnetic clutch. Modern, environmentally friendly chlorine free refrigerants can be used with the compressor.

M.170.1.4. Compressor drive belts shall be manufactured from Kevlar[®] material to provide longer service life.

M.170.1.5. A manually adjustable belt tensioning device shall be provided to maintain proper belt tension.

M.170.1.6. The main air conditioning system capacity shall be at least 90,000 Btu's/hr. (26,376 W) with R134a.

M.170.1.7. Driver's A/C capacity shall be at least 10,800 Btu's/hr. (3,165 W).

M.170.1.8. The condenser fan motors with shrouded axial fans shall be brushless type with totally enclosed grease lubricated bearings. Motor shall be 24 volt, minimum 2 horsepower (1.5 kw) and operate only when the A/C is on for maximum efficiency. The condenser core shall be located to the rear of the number 2 baggage bay and include copper tubes and e-coated aluminum fins and have approximately 1,200 in² (7,742 cm²) of condensing surface. The receiver tank shall be equipped with a refrigerant sight gauge to be viewed through a window in the left-hand number 3 baggage compartment.

M.170.1.9. The evaporator shall be mounted under floor in the same compartment as the heater core for "Reheat Cycle" and humidity control and shall include copper tubes and aluminum fins.

M.170.1.10. A separate control shall be provided for the front dash heating and air conditioning, as well as for the main under floor unit. A HVAC system control panel is required for the

main under floor system. Control shall be within easy reach of the operator. The system shall allow the driver to set a specific interior coach temperature between the range of 60° F (16°C) and 80° F (27°C). The outside temperature can be displayed by switching between interior and exterior on the control panel. The HVAC controller shall monitor the temperature so that the interior temperature selected is maintained consistently. Where practicable, all controls shall be of a solid state design.

M.170.1.11. The system shall be designed with return air ducts at both front and rear of coach for balanced airflow. The system shall introduce a minimum of 10% fresh outside air when the fresh air intake is open.

M.170.1.12. Heat shall be applied to the front step tread to prevent accumulation of snow, ice, or slush. Step well heat shall be supplied and controlled by the driver's heater and defroster system. The manufacturer shall provide and install two valves with caps near the air conditioning compressor.

M.170.1.13. All electric motors which are part of the climate control system shall be permanent magnet type, except the Condenser and Main Evaporator motors, which shall be brushless type. Motors shall have double sealed, pre-lubricated anti-friction, replaceable ball bearings with moisture resistant grease. 3/8 inch (10 mm) and 5/16 inch (8 mm) diameter zinc terminal studs with bonded internal motor leads and anti-rotation insulators shall be used except driver's evaporator and parcel rack evaporators.

M.171. CONTROLS

M.171.1. The heating, cooling, ventilating and off operational modes of the interior climate control system shall be controlled by switches or displays conveniently located to the driver. In the heating and cooling modes, the system shall be governed by an electronic control that regulates the amount of cooling and heating capacity available to the passenger area. The temperature will be adjustable between 60°F (16°C) and 80°F (27°C). The temperature sensors used must be suitable for transit service and accurate to +/- 1°F.

M.172. AIR FLOW

M.172.1. PASSENGER AREA

M.172.1.1. The cooling mode of the interior climate control system shall introduce air into the coach up along the sidewall at a minimum rate of 25 cubic feet (0.71³ m) per minute per passenger based on the standard configuration coach with full standee load. This air shall be composed of no less than 10 percent outside air. Airflow shall be evenly distributed throughout the coach with air velocity not exceeding 60 feet (0.305 meters) per minute on any passenger.

M.172.1.2. Airflow may be reduced to 15 cubic feet (0.43³ m) per minute per passenger when operating in the heating mode with full standee load. Heated air introduced into the coach shall contain no less than 10 percent outside air. In the heating mode, the fans will activate immediately to assure an air outlet temperature of 70 degrees F (21° C). Outside airflow may be cut off during initial warm up/cool down, provided that manual adjustment is not required.

M.173. DRIVER'S AREA

M.173.1. The coach interior climate control system shall deliver at least 200 cubic feet (6.0³ m) per minute of air to the driver's area when operating in the ventilating and cooling modes. Adjustable nozzles shall permit variable distribution or shut down of the airflow. A separate heater or windshield defroster unit shall be capable of diverting heated air to the driver's feet and legs. The defroster motor shall be a permanent magnet type motor. The defroster or interior climate control system shall maintain visibility through the driver's side window. A separate evaporator, fan and control shall supply conditioned air to the driver's area.

M.174. AIR INTAKE

M.174.1. Outside openings for air intake shall be located to ensure cleanliness of air entering the climate control system, particularly with respect to exhaust emissions from the coach and adjacent traffic. All intake openings shall be baffled to prevent entry of snow, sleet, or water. Outside air shall be filtered before discharge into the passenger compartment. More efficient air filtration may be provided to maintain efficient heater and/or evaporator operation. The air filter shall be easily removed for service. Moisture drains from air intake openings shall be located so that they will not be subjected to clogging from road dirt, but shall be accessible for cleaning and inspection.

M.175. RADIO AND PUBLIC ADDRESS

M.175.1. MOBILE RADIO SYSTEM

M.175.1.1. A radio compartment, antenna, conduit, electrical and other requirements shall be provided to support a mobile radio system as and if required by the end user. The location, materials, and installation of all items installed on the coach in support of the mobile radio equipment is subject to approval by the end user. Any special tools required such as, but not limited to, security screwdrivers and latch handles shall be supplied.

M.176. PUBLIC ADDRESS SYSTEM

M.176.1. A public address system shall be installed that enables the driver to address passengers either inside or outside the coach. A total of at least 20 interior speakers shall broadcast, in a clear tone, announcements that are clearly perceived from all seat positions at approximately the same volume level. Speaker shall be provided outside above the entrance door so that announcements can be clearly heard by passengers standing near the door(s). A driver controlled switch shall select inside or outside announcements. The system shall be muted when not in use. The microphone shall not interfere with the operation of the mobile radio system.

M.177. ENTERTAINMENT SYSTEM

M.177.1. An in vehicle passenger entertainment system shall consist of 1 AM/FM/CD/DVD/Radio in dash within reach of the vehicle operator. A minimum of six 10" or greater LCD monitors shall be placed strategically for maximum passenger viewing.

M.178. EMERGENCY EQUIPMENT

M.178.1. On board emergency equipment, per Federal Motor Carrier Safety Regulations Part 393, shall be provided with each coach. The equipment shall be mounted out of the way of passengers but shall be readily accessible:

M.178.1.1. *Fire Extinguisher* - 5 pound (2.3 kg) capacity, Underwriter's Laboratories rating of A, B, C or more, marked as such with charge indicator, mounted in a cradled bracket.

M.178.1.2. *Emergency Warning Triangles*-Three bi-directional emergency reflective triangles conforming to the FMVSS 125 in a case and mounted in the battery compartment.

M.179. WARRANTY REQUIREMENTS

M.179.1. The contractor warrants and guarantees to the original Procuring Agency each complete bus and specific subsystem and components for 100% parts and labor as follows:

M.179.1.1. Warranty shall begin on the date that the vehicle delivery is accepted by the agency issuing the purchase order.

M.179.1.2. The air-conditioning system shall have a minimum 2 years unlimited mileage.

M.179.1.3. Any parts under warranty must be available and delivered to the purchasing transportation provider or their repair shop within 5 days of the time they requested/ordered them. The bus vendor/manufacture shall bear all reasonable financial costs of shipment of parts.

M.179.1.4. The warranty, as well as any recall notifications, shall cover each vehicle of the ultimate purchaser or recipient agency. The vendor shall provide a copy of any recall notice to the purchasing agency.

M.179.1.5. Bumper to bumper twenty four month warranty with unlimited mileage.

M.180. BUS TESTING

M.180.1. Certification shall be provided that in accordance with 49 CFR Part 665,

M.180.2. Bus Testing, the vehicle either does not need to be tested (with justification specified for exemption) or has been tested at the bus testing facility and a test report is included.

M.181. BUS WATER TESTING

M.181.1. The roofs, windows, windshield and all doors of all coaches shall be water tested, as follows:

M.181.2. The water test shall consist of a series of nozzles that are strategically located around the perimeter of the vehicle so as to the nozzles spray water over the entire surface of the vehicle.

M.181.3. The nozzles shall eject a volume of water no less than 2.6 gallons per minute under a pressure of no less than twenty-two (22) pounds per square inch measured at the nozzle tip.

M.181.4. There shall be no less than twenty (20) nozzles installed in the water test area, each capable of directing a force of water as indicated above.

- M.181.5.** The Vendor/Manufacture shall be required to water test each vehicle, under the conditions set forth above, for no less than five (5) minutes, in order to determine whether or not there are any body leaks at the window areas, door areas, roof panels, etc.
- M.181.6.** The Vendor/Manufacture shall take the necessary corrective action when body leaks are found to exist as a result of the above test, and conduct a second water test to recheck for body leaks following corrective action.

M.182. ALTOONA TESTING

- M.182.1.** Vehicle must be tested in the 7-year/200,000 mile category at the Altoona Bus Testing Facility in Duncansville, PA. And a copy of the full report must be submitted with the Proposal.

M.183. GENERAL

- M.183.1.** All equipment cataloged as standard for the basic vehicle, unless superseded by these specifications, must be furnished and included in the purchase price of each vehicle. Complete printed specifications, published literature, and photos, or illustrations of the basic units that the Supplier proposes to furnish with this Proposal must accompany each Proposal.

M.184. QUALITY OF MATERIALS

- M.184.1.** Welding procedures and materials shall be in accordance with standards of the American Society of Testing Materials and the American Welding Society. All visible welds shall be grounded smooth. Where metal is welded, the contact surface shall be free of scale, spatter, and grease and shall be treated to preclude rusting.

M.185. PUBLICATIONS AND PRINTED MATERIALS

- M.185.1.** Each vehicle shall have a complete set of operation, quality assurance, and warranty publications.
- M.185.2.** The information shall be organized in a three ring binder format with each sections clearly identified.
- M.185.3.** As built wiring diagram and as built parts manuals for body and all auxiliary equipment.
- M.185.4.** Maintenance and inspection schedule incorporating the required maintenance and inspection of the basic vehicle and its sub-systems.
- M.185.5.** Operator's manual: A complete operations manual and troubleshooting guide with a detailed manufacturer's parts list that covers the conversion features on the vehicle as listed in this specification. The manual will provide complete, comprehensive instructions for the wheelchair accessories, wheelchair list deployment, air conditioning system, tie downs, heater, deployment of seats, wiring diagram and related equipment. One paper copy and an electronic copy of the parts and maintenance manual will be provided by the seller to the buyer.
- M.185.6.** Warranty papers for chassis, body, and additional equipment.
- M.185.7.** Warranty Information: Each vehicle must have a published listing of contractor warranty repair locations, including address, telephone number, and contact names for the State of Oklahoma.

M.186. PRE-AWARD AUDIT

- M.186.1.** The vehicles are not considered delivered to the purchasing agency until the required FTA documents are completed by a Government Official.
- M.186.2.** A Pre-Award Audit shall be conducted to determine if the proposal meets specifications. The Supplier shall submit documents, which include certification of the manufacturer's compliance with the Federal Transit Administration (FTA) Pre-Award Buy America Audit Requirements. The document submitted shall include the following information for each major component used on vehicle:
- M.186.2.1.** Name and address of each supplier.
 - M.186.2.2.** Cost of each major component and subcomponent. In order to protect proprietary information, the document may reflect the percentage of total cost each item represents instead of the actual cost.
 - M.186.2.3.** Country of origin of each major component and subcomponent.
 - M.186.2.4.** Name and address of company where final assembly occurs.
 - M.186.2.5.** Cost of final assembly
 - M.186.2.6.** Signature of authorized representative of vehicle manufacturer.

M.187. POST- DELIVERY AUDIT

M.187.1. A Post Delivery Audit of the vehicle(s) shall be conducted at the purchaser's facility, to determine that the completed vehicle(s) meets specifications. Once this process has been satisfactorily completed, the vehicle(s) shall be considered acceptable.

M.188. ACCESSIBILITY REQUIREMENTS

M.188.1. When submitting a Proposal for an accessible vehicle for the disabled, the vendor shall provide a list of the vehicle related equipment illustrating the component cost and related installation charges. The purpose of this list is to reflect an accurate cost for those vehicle related items, which are required to make the vehicle accessible to the disabled.

M.189. ACCEPTANCE OF VEHICLES

M.189.1. Upon delivery at the designed location specified within this document the final acceptance will occur after the vehicles have been inspected, road tested and all FTA required post audit delivery requirements have been met.

M.189.2. All vehicles shall be insured by the Supplier until the post audit delivery has been conducted at minimum

N. SOLICITATION SPECIFICATIONS FOR HEAVY-DUTY TRANSIT LOW-FLOOR DIESEL BUS 30, 35, AND 40 FOOT

N.1. DELIVERY

- N.1.1.** Vehicle must be delivered at a maximum of 180 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following:
 - N.1.1.1.** The vehicle must have a full tank of fuel when delivered.
 - N.1.1.2.** Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
 - N.1.1.3.** All parts added, as part of the modification process shall be new.
 - N.1.1.4.** Headlights properly aligned
 - N.1.1.5.** Engine Tuned
 - N.1.1.6.** All accessories properly adjusted
 - N.1.1.7.** Electrical, braking and suspension systems inspected
 - N.1.1.8.** Both batteries Charged
 - N.1.1.9.** Front-end aligned, all wheels balanced, including spare
 - N.1.1.10.** All lubricants checked, and greased if needed
 - N.1.1.11.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
 - N.1.1.12.** Warranty papers and owner's guide
 - N.1.1.13.** Exterior and interior cleaned and washed.
 - N.1.1.14.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.
 - N.1.1.15.** Under no circumstances are tow vehicles to be attached to any buses.
 - N.1.1.16.** Each vehicle must be delivered to the agency submitting the P.O.

N.2. CERTIFICATE OF ORIGINS

- N.2.1.** Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order **five** business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery **is not acceptable**.

N.3. NOTIFICATION

- N.3.1.** Vendor shall notify buyer of vehicle delivery **ten** business days prior. If these specifications contradict any listed in the Federal Regulations, they are superseded by those of the Federal Regulations

N.4. REFERENCED PUBLICATIONS

- N.4.1.** 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.

N.5. LEGAL REQUIREMENTS

- N.5.1.** The Contractor shall comply with all applicable federal, state and local regulations. These shall include but not be limited to ADA, as well as state and local accessibility, safety and security requirements. Local regulations are defined as those below the state level.
- N.5.2.** Buses shall meet all applicable FMVSS and shall accommodate all applicable FMCSR regulations in effect at location of the Agency and the date of manufacture.

- N.5.3.** 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.

N.6. OVERALL REQUIREMENTS

- N.6.1.** 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. Components used in the vehicle shall be of heavy-duty design and proven in transit service.
- N.6.2.** The buses shall afford features essential for safe, efficient and comfortable operation by the operator. This implies the utmost in road and traffic visibility under all driving conditions and adequate means for safe passenger movement. The bus must be maneuvered easily in normal and heavy traffic.
- N.6.3.** All Proposers must conform to these specifications and the product they furnish shall be of first-class quality, and workmanship, and shall be of the best obtainable in the various trades. The design of the body, chassis, and equipment, which the manufacturer proposes to furnish, shall be such as to produce a vehicle of substantial and durable construction in all respects.
- N.6.4.** All systems, sub-systems, and components shall be individually and permanently labeled with Manufacturer, Part Number, and Serial Number. Label is to be located, in each instance, for easiest access for reading while installed for use in the bus. List of all systems, subsystems, and components shall accompany each bus either on paper or diskette. This shall include an OEM to vendor cross-reference listing.
- N.6.5.** The manufacturer shall use FC-300 and FC-195 hoses for all flexible lines except A/C and discharge from the air compressor to the wet tank.
- N.6.6.** The manufacturer shall be responsible for providing all parts or details which make each bus complete and ready for service, even though such part(s) or details(s) are not mentioned in these specifications.
- N.6.7.** All buses shall be in compliance with the Americans with Disabilities Act (ADA). These buses shall be new, unused, current model specifically designed for intra-city service and substantially manufactured in the United States (in accordance with "Buy America" requirements). These units must meet all Federal requirements applicable to this type of vehicle.
- N.6.8.** Buses provided under this contract shall be 30 foot, 35 foot, and 40 foot in length, 102 inches wide, with a low floor standard transit design.

N.7. WORKER AND PROTECTIVE MEASURES

- N.7.1.** All bolts or rods passing through wood shall be sealed with zinc chromate or other approved sealing compound. Where wood and wood are placed together, all outer edges of wood, as well as the edges of holes, cutouts and notches shall be coated with a linseed oil and titanium dioxide sealer or zinc chromate or other appropriate sealing compound.
- N.7.2.** All exterior light fixtures shall be fitted to the contour of the bus body and adequately sealed to prevent entrance of water.
- N.7.3.** All rubber seals on ventilator doors and compartment cabinet doors shall be placed in 'U' shaped channels to firmly hold the rubber in place. Equally, self-adhering closed cell neoprene seals may be used, without 'U' channels.
- N.7.4.** All burrs and sharp edges shall be dressed so as to prevent injury to passengers and employees, or damage to their clothing.
- N.7.5.** All buses shall be subjected to water tests simulating the severe rain conditions experienced in the Oklahoma environment. Windows, escape hatches, doors, etc. are subject to an approved water test to be conducted at the manufacturer's facility by the manufacturer and shall be observed by the Resident Inspector(s).
- N.7.6.** Water testing may be verified by further testing at the agency's Maintenance Facility prior to the acceptance of each vehicle if test observation or verification of leak repair is missed on or not observed by the Resident Inspector on any bus built. Any bus that fails to pass the water test shall be corrected by the Contractor. The retest/corrective repair cycle shall repeat until the leak(s) have been eliminated to the agency's satisfaction.

N.8. WATER TEST DESCRIPTION

- N.8.1.** The roof, roof hatches, front cap, rear cap, sidewalls, passenger windows, operator's windows, destination sign windows, windshields, wheel wells and all doors of all buses shall be water tested prior to the delivery of each unit as follows:
- N.8.1.1.** The water test shall consist of a series of nozzles which are strategically located around the perimeter of the vehicle so as to spray water over the entire surface of the vehicle.

N.8.1.2. The nozzles shall eject a volume of water no less than 2.6 gallons per minute per nozzle under a pressure of no less than 22 lbs. per minute measured at the nozzle tip.

N.8.1.3. The Contractor shall be required to water test each vehicle under the conditions described above for no less than 15 minutes to ensure there are no water leaks in the bus.

N.8.1.4. Bus road testing shall be conducted immediately after the water test.

N.8.2. Contractor shall take the necessary steps of corrective action to repair any leaks found as a result of the described test and shall repeat the 15 minute water test to ensure that corrective steps have been successful. This process shall be repeated until no leaks are found. Documentation of each bus shall be kept by the manufacturer as to the location of the leak, what caused the leak to occur and shall describe the repair action taken to prevent the leak from reoccurring.

N.8.3. If the Contractor's bus manufacturing process water test differs from the water test process and criteria described above, then any deviations shall be approved by the Procuring Agency.

N.9. TOTAL BUS OPERATION

N.9.1. 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 twenty-five (25) miles during the road tests. The plan shall be submitted to the agency for approval.

N.9.2. All zerk grease testing fittings shall be accessible from a pit location with a standard straight nose grease gun.

N.9.3. All vehicles will be road-tested and dyno-tested.

N.10. WEIGHT

N.10.1. 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.

N.10.2. Buses at a capacity load shall not exceed the tire factor limits, brake test criteria or structural design criteria.

N.11. CAPACITY

N.11.1. The vehicle shall be designed to carry the gross vehicle weight, which shall not exceed the bus GVWR.

N.12. Service Life

N.12.1. The minimum useful design life of the bus in transit service shall be at least 12 years or 500,000 miles. It shall be capable of operating at least 40,000 miles per year, including the 12th year.

N.13. MAINTENANCE AND INSPECTION

N.13.1. 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).

N.13.2. Test ports shall be provided for commonly checked functions on the bus, such as air intake, exhaust, hydraulic, pneumatic, charge-air and engine cooling systems, engine, transmission, etc.

N.13.3. All Engine and Transmission components will have the fluid sampling valves (or equivalents) installed that are easy to access: device and location selection to be made at pre-production meeting.

N.13.4. The manufacturer shall give prime consideration to the routine problems of maintaining the vehicle. All bus 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 bus structure and/or equipment such as seats and flooring under seats in order to gain access to these areas. Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance, using tools and equipment that are normally available as standard commercial items.

N.13.5. Requirements for the use of unique specialized tools will be minimized. The body and structure of the bus shall be designed for ease of maintenance and repair. Individual panels or other equipment which 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.

N.13.6. 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.

N.13.7. *NOTE:* 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 bus.

N.14. INTERCHANGEABILITY

- N.14.1.** 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 separate 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.
- N.14.2.** 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. Contractor shall identify and secure approval for any changes in components or unit construction provided within a Contract.
- N.14.3.** In the event that the Contractor is unable to comply with the interchangeability requirement, the Contractor must notify the Agency and obtain the Agency's prior written approval, including any changing in pricing.
- N.14.4.** Agency shall review proposed product changes on a case-by-case basis and shall have the right to require extended warranties to ensure that product changes perform as least as well as the originally supplied products.

N.15. TRAINING

- N.15.1.** Along with the purchase of new buses, it is the Procuring Agency's requirements to have the manufacturer provide an appropriate program of instruction targeted to the operator, servicing, and maintenance personnel. This will be accomplished through a combination of Agency on-site and Contractor and/or supplier site training.
- N.15.2.** All training instructors shall be competent to teach the course area they are instructing. Further, all instructors shall speak English and have a complete understanding of the English language. If the instructor or vendor presenter lacks the skill or knowledge to provide instruction, or cannot communicate with the students, the Procuring Agency reserves the right to request that the instructor be replaced and the area of training be repeated.
- N.15.3.** Note: All Training will be priced as an option and separately from the base bus price.

N.16. OPERATOR ORIENTATION

- N.16.1.** The Contractor shall provide an 8-hour course of instruction for Procuring Agency for Operations personnel. Class size is not to exceed 10 employees per session. The program shall include, but not be limited to the following:
 - N.16.1.1.** Operator Compartment, Controls and Switches, Warning Indicators and Gauges, Seat Adjustment, Door Control, Walk Around Inspection, Compartment-by-Compartment Explanation, Mirror Adjustments, Climate Control System, Wheelchair Ramp, Safety Equipment, And Emergency Procedures Wheelchairs securement.

N.17. MAINTENANCE ORIENTATION

- N.17.1.** The Contractor shall provide an 8-hour course of instruction for Procuring Agency Maintenance personnel on Vehicle Servicing. Class size is not to exceed 10 employees per session. At minimum, the course shall cover the following areas:
 - N.17.1.1.** Chassis, Suspension, Steering, Axles, Brakes Air, Body, Doors, Electrical, Engine, Fuel, Transmission, HVAC, Fire Suppression, Towing/Jacking

N.18. TECHNICAL TRAINING

- N.18.1.** The Contractor shall provide a structured program of technical training which will consist of specific and identifiably separate curriculum for each subject area. Each subject area training session shall be between eight (8) and forty (40) classroom/hands-on hours based on subject area, with class size being no more than (10) participants. The training will be delivered at the Procuring Agency's location on a schedule coordinated by the Procuring Agency's training department and the Contractor.
- N.18.2.** The following subject areas will be offered:
 - N.18.2.1.** Body and Chassis, Suspension and Steering, Electrical and Electronics, Air and Brake System, HVAC/Climate Controls, Engine, Transmission, Wheelchair Ramp System, Destination Signs, Doors, Axles and Tires, Fuel System, and Fire Suppression
- N.18.3.** The technical training shall be delivered on a schedule coordinated between the Procuring Agency's training department and the Contractor. The subject area of sessions to be provided will be negotiated between the Procuring Agency's training personnel and the Contractor, with the base requirement being 96 hours.

N.19. OEM

- N.19.1.** The Contractor shall provide two (2) class slots at the manufacturer's suppliers training facility for technical instruction course on the operation, diagnostics, troubleshooting, repair, and servicing of the below listed areas:
 - N.19.1.1.** Engine
 - N.19.1.2.** Transmission

N.20. OPERATING ENVIRONMENT

N.20.1. The bus shall achieve normal operation in ambient temperature ranges of 10°F to 115°F, 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 feet.

N.21. NOISE

N.21.1. INTERIOR NOISE

N.21.1.1. 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 65 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.

N.21.1.2. The bus-generated noise level experienced by a passenger at any seat location in the bus shall not exceed 80 dBA. The operator area shall not experience a noise level of more than 75.5 dBA.

N.21.2. EXTERIOR NOISE

N.21.2.1. Airborne noise generated by the bus and measured from either side shall not exceed 80 dBA under full power acceleration when operated 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 83 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.

N.21.2.2. All noise readings shall be taken fifty (50) feet from, and perpendicular to, the centerline of the bus with all accessories operating. The Contractor shall comply with the exterior noise requirements defined in local laws and ordinances identified by the Agency and SAE J366.

N.22. FIRE SAFETY

N.22.1. 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.

N.22.2. 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.

N.23. RESPECT FOR THE ENVIRONMENT

N.23.1. In the design and manufacture of the bus, the Contractor shall make every effort to reduce the amount of potentially hazardous waste. In accordance with Section 6002 of the Resource Conservation and Recovery Act, the Contractor shall use, whenever possible and allowed by the specifications, recycled materials in the manufacture of the bus.

N.24. BUS DIMENSIONS

N.24.1. PHYSICAL SIZE

N.24.1.1. 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 shall have the following overall dimensions.

N.24.2. BUS LENGTH:

N.24.2.1. 30 Foot Bus (29' 11" TO 34' 11")

N.24.3. BUS WIDTH

N.24.3.1. Body width shall be 102 inches (+0, -1 inch)

N.24.4. BUS HEIGHT

N.24.4.1. Maximum overall height shall be 140 inches, including all rigid, roof-mounted items.

N.24.5. STEP HEIGHT

N.24.5.1. The step height shall not exceed 16.5 inches at either doorway without kneeling and shall not exceed 15.5 inches at the step. A maximum of two steps is allowed to accommodate a raised aisle floor in the rear of the bus.

N.24.6. UNDERBODY CLEARANCE

N.24.6.1. The bus shall maintain the minimum clearance dimensions as defined in SAE Standard J689, regardless of load up to the gross vehicle weight rating.

N.24.7. RAMP CLEARANCES

N.24.7.1. 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.

N.24.7.2. 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.

N.24.7.3. 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.

N.24.8. TABLE 2

N.24.8.1. Breakover Angle

Angle	30-ft Bus
Approach	8.6 degrees (min.)
Front breakover	8 degrees (min.)
Departure	8.1 degrees (min.)

N.24.9. GROUND CLEARANCE

N.24.9.1. Ground clearance shall be no less than 9 inches, (8 inches at jacking pad) except within the axle zone and wheel area.

N.24.9.2. Axle zone clearance, which is the projected area between tires and wheels on the same axial centerline, shall be no less than 5.4 inches.

N.24.9.3. Wheel area clearance shall be no less than 8 inches for parts fixed to the bus body and 6 inches for parts that move vertically with the axles.

N.24.10. FLOOR HEIGHT

N.24.10.1. Height of the step above the street shall be no more than 16 inches measured at the centerline of the front and rear doorway.

N.24.10.2. The floor may be inclined along the longitudinal axis of the bus, and the incline shall not exceed 3.5 degrees off the horizontal except locally at the doors where 2 degree slope toward the door is allowed.

N.24.10.3. All floor measurements shall be with the bus at the design running height and on a level surface and with the standard installed tires.

N.24.10.4. A maximum of two steps is allowed to accommodate a raised aisle floor in the rear of the bus.

N.24.11. INTERIOR HEADROOM

N.24.11.1. Headroom above the aisle and at the centerline of the aisle seats shall be no less than 78 inches in the forward half of the bus tapering to no less than 74 inches forward of the rear settee.

N.24.11.2. At the centerline of the window seats, headroom shall be no lower than 65 inches, except for parcel racks and reading lights, if specified.

N.24.11.3. Headroom at the back of the rear bench seat may be reduced to a minimum of 56 inches, but it shall increase to the ceiling height at the front of the seat cushion.

N.24.11.4. 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.

N.24.12. AISLE WIDTH

N.24.12.1. The minimum clear aisle width between pairs of transverse seats with all attached hardware shall be at least 22 inches.

N.24.12.2. The aisle width between the front wheelhouses shall be at least 35.5 inches, and the entire area between the front wheelhouses shall be available for passengers and mobility aid devices.

N.25. VEHICLE PERFORMANCE

N.25.1. POWER REQUIREMENTS

N.25.1.1. The propulsion system shall be sized to provide sufficient power to enable the bus to meet the defined acceleration, top speed, and gradability requirements, and operate all propulsion-driven accessories using actual road test results and computerized vehicle performance data.

N.25.2. TOP SPEED

N.25.2.1. 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.

N.25.3. *NOTE:* Values are assumed to be sustained. Manufacturer shall supply Agency with data if there is a variance between peak performance and sustained vehicle performance.

N.25.4. GRADEABILITY

N.25.4.1. Gradeability requirements shall be met on grades with a dry commercial asphalt or concrete pavement at GVWR with all accessories operating.

N.25.5. DEFAULT

N.25.5.1. The propulsion system and drivetrain shall enable the bus to achieve and maintain a speed of 40 mph on a 2½ percent ascending grade and 15 mph on a 10 percent ascending grade continuous.

N.25.6. *NOTE:* Values are assumed to be sustained. Manufacturer shall supply Agency with data if there is a variance between peak performance and sustained vehicle performance.

N.25.7. ACCELERATION

N.25.7.1. The acceleration shall meet the requirements below and shall be sufficiently gradual and smooth to prevent throwing standing passengers off-balance. Acceleration measurement shall commence when the accelerator is depressed.

N.25.8. TABLE 3

N.25.8.1. Maximum Start Acceleration Times on a Level Surface

SPEED (MPH)	MAXIMUM TIME (SECONDS)
10	5
20	10
30	18
40	30
50	60
TOP SPEED	

N.25.9. OPERATING RANGE

N.25.9.1. The operating range of the bus shall be designed to meet the operating profile as stated in the "Design Operating Profile" section.

N.25.10. DIESEL

N.25.10.1. The operating range of the bus when run on the Altoona Test cycle shall be at least 350 miles with full fuel capacity.

N.26. POWER PLANT

N.26.1. ENGINE - DIESEL

N.26.1.1. The bus shall be powered by a Cummins ISL 280 HP diesel engine capable of providing the performance to satisfy the operating conditions in geographical areas throughout the state of Oklahoma. The engine shall have a minimum design life of 12.5 years or 500,000 miles, whichever comes first, and it shall be designed to require no more than one (1) major overhaul to achieve this lifetime. The engine and the transmission shall be compatible with each other in that the electronic controls of the engine shall interface with the transmission and vice versa, if controls are used. Engine shall meet all current Federal EPA requirements. A copy of the engine certification shall be supplied with the proposal.

N.26.1.2. The engine shall comply with applicable local, state, and/or federal emissions and useful life requirements. Components of the fuel management and/or control system shall have a design life of not less than 150,000 miles without replacement or major service. The lifetime estimate is based on the design operating profile.

N.26.1.3. The engine shall be equipped with an electronically controlled management system, compatible with either 12- or 24-volt power distribution. The engine control system shall be capable of transmitting and

receiving electronic inputs and data from other drivetrain components and broadcasting that data to other vehicle systems. Communication between electronic drivetrain components and other vehicle systems shall be made using the communications networks. The engine's electronic management system shall monitor operating conditions and provide instantaneous adjustments to optimize both engine and bus performance. The system shall be programmable to allow optimization of programmable features.

N.26.1.4. The engine starting system shall be protected by an interlock that prevents its engagement when the engine is running. Special equipment or procedures may be employed to start the bus when exposed to temperatures less than 30°F for a minimum of four hours without the engine in operation. All cold weather starting aids, engine heating devices and procedures shall be of the type recommended by the engine manufacturer and approved by the Agency. The integration of all systems on the vehicle relative to engine idle speed shall be the responsibility of the vehicle manufacturer to meet the requirements of the transit property. A 120 volt @ 100 watt engine block heater will be located in the rear engine compartment.

N.26.2. AUTOMATIC ENGINE PROTECTION/SHUTDOWN OVERRIDE FEATURE

N.26.2.1. The engine control system shall protect the engine against progressive damage. The system shall monitor conditions critical for safe operation and automatically de-rate power and/or speed and initiate engine shutdown as needed. The on-board diagnostic system shall trigger an audible alarm and warning light to signal the operator when the engine control unit detects a malfunction and the engine protection system is activated.

N.26.2.2. Automatic shutdown shall occur when parameters established for the functions below are exceeded:

N.26.2.2.1. Coolant Level

N.26.2.2.2. Coolant Temperature

N.26.2.2.3. Oil Pressure

N.26.2.2.4. Oil Temperature

N.26.2.2.5. 20 minutes of Idling

N.26.2.2.6. Exhaust Temperature

N.26.2.2.7. Fire Suppression

N.26.2.3. The automatic shutdown for the Fire Suppression feature shall occur when the Fire Suppression system is discharged.

N.26.2.4. A control shall be available to the operator, to allow temporary override (30-45 seconds) of the engine protection/shutdown system if engine power is required to move the bus in emergency conditions. Override action shall be recorded. This data shall be retrievable by the Agency.

N.26.2.5. The fast idle device shall be activated and controlled automatically by the engine control system. This device will operate only when the transmission is in neutral.

N.26.2.6. The integration of all systems on the vehicle relative to engine idle speed shall be the responsibility of the vehicle manufacturer and shall meet the requirements of the transit property.

N.26.2.7. The engine starting system shall be protected by an interlock that prevents its engagement when the engine is running.

N.26.2.8. Engine throttle operation shall be inhibited, through interlocks, whenever:

N.26.2.8.1. Front or rear door open

N.26.2.8.2. The vehicle is kneeled

N.26.2.8.3. Wheelchair ramp is in operation

N.26.2.8.4. Rear door emergency release

N.26.2.8.5. Fast Idle Operation

N.26.2.9. Failure of the engine throttle control shall not result in an unsafe condition. Loss of air or electrical throttle control shall inhibit throttle.

N.26.2.10. A rear mounted engine speed control (hand throttle) will be provided.

N.26.2.11. The engine shall have on-board diagnostic capabilities, able to monitor vital functions, store out-of-parameter conditions in memory, and communicate faults and vital conditions to service personnel. Diagnostic reader device connector ports, suitably protected against dirt and moisture, shall be provided in operator's area and near or inside engine compartment. The on-board diagnostic system shall inform the operator via visual and/or audible alarms when out-of-parameter conditions exist for vital engine functions. All removable caps shall be tethered including the caps for the diagnostic connector ports in the operator's area and in the engine compartment.

N.26.3. PROPULSION SYSTEM SERVICE

N.26.3.1. The propulsion system shall be arranged so that accessibility for all routine maintenance is assured. No special tools, other than dollies and hoists, shall be required to remove the propulsion system or any subsystems. However, the Agency shall recognize that properly rated test equipment and safe electrical work practices are essential when servicing all voltage components. The exhaust system, air cleaner, air compressor, starter (if used), alternator, radiator, all engine accessories, and any other component requiring service or replacement shall be easily removable.

N.26.4. STANDARD REQUIREMENTS FOR A FAST IDLE DEVICE

N.26.4.1. The fast idle device shall be activated and controlled automatically by the control system.

N.26.5. COOLING SYSTEMS

N.26.5.1. The cooling systems shall be of sufficient size to maintain all engine and transmission fluids and engine intake air at safe, continuous operating temperatures during the most severe operations possible and in accordance with engine and transmission manufacturers' cooling system requirements. The cooling system fan controls should sense the temperatures of the operating fluids and the intake air, and if either is above safe operating conditions the cooling fan should be engaged. The fan control system shall be designed with a fail-safe mode of "fan on." The cooling system shall meet the requirements stated in the operating environment.

N.26.5.2. The engine shall be cooled by a water-based, pressure type, cooling system that does not permit boiling or coolant loss during the operations described above. Engine thermostats shall be easily accessible for replacement. Shutoff ball valves shall allow filter replacement without coolant loss. Ball valves shall permit complete shutoff of lines for the heating and defroster units, and water booster pumps. The water boost pump shall be a long life brushless design. All low points in the water-based cooling system shall be equipped with a standard with a 1/4" MPT brass hex plug. Air vent valves shall be fitted at high points in the cooling system unless it can be demonstrated that the system is self-purging.

N.26.5.3. A Modine E-Fan electric fan system or approved equal will be provided. Electric fans shall be brushless, variable speed, reversible and have a corrosion resistant metal shroud with finger guards that meet SAE spec J1308_200808. The fans should provide electronic feedback control and have diagnostics capability through the standard SAE J1939 diagnostics port. The cooling system shall consist of multiple electric DC brushless pusher type variable speed fans with electronic feedback controls. Electric fan motor speeds shall have a minimum operating range of 0-5500 rpm with capability of manual or automatic reverse operation in order to assist in debris removal. The cooling system shall be equipped with a master controller with the following capabilities; automatically reduce fan speed when the vehicle stops to minimize noise.

N.26.5.3.1. As an option, an EMP electric fan system will be made available and priced separately.

N.26.5.4. A means of determining satisfactory engine coolant level shall be provided. 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 inches above the ground. Radiator and charge air cooler fan(s) shall be electrically driven and capable of a manual reverse operations for periodic self-cleaning of the radiator and charge air cooler.

N.26.6. CHARGE AIR COOLING

N.26.6.1. 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.

N.26.7. TRANSMISSION COOLING

N.26.7.1. 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 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.

N.26.8. TRANSMISSION— CONVENTIONAL POWERTRAIN

N.26.8.1. The transmission shall be an Allison B400R 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.

N.26.8.2. The electronic controls shall be capable of transmitting and receiving electronic inputs and data from other drivetrain components and broadcasting that data to other vehicle systems. 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-volt power distribution, provide consistent shift quality and compensate for changing conditions such as variations in vehicle weight and engine power.

N.26.8.3. A nominal brake pedal application of 6 to 10 psi shall be required by the operator to engage forward or reverse range from the neutral position to prevent sudden acceleration of the bus from a parked position.

N.26.8.4. 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 operator when the electronic control unit detects a malfunction.

N.26.8.4.1. As an option, an electronic transmission fluid level monitoring and protection system will be made available and priced separately.

N.26.8.5. Models with remote mounted transmission vents shall have vents mounted to prevent plugging and/or the entry of foreign materials.

N.26.9. RETARDER

N.26.9.1. 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.

N.26.9.2. Actuation of ABS and/or automatic traction control (ATC) shall override the operation of the brake retarder.

N.26.10. STANDARD REQUIREMENT FOR RETARDER ACTIVATION

N.26.10.1. The retarder shall be adjustable within the limits of the powertrain and activated when the brake pedal is depressed. The Agency will work with the OEM/drive system manufacturer to determine retarder performance settings. A retarder disable switch shall be accessible to the seated operator. Disabling retarder shall be recorded for Agency data collection.

N.26.11. MOUNTING

N.26.11.1. All powerplant mounting shall be mechanically isolated to minimize transfer of vibration to the body structure and provide a minimum clearance of 0.75 inches. Mounts shall control the movement of the powerplant so as not to affect performance of belt-driven accessories or cause strain in piping and wiring connections to the powerplant.

N.26.12. ENGINE / TRANSMISSION OIL FILL / FILTERS

N.26.12.1. 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. The engine and transmission shall be equipped with sufficient heavy-duty fuel and oil filters for efficient operation and to protect the engine and transmission between scheduled filter changes. All filters shall be easily accessible and the filter bases shall be plumbed to ensure correct reinstallation.

N.26.13. ENGINE COMPARTMENT GAUGES

N.26.13.1. Engine oil pressure, transmission and coolant temperature gauges are required in engine compartment.

N.26.14. ENGINE AIR CLEANER

N.26.14.1. 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 air filter.

N.26.15. HYDRAULIC SYSTEMS

N.26.15.1. Hydraulic system service tasks shall be minimized and scheduled no more frequently than those of other major bus systems. All elements of the hydraulic system shall be easily accessible for service or unit replacement. 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.

N.26.15.2. The hydraulic system shall operate within the allowable temperature range as specified by the lubricant manufacturer.

N.26.16. FLUID LINES

N.26.16.1. 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.

N.26.16.2. 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.

N.26.16.3. All hoses, pipes, lines and fittings shall be specified and installed per the manufacturer's recommendations.

N.26.17. FITTINGS AND CLAMPS

N.26.17.1. 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.

N.26.17.2. 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.

N.26.18. CHARGE AIR PIPING

N.26.18.1. 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.

N.26.18.2. Charge air piping shall be constructed of stainless steel, aluminized steel or anodized aluminum, except between the air filter and turbocharger inlet, where piping may be constructed of fiberglass. 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 360-degree seal.

N.26.19. RADIATOR

N.26.19.1. Radiator piping shall be stainless steel or brass tubing, and if practicable, hoses shall be eliminated. Necessary hoses shall be impervious to all bus fluids. All hoses shall be secured with stainless steel clamps that provide a complete 360-degree seal. The clamps shall maintain a constant tension at all times, expanding and contracting with the hose in response to temperature changes and aging of the hose material.

N.26.20. OIL AND HYDRAULIC LINES

N.26.20.1. 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.

N.27. FUEL

N.27.1. FUEL LINES

N.27.1.1. Fuel lines shall be securely mounted, braced and supported as designed by the bus manufacturer to minimize vibration and chafing and shall be protected against damage, corrosion or breakage due to strain or wear.

N.27.1.2. Manifolds connecting fuel containers shall be designed and fabricated to minimize vibration and shall be installed in protected locations to prevent line or manifold damage from unsecured objects or road debris.

N.27.1.3. Fuel hose and hose connections, where permitted, shall be made from materials resistant to corrosion and fuel and protected from fretting and high heat. Fuel hoses shall be accessible for ease of serviceability.

N.27.2. Fuel Lines - Diesel

N.27.2.1. Fuel lines shall be capable of carrying the type of fuel specified by the Agency (i.e., up to B20 type fuel).

N.28. DESIGN AND CONSTRUCTION

N.28.1. DESIGN AND CONSTRUCTION - DIESEL FUEL TANK(S)

N.28.1.1. The fuel tank(s) shall be made of corrosion resistant stainless steel. The fuel tank(s) shall be made of 3CR12 structural stainless steel. The fuel tank(s) shall be securely mounted to the bus to prevent movement during bus maneuvers.

N.28.1.2. The fuel tank(s) shall be equipped with an external, hex head, drain plug. It shall be at least a 3/8-inch size and shall be located at the lowest point of the tank(s). The fuel tank(s) shall have an inspection plate or easily removable filler neck to permit cleaning and inspection of the tank(s) without removal from the bus. The tank(s) shall be baffled internally to prevent fuel-sloshing noise regardless of fill level. The baffles or fuel pickup location shall assure continuous full power operation on a 6 percent upgrade for 15 minutes starting with no more than 25 gallons of fuel over the unusable amount in the tank(s). The bus shall operate at idle on a 6 percent downgrade for 30 minutes starting with no more than 10 gallons of fuel over the unusable amount in the tank(s). All systems/engines on all model buses will be compatible with all blends of Bio-Diesel fuel based on manufacturer's recommendations.

N.28.1.3. The materials used in mounting shall withstand the adverse effects of road salts, fuel oils, and accumulation of ice and snow for the life of the bus.

N.28.2. LABELING

N.28.2.1. The capacity, date of manufacture, manufacturer name, location of manufacture, and certification of compliance to Federal Motor Carrier Safety Regulation shall be permanently marked on the fuel tank(s). The markings shall be readily visible and shall not be covered with an undercoating material.

N.28.3. FUEL FILLER

N.28.3.1. The fuel filler shall be located 7 to 38 feet (on a 30 foot bus) behind the centerline on the street side of the bus. The filler cap shall be retained to prevent loss and shall be recessed into the body.

N.28.3.2. The fill and vent receptacles shall be located within an enclosure on the left side of the bus. The access door shall be sized to allow full viewing of gauges, ease of hookups and maneuver of fuel nozzle.

N.28.3.3. 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.

N.29. EMISSIONS AND EXHAUST

N.29.1. EXHAUST EMISSIONS

N.29.1.1. The engine and related systems shall meet all applicable emission and engine design guidelines and standards.

N.29.2. EXHAUST SYSTEM

N.29.2.1. Exhaust gases and waste heat shall be discharged from the roadside rear corner of the roof. The exhaust pipe shall be of sufficient height to prevent exhaust gases and waste heat from discoloring or causing heat deformation to the bus. 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. An exhaust after-treatment system will be provided to ensure compliance to all applicable EPA regulations in effect.

N.29.3. DIESEL EXHAUST FLUID (DEF) INJECTION

N.29.3.1. If required by the engine manufacturer to meet NOx level requirements specified by EPA, a DEF injection system will be provided. The DEF system will minimally include a tank, an injector, a pump, an ECM and a selective catalytic converter. The tanks shall be designed to store DEF in the operating environment described in the "Operating Environment" section. The DEF fluid lines shall be designed to prevent the DEF from freezing. The DEF injection system shall not be damaged from a cold soak at 10°F.

N.29.4. PARTICULATE AFTER-TREATMENT

N.29.4.1. 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.

N.29.5. FIRE SUPPRESSION SYSTEM

N.29.5.1. An Amerex V25 automatic fire suppression system will be provided to ensure adequate coverage in the engine compartment and main electrical box areas should a fire event happens. The system shall incorporate a telltale, dash mounted operator warning light, audible indicator and switch, automatically shutting off all fans and climate control systems in the event of discharge.

N.29.5.2. The system installed shall be certified by the vehicle manufacturer that it is suitable for use in the proposed vehicle in case the unit fails to function during an on board vehicle event or fire. Each vehicle shall be delivered with a certificate identifying the vehicle identification number (VIN) for which it applies. The system shall be U.L., U.C.L., and F.M. listed and meet all D.O.T. and F.M.V.S.S. and be certified by the vehicle and equipment manufacturer.

N.29.5.3. NOTE: As an option, a delete for the Fire Suppression for the diesel bus will be included.

N.30. STRUCTURE

N.30.1. DESIGN

N.30.1.1. The structure of the bus shall be designed to withstand the transit service conditions typical of an urban 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. The design operating profile specified by the Agency shall be considered for this purpose.

N.30.2. ALTOONA TESTING

N.30.2.1. 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 any and all such failures will not occur shall be submitted to the Agency.

N.30.3. ALTOONA TEST REPORT PROVIDED TO AGENCY PRIOR TO START OF BUS PRODUCTION

N.30.3.1. Prior to the start of any bus manufacturing or assembly processes, the structure of the proposed bus model shall have undergone appropriate structural testing and/or analysis, including the complete regimen of FTA required Altoona tests. Prior to assembly of the first bus, the OEM shall provide the Agency with a completed report of Altoona testing for the proposed bus model along with a plan of corrective action to address deficiencies, breakdowns and other issues identified during Altoona testing. The bus model tested shall match the bus model proposed for procurement, including structure, axles and drive-train. Base model and partial Altoona test reports are acceptable when the combination of these tests adequately represents the proposed bus model.

N.31. STRUCTURAL VALIDATION BASELINE

N.31.1. STRUCTURAL ANALYSIS

N.31.1.1. The structure of the bus shall have undergone appropriate structural testing and/or analysis. At minimum, appropriate structural testing and analysis shall include Altoona testing or Finite Element Analysis (FEA).

N.31.2. DISTORTION

N.31.2.1. 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 inch curb or in a 6 inch deep hole.

N.31.3. RESONANCE AND VIBRATION

N.31.3.1. All structure, body and panel-bending mode frequencies, including vertical, lateral and torsional modes, shall be sufficiently removed from all primary excitation frequencies to minimize audible, visible or sensible RESONANT VIBRATIONS DURING NORMAL SERVICE.

N.31.4. ENGINE COMPARTMENT BULKHEADS

N.31.4.1. 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. 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.

N.31.4.2. 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.

N.31.5. CRASHWORTHINESS

N.31.5.1. The bus body and roof structure shall withstand a static load equal to 150 percent of the curb weight evenly distributed on the roof with no more than a 6 inch reduction in any interior dimension. Windows shall remain in place and shall not open under such a load. These requirements must be met without the roof-mounted equipment installed.

N.31.5.2. The bus shall withstand a 25 mph impact by a 4000-pound automobile at any side, excluding doorways, along either side of the bus with no more than 3 inches of permanent structural deformation at seated passenger hip height. This impact shall not result in sharp edges or protrusions in the bus interior.

N.31.5.3. Exterior panels below 35 inches from ground level shall withstand a static load of 2000 lbs. applied perpendicular to the bus by a pad no larger than 5 sq. inches. This load shall not result in deformation that prevents installation of new exterior panels to restore the original appearance of the bus. The transit bus, at GVWR and under static conditions, shall not exhibit deformation or deflection that impairs operation of doors, windows, or other mechanical elements. Static conditions include the vehicle at rest with any one wheel or dual set of wheels on a 6 inch curb or in a 6 inch deep hole.

N.31.5.4. The sidewall structure shall be capable of withstanding impacts of 200 foot pounds of energy from a steel faced spherical missile no less than 9 inches in diameter and of a 500 pound load applied anywhere along their length by a rigid plate 1 foot in length with no visible damage to the supporting structure. A damaged portion of the supporting structure shall be replaceable without requiring removal or replacement of the entire structure.

N.31.5.5. The bus chassis shall be stainless steel with an integrated side impact barrier to provide additional safety to the passengers in the low floor area.

N.31.6. CORROSION

N.31.6.1. 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 Agency's use of proper cleaning and neutralizing agents.

N.31.6.2. 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.

N.31.7. CORROSION-RESISTANCE REQUIREMENTS FOR EXPOSED AND INTERIOR SURFACES OF TUBING BELOW LOWER WINDOW LEVEL

N.31.7.1. All exposed surfaces and the interior surfaces of tubing and other enclosed members below lower window line shall be corrosion resistant through application of a corrosion protection system.

N.31.8. TOWING

N.31.8.1. Each towing device shall withstand, without permanent deformation, tension loads up to 1.2 times the curb weight of the bus within 20 degrees of the longitudinal axis of the bus. If applicable, the rear towing device(s) shall not provide a foothold for unauthorized riders. The method of attaching the towing device shall not require the removal, or disconnection, of front suspension or steering components. Removal of the bike rack is permitted for attachment of towing devices.

N.31.8.2. A plug connector permanently mounted at the front of the bus shall provide for bus tail lamp, marker, stop and turn signal lamp operation as controlled from the towing vehicle. The connector shall include a spring-loaded dust- and water-resistant cap. Shop air connectors shall be provided at the front and rear of the bus and shall be capable of supplying all pneumatic systems of the bus with externally sourced compressed air. The location of these shop air connectors shall facilitate towing operations.

N.31.9. LIFTED (SUPPORTED) FRONT AXLE AND FLAT TOWING CAPABILITY

N.31.9.1. The front towing devices shall allow attachment of adapters for a rigid tow bar and shall permit the lifting of the bus until the front wheels are clear off the ground in order to position the bus on the towing equipment by the front wheels. These devices shall also permit common flat towing.

N.31.9.2. Two rear recovery devices/tie downs shall permit lifting and towing of the bus for a short distance, such as in cases of an emergency, to allow access to provisions for front towing of bus. The method of

attaching the tow bar or adapter shall require the specific approval of the Agency. 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 hook with a 1 inch throat.

N.31.10. JACKING

N.31.11. It shall be possible to safely jack up the bus, at curb weight, with a common 10-ton floor jack with or without special adapter, when a tire or dual set is completely flat and the bus is on a level, hard surface, without crawling under any portion of the bus. Jacking from a single point shall permit raising the bus sufficiently high to remove and reinstall a wheel and tire assembly. Jacking pads located on the axle or suspension near the wheels shall permit easy and safe jacking with the flat tire or dual set on a 6 inch high run-up block not wider than a single tire. The bus shall withstand such jacking at any one or any combination of wheel locations without permanent deformation or damage.

N.31.12. HOISTING

N.31.12.1. 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.

N.32. FLOOR

N.32.1. DESIGN

N.32.1.1. 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 1/4 inch 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.

N.32.2. STRENGTH

N.32.2.1. 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 bus. 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.

N.32.2.2. The floor deck shall be reinforced as needed to support passenger loads. At GVWR, the floor shall have an elastic deflection of no more than 0.60 inches from the normal plane. The floor shall withstand the application of 2.5 times gross load weight without permanent detrimental deformation. The floor, with coverings applied, shall withstand a static load of at least 150 lbs. applied through the flat end of a 1/2 inch diameter rod, with 1/32 inch radius, without permanent visible deformation.

N.32.3. CONSTRUCTION

N.32.3.1. 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.

N.32.4. PRESSURE-PRESERVED PLYWOOD PANEL

N.32.4.1. Plywood shall be certified at the time of manufacturing by an industry-approved third-party inspection agency 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. Plywood shall be pressure-treated with a preservative chemical and process such as alkaline copper quaternary (ACQ) 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 15 percent.

N.33. PLATFORMS

N.33.1. OPERATOR'S AREA

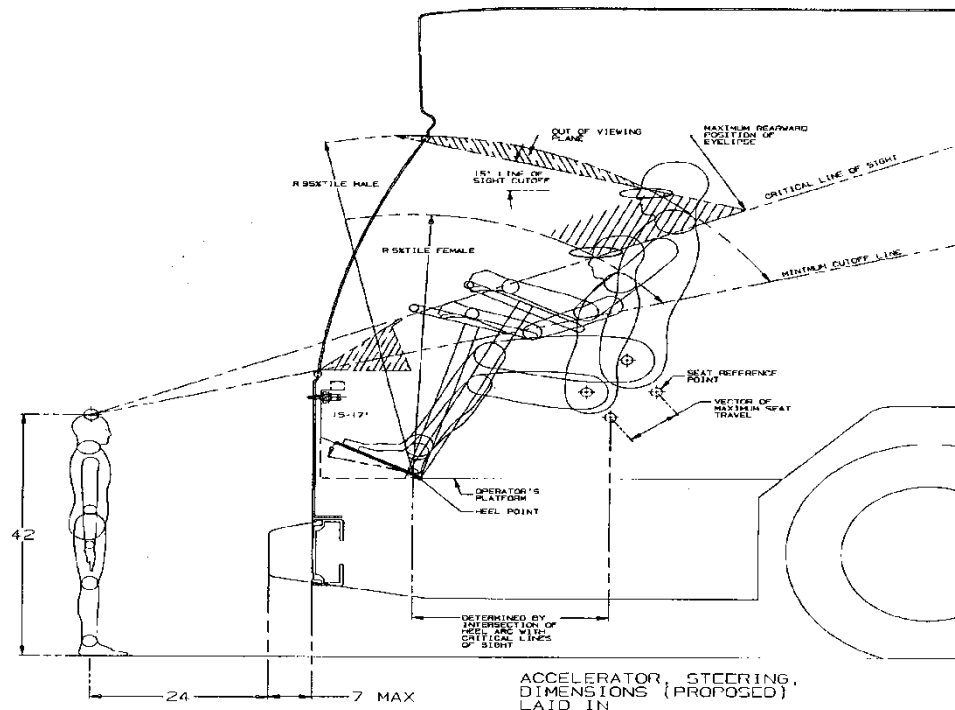
N.33.1.1. The covering of platform surfaces and risers, except where otherwise indicated, shall be the same material as specified for floor covering. Trim shall be provided along top edges of platforms unless integral nosing is provided.

N.33.2. OPERATOR'S PLATFORM

N.33.2.1. The operator's platform shall be of a height such that, in a seated position, the operator can see an object located at an elevation of 42 inches above the road surface, 24 inches from the leading edge of the bumper. Notwithstanding this requirement, the platform height shall not position the operator such that the operator's vertical upward view is less than 15 degrees. A warning decal or sign shall be provided to alert the operator to the change in floor level. Figure 3 illustrates a means by which the platform height can be determined, using the critical line of sight.

N.33.2.2. FIGURE 3

N.33.2.2.1. Determining Platform Height



N.33.3. FAREBOX

N.33.3.1. Farebox placement should minimize impact to passenger access and minimize interference with the operator's line of sight.

N.33.4. REAR STEP AREA TO REAR AREA

N.33.4.1. If the vehicle is of a bi-level floor design, 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 inches 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.

N.34. WHEEL HOUSING

N.34.1. DESIGN AND CONSTRUCTION

N.34.1.1. 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 stainless steel.

N.34.1.2. 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 shall be adequately reinforced where seat pedestals are installed. Wheel housings shall have sufficient sound insulation to minimize tire and road noise and meet all noise requirements of this specification.

- N.34.1.3.** 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, or its use as a luggage rack.
- N.34.1.4.** 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 inches above floor shall be equipped with scuff-resistant coating or stainless steel trim.
- N.34.1.5.** Wheel housings, as installed and trimmed, shall withstand impacts of a 2 inch steel ball with at least 200 ft.-lbs. of energy without penetration.
- N.34.1.6.** 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 inches higher than the wheel well housing.

N.35. CHASSIS

N.35.1. SUSPENSION

N.35.1.1. GENERAL REQUIREMENTS

N.35.1.1.1. The front, 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.

N.35.1.2. ALIGNMENT

N.35.1.2.1. All axles should be properly aligned so the vehicle tracks accurately within the size and geometry of the vehicle.

N.35.2. SPRINGS AND SHOCK ABSORBERS

N.35.2.1. SUSPENSION TRAVEL

N.35.2.1.1. The suspension system shall permit a minimum wheel travel of 2.75 inch jounce-upward travel of a wheel when the bus hits a bump (higher than street surface), and 2.75 inch rebound-downward travel when the bus comes off a bump and the wheels fall relative to the body. Urethane bumpers shall be provided at the limit of jounce travel. Rebound travel may be limited by urethane 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 1/2 inch at any point from the height required. The safe operation of a bus cannot be impacted by ride height up to 1 inch from design normal ride height

N.35.2.2. DAMPING

N.35.2.2.1. 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 bus motion to three cycles or less after hitting road perturbations. The shock absorber bushing shall be made of urethane material that will last the life of the shock absorber. The damper shall incorporate a secondary hydraulic rebound stop.

N.35.2.3. LUBRICATION

N.35.2.3.1. STANDARD GREASE FITTINGS

N.35.2.3.1.1. 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.

N.35.2.4. KNEELING

N.35.2.4.1. A kneeling system shall lower the entrance(s) of the bus a minimum of 2.0 inches during loading or unloading operations regardless of load up to GVWR, measured at the longitudinal centerline of the entrance door(s) by the operator. The kneeling control shall provide the following functions:

N.35.2.4.1.1. Downward control must be held to allow downward kneeling movement.

N.35.2.4.1.2. Release of the control during downward movement must completely stop the lowering motion and hold the height of the bus at that position.

N.35.2.4.1.3. Upward control actuation must allow the bus to return to normal floor height without the operator having to hold the control.

N.35.2.4.2. 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 inches 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.

N.35.2.5. An indicator visible to the operator shall be illuminated until the bus is raised to a height adequate for safe street travel. An audible warning alarm will sound simultaneously with the operation of the kneeler to alert passengers and bystanders. A warning light mounted near the curbside of the front door, a minimum 2.5 inches 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.

N.36. WHEELS AND TIRES

N.36.1. WHEELS

N.36.1.1. All wheels shall be interchangeable and shall be removable without a puller. 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.

N.36.2. PAINTED STEEL

N.36.2.1. Wheels and rims shall be hub-piloted steel with white powder coat (maximum 3.5 mil) and shall resist rim flange wear.

N.36.3. TIRES

N.36.3.1. 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. 30' buses will have 275/70/22.5 tires.

N.37. STEERING

N.37.1. 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.

N.38. STEERING AXLE

N.38.1. SOLID BEAM AXLE AND GREASE-TYPE FRONT BEARINGS AND SEALS

N.38.1.1. The front axle shall be a Meritor solid beam, non-driving with a load rating sufficient for the bus loaded to GVWR and shall be equipped with oil type front wheel bearings and seals. All friction points on the front axle shall be equipped with replaceable bushings or inserts and lubrication fittings easily accessible from a pit or hoist.

N.38.1.2. 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.

N.38.1.3. The steering geometry of the outside (frontlock) wheel shall be within 2 degrees of true Ackerman up to 50 percent lock measured at the inside (backlock) wheel. The steering geometry shall be within 3 degrees of true Ackerman for the remaining 100 percent lock measured at the inside (backlock) wheel.

N.39. STEERING WHEEL

N.39.1. TURNING EFFORT

N.39.1.1. 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.

N.39.1.2. Under these conditions, the torque required to turn the steering wheel 10 degrees 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.

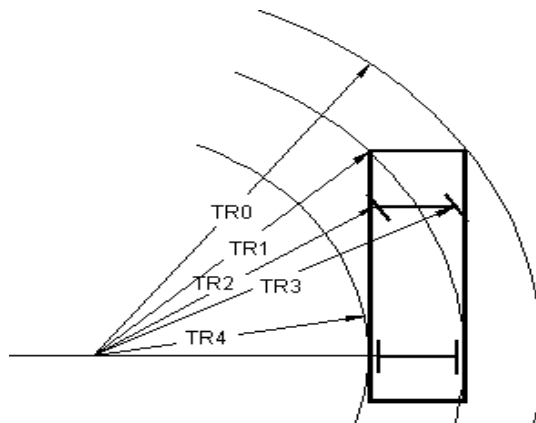
N.39.1.3. Power steering failure shall not result in loss of steering control. With the bus in operation, the steering effort shall not exceed 55 lbs. at the steering wheel rim, and perceived free play in the steering system shall not materially increase as a result of power assist failure. Gearing shall require no more than seven turns of the steering wheel lock-to-lock.

N.39.1.4. Caster angle shall be selected to provide a tendency for the return of the front wheels to the straight position with minimal assistance from the operator.

N.39.1.5. TURNING RADIUS

Bus Length	Maximum Turning Radius
30 ft.	31 ft. (TR0)

N.39.1.6. FIGURE 4 TURNING RADIUS



N.39.2. STEERING WHEEL, GENERAL

N.39.2.1. The steering wheel diameter shall be approximately 18-20 inches; the rim diameter shall be 7/8 inch to 1-1/4 inches and shaped for firm grip with comfort for long periods of time.

N.39.2.2. 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.

N.39.3. STEERING COLUMN TILT

N.39.3.1. The steering column shall have full tilt capability with an adjustment range of no less than 40 degrees from the vertical and easily adjustable by the operator.

N.39.4. STEERING WHEEL TELESCOPIC ADJUSTMENT

N.39.4.1. The steering wheel shall have full telescoping capability and have a minimum telescopic range of 1.8 inches and a minimum low-end adjustment of 28 inches, measured from the top of the steering wheel rim in the horizontal position to the cab floor at the heel point.

N.39.5. DRIVE AXLE

N.39.5.1. The bus shall be driven by a heavy-duty Meritor single reduction 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.

N.39.5.2. The drive shaft shall be guarded to prevent hitting any critical systems, including brake lines, bus floor or the ground, in the event of a tube or universal joint failure.

N.40. BRAKES

N.40.1. SERVICE BRAKE

N.40.1.1. Brakes shall be self-adjusting. Brake wear indicators (visible brake sensors) shall be provided on exposed push rods.

N.40.2. ACTUATION

N.40.2.1. Air-Actuated Brakes

N.40.2.1.1. 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 70 lbs. at a point 7 inches above the heel point of the pedal to achieve maximum braking. The heel point is the location of the operator's heel when his or her foot is rested flat on the pedal and the heel is touching the floor or heel pad of the pedal. The ECU for the ABS system shall be protected, yet in an accessible location to allow for ease of service.

N.40.2.1.2. The total braking effort shall be distributed between all wheels in such a ratio as to ensure equal friction material wear rate at all wheel locations. Manufacturer shall demonstrate compliance by providing a copy of a thermo dynamic brake balance test upon request.

N.40.2.2. Automatic Traction Control - Microprocessor controlled automatic traction control (ATC) shall be provided.

N.40.3. FRICTION MATERIAL

N.40.3.1. The brake linings shall be made of non-asbestos material. In order to aid maintenance personnel in determining extent of wear, a provision such as a scribe line or chamfer indicating the thickness at which replacement becomes necessary shall be provided on each brake lining. The complete brake lining wear indicator shall be clearly visible from the hoist or pit without removing backing plates.

N.40.4. HUBS

N.40.4.1. 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.

N.40.5. DRUM BRAKES

N.40.5.1. The service brakes shall be two (2) shoe, internal-expanding, air operated S-cam type brakes at each wheel. The brakes must be capable of stopping the vehicle in accordance with the performance requirements of State and Federal regulations in effect at the time of manufacture. Parking brake shall be spring applied, air released chamber mounted on the rear axle assembly. All brake linings shall be of non-asbestos material three-quarters (3/4) inch thick. Brake shoe return springs shall be the heaviest available.

N.40.5.2. Spring brake chambers shall be provided, and shall comply with requirements of State and Federal regulations FMVSS 121 in effect at time of manufacturer on the front and rear of these buses. At a minimum the front chamber shall be size 24 and the rear shall be size 36. The emergency air tank shall be piped to a service valve at the left front corner of the bus to fill the tank for towing the vehicle.

N.40.5.3. Brake shoe effective area shall total a minimum of 932 square inches. Brake shoes shall be operated by cams which in return are operated by automatic slack adjusters. Slack adjusters shall be equipped with grease fittings and be capable of automatic adjustments throughout the life of the lining and drum assembly. Brake lines shall be installed so that the possibility of damage is minimized.

N.40.5.4. Lines and hoses shall be clamped and supported in a manner which minimizes long, unsupported hose lengths and precludes rubbing against any part of the bus.

N.40.5.5. The parking and emergency brakes shall be with a 40 PSI setting, controlled by a manual valve located convenient to the operator for safe, convenient access. Valve operation shall be "pull to set brakes" and "push to release" type brake system.

N.40.5.6. This brake shall have stopping ability that is equal to or better than required by Federal and State regulations. It shall automatically apply if air system pressure falls below half the normal value or such other value as is recommended by the manufacturer. This parking/emergency brake shall be of spring brake design. The manufacturer will provide in their proposal a statement of brake efficiency at empty and loaded capacity.

N.40.5.7. NOTE: As an option, a brake stroke and wear monitoring system shall be made available and priced separately.

N.40.6. PARKING/EMERGENCY BRAKE

N.40.6.1. Air Brakes - 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.

N.41. INTERLOCKS

N.41.1. PASSENGER DOOR INTERLOCKS

N.41.1.1. To prevent opening mid and rear passenger doors while the bus is in motion, a speed sensor shall be integrated with the door controls to prevent the mid/rear doors from being enabled or opened unless the bus speed is less than 2 mph.

N.41.1.2. 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 operator's door control is moved to a mid/rear door enable or open position, or a mid or rear door panel is opened more than 3 inches 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.

- N.41.1.3.** All door systems employing brake and accelerator interlocks shall be supplied with supporting failure mode effects analysis documentation (FEMA), 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 and unsecured condition, unless the door master switch has been actuated to intentionally release the interlocks.
- N.41.1.4.** 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 whenever front doors are open, selection to be made by Procuring Agency at pre-production meeting.

N.42. PNEUMATIC SYSTEM

N.42.1. GENERAL

- N.42.1.1.** 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.
- N.42.1.2.** 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.

N.42.2. AIR COMPRESSOR

- N.42.2.1.** An engine-driven air compressor shall be sized to charge the air system from 40 psi to the governor cut-off pressure in less than four (4) minutes while not exceeding the fast idle speed setting of the engine.

N.42.3. AIR LINES AND FITTINGS

- N.42.3.1.** 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:

N.42.3.1.1. **Green** Indicates primary brakes and supply

N.42.3.1.2. **Red** Indicates secondary brakes

N.42.3.1.3. **Brown** Indicates parking brake

N.42.3.1.4. **Yellow** Indicates compressor governor signal

N.42.3.1.5. **Black** Indicates accessories

N.42.3.1.6. **Blue** Indicates suspension

- N.42.3.2.** 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 inch intervals or less.

- N.42.3.3.** The compressor discharge line between powerplant 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.

- N.42.3.4.** 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.

N.42.4. AIR RESERVOIRS

- N.42.4.1.** All air reservoirs shall meet the requirements of FMVSS Standard 121 and SAE Standard J10. 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.

N.42.5. AIR SYSTEM DRYER

N.42.5.1. 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 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.

N.43. ELECTRICAL, ELECTRONIC AND DATA COMMUNICATION SYSTEMS

N.43.1. OVERVIEW

N.43.1.1. 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).

N.43.1.2. Electronic devices are individual systems and components that process and store data, integrate electronic information or perform other specific functions.

N.43.1.3. 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.

N.43.1.4. Information level systems that require vehicle information for their operations or provide information shall adhere to J1939 data standard.

N.43.1.5. Data communications systems are divided into three levels to reflect the use of multiple data networks:

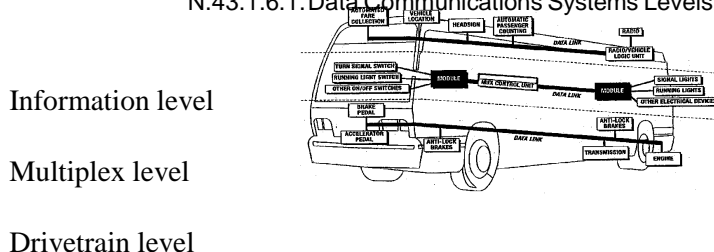
N.43.1.5.1. Drivetrain level: Components related to the drivetrain including the propulsion system components (engine, transmission and hybrid units), and anti-lock braking system (ABS), which may include traction control.

N.43.1.5.2. Information level: Components whose primary function is the collection, control or display of data that is not necessary to the safe drivability of the vehicle (i.e., the vehicle will continue to operate when those functions are inoperable). These components typically consist of those required for automatic vehicle location (AVL) systems, destination signs, fare boxes, passenger counters, radio systems, automated voice and signage systems, video surveillance and similar components.

N.43.1.5.3. Multiplex level: Electrical or electronic devices controlled through input/output signals such as discrete, analog and serial data information (i.e., on/off switch inputs, relay or relay control outputs). Multiplexing is used to control components not typically found on the drivetrain or information levels, such as lights; wheelchair lifts; doors; heating, ventilation and air conditioning (HVAC) systems; and gateway devices.

N.43.1.6. FIGURE 5

N.43.1.6.1. Data Communications Systems Levels



N.43.2. MODULAR DESIGN

N.43.2.1. 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 it's interconnect by means of connectors.

N.43.2.2. Powerplant 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.

N.43.3. ENVIRONMENTAL AND MOUNTING REQUIREMENTS

N.43.3.1. 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 SAE J1455.

N.43.3.2. 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 SAE J1113 and UNECE Council Directive 95/54 (R-10).

- N.43.3.3.** The Agency shall follow recommendations from bus manufacturers and subsystem Suppliers regarding methods to prevent damage from voltage spikes generated from welding, jump starts, shorts, etc.
- N.43.3.4.** 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.
- N.43.3.5.** 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.
- N.43.3.6.** All electrical/electronic hardware and its mounting shall comply with the shock and vibration requirements of SAE J1455.
- N.43.3.7.** Electrical cables and wiring shall be adequate for all anticipated loads. The main wiring harness shall, to the maximum extent practical, be installed inside the bus body passenger compartment and, where that is not practical, shall be secured in frame rail raceways. The Contractor shall route and secure all wiring so that it does not rub anywhere. Routing of step well light wiring shall be such as to avoid rubbing door posts, etc. When wires or looms pass through metal, the wires shall be protected by a rubber grommet.
- N.43.3.8.** Each electrical panel, i.e. front and exit door panels, battery compartment, and front electrical panel shall provide an explanation of the respective electrical circuits and components contained within and shall be furnished in a silk-screened or water/oil proof diagram on the inside of the door panel.
- N.43.3.9.** All engine compartment wiring and light wiring shall be insulated from the heat and be resistant to oil and grease. Electrical equipment, junction boxes and connectors shall not be placed where they are subjected to excessive heat, oil, grease, or road spray. All multiple terminal connectors shall be military (cannon plug) type, fully sealed and protected with a potting compound to prevent outside dirt and corrosives from entering the wiring, connectors, or plugs.
- N.43.3.10.** All main power supply terminals shall be covered with electric post rubber cover.
- N.43.3.11.** All electrical end plugs shall be covered. The wiring harnesses shall incorporate ten percent (10%) spare wires. 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. All cables and harnesses shall be secured to prevent chafing or shorting against each other or any part of the vehicle.
- N.43.3.12.** Clamps shall be rubber or PVC clad aircraft type. Grommets or other protective material shall be installed at points where wiring penetrates metal structures.
- N.43.3.13.** All wiring shall start and end at a junction block or component.
- N.43.3.14.** All inline and bulkhead connectors are to be of the weather pack sealed type.
- N.43.3.15.** Multi-pin connectors shall be protected internally from corrosion with silicone dielectric grease (Dow Corning #4). All circuits except the engine emergency shut-off and speedometer circuits must be protected by reset circuit breakers that clearly indicate their position when tripped. Each breaker must be labeled. Circuit breakers must have plastic dust caps.
- N.43.3.16.** Provide constant power for powering systems, such as but not limited to the fire suppression, radio, farebox, and DC-DC converter that require constant power when battery cutoff switch is off.
- N.43.3.17.** The windshield wiper and headlamps electric circuit shall be protected by modified auto-reset circuit breakers sized to the requirement of the load.
- N.43.3.18.** Rubber Covers shall be provided for all the Electric Posts.
- N.43.3.19.** All junction boxes located in the engine compartment shall be designed to allow thorough steam cleaning of the engine compartment area without intrusion of water.
- N.43.3.20.** Major junction panels shall be readily accessible for maintenance, not located behind or alongside seat or other fixed/semi-fixed obstructions. Access panels and junction box covers shall have seals which will preclude entry of rain, wash water, road debris, etc. All wiring and junction panel terminals shall be numbered and color coded for easy identification. A diagram showing the coding as the bus was built shall be furnished.
- N.43.3.21.** The Contractor shall supply at least two spare circuits in the main harness between the front and rear of the bus. The main harness from the engine compartment shall be equipped with multiple circuit cannon type connectors.

N.43.4. HARDWARE MOUNTING

- N.43.4.1.** 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.
- N.43.4.2.** 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.
- N.43.4.3.** 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.
- N.43.4.4.** All electrical/electronic hardware and its mounting shall comply with the shock and vibration requirements of SAE J1455.

N.44. GENERAL ELECTRICAL REQUIREMENTS

N.44.1. BATTERIES

N.44.1.1. Low-Voltage Batteries (24V)

- N.44.1.1.1.** Four (4) Group 31 twelve volt (12V) lead acid filled thermal battery units, with top studs connectors with minimum 950 cold cranking amps at zero degrees Fahrenheit with a reserve capacity of 425 minutes or greater will be required.

N.44.2. BATTERY CABLES

- N.44.2.1.** The battery terminal ends and cables 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, be flexible and 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 SGT, SGX or GXL and SAE Recommended Practice J541. A wiring diagram will be water proof and mounted to the battery access door.

N.44.3. MASTER BATTERY SWITCH

- N.44.3.1.** A single master switch shall be provided near the battery compartment for the disconnecting of all battery positives (12V and 24V), except for safety devices such as the fire suppression system and other systems as specified. 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 off or are in normal service. The access door shall be labeled "Battery Emergency Shut-Off Switch."
- N.44.3.2.** Turning the master switch off with the powerplant operating 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.

N.44.4. JUMP-START CONNECTOR

- N.44.4.1.** A jump-start connector, red for 24V and blue for 12V, shall be provided at a location determined at the pre-production meeting and shall be equipped with dust cap and adequately protected from moisture, dirt and debris.

N.44.5. BATTERY COMPARTMENT

- N.44.5.1.** The battery compartment must be well-ventilated to prevent hydrogen buildup while protecting the compartment from road spray, water intrusion and de-icing chemicals. Batteries shall be mounted in a stainless steel slide out tray on rollers, with less than 50 lbs. of effort. The battery tray shall have drain holes. The batteries shall not be located in the engine compartment.
- N.44.5.2.** The vehicle shall be equipped with a 12VDC and 24VDC quick disconnect switch (es). The battery compartment door shall conveniently accommodate operation of the 12VDC and 24VDC quick disconnect switch (es).

N.44.6. ALTERNATOR / REGULATOR

- N.44.6.1.** A Niehoff 803 alternator or equivalent shall supply the entire nighttime operating electrical load of the coach while providing at least 20 percent (20%) of its current output for battery charging when the battery is fully discharged.

N.44.7. CIRCUIT PROTECTION

- N.44.7.1.** 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 breakers or

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 Agency mechanic with visible indication of open circuits.

N.44.7.2. The Agency 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. 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.

N.44.8. GROUND

N.44.8.1. 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 four ground ring/spade terminal connections shall be made per ground stud. Electronic equipment requiring an isolated ground to the battery (i.e., electronic ground) shall not be grounded through the chassis.

N.44.9. LOW VOLTAGE/LOW CURRENT WIRING AND TERMINALS

N.44.9.1. All power and ground wiring shall conform to specification requirements of SAE Recommended Practice J1127, J1128 and J1292. Double insulation shall be maintained as close to the junction box, electrical compartment or terminals as possible. The requirement for double insulation shall be met by wrapping the harness with plastic electrical tape or by sheathing all wires and harnesses with non-conductive, rigid or flexible conduit.

N.44.9.2. 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 present in the harness. Kinking, grounding at multiple points, stretching, and exceeding minimum bend radius shall be prevented.

N.44.9.3. 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.

N.44.9.4. 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.

N.44.9.5. 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.

N.44.9.6. 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 watertight 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 either use different inserts or different insert orientations to prevent incorrect connections.

N.44.9.7. 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 inch, 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.

N.44.9.8. Ultra-sonic and T-splices may be used with 7 AWG or smaller wire. When a T-splice is used, it shall meet these additional requirements:

N.44.9.8.1. It shall include a mechanical clamp in addition to solder on the splice.

N.44.9.8.2. The wire shall support no mechanical load in the area of the splice.

N.44.9.8.3. The wire shall be supported to prevent flexing.

N.44.9.9. All splicing shall be staggered in the harness so that no two splices are positioned in the same location within the harness.

N.44.9.10. 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.

N.44.9.11. The instrument panel and wiring shall be easily accessible for service from the operator'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.

N.44.10. ELECTRICAL COMPONENTS

N.44.10.1. 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.

N.44.10.2. 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 and wiper motors). All electric motors shall be easily accessible for servicing.

N.44.11. ELECTRICAL COMPARTMENTS

N.44.11.1. 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.

N.44.11.2. The front compartment shall be completely serviceable from the operator'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.

N.44.12. GENERAL ELECTRONIC REQUIREMENTS

N.44.12.1. 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.

N.44.12.2. 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 50V 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.

N.44.13. WIRING AND TERMINALS

N.44.13.1. Kinking, grounding at multiple points, stretching and reducing the bend radius below the manufacturer's recommended minimum shall not be permitted.

N.44.14. DISCRETE INPUTS/OUTPUTS (I/O)

N.44.14.1. 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.

N.44.15. SHIELDING

N.44.15.1. 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.

N.44.15.2. *NOTE:* A shield grounded at both end forms a ground loop, which can cause intermittent control or faults.

N.44.15.3. 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.

N.44.16. COMMUNICATIONS

N.44.16.1. 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.

N.44.16.2. Communications networks that use power line carriers (e.g., data modulated on a 24V-power line) shall meet the most stringent applicable wiring and terminal specifications.

N.44.17. RADIO FREQUENCY (RF)

N.44.17.1. 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 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.

N.44.18. AUDIO

N.44.18.1. 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.

N.44.19. MULTIPLEXING - GENERAL

N.44.19.1. The Dynex multiplexing system shall 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.

N.44.19.2. Versatility and future expansion shall be provided for by expandable system architecture. The multiplex system shall be capable of accepting new inputs and outputs through the addition of new modules and/or the utilization of existing spare inputs and outputs.

N.44.19.3. All like components in the multiplex system shall be modular and interchangeable with 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.

N.44.19.4. Ten percent (10%) of the total number of inputs and outputs, or at least one each for each voltage type utilized (0V, 12V, 24V) at each module location shall be designated as spares.

N.44.20. DATA COMMUNICATIONS - GENERAL

N.44.20.1. 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 Agency with the following minimum information:

N.44.20.1.1. 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).

N.44.20.1.2. Data definition requirements that ensure access to diagnostic information and performance characteristics.

N.44.20.1.3. The capability and procedures for uploading new application or configuration data.

N.44.20.1.4. Access to revision levels of data, application software and firmware.

N.44.20.1.5. The capability and procedures for uploading new firmware or application software.

N.44.20.1.6. Evidence that applicable data shall be broadcast to the network in an efficient manner such that the overall network integrity is not compromised.

N.44.20.2. Any electronic vehicle components used on a network shall be conformance tested to the corresponding network standard.

N.44.21. DRIVETRAIN LEVEL

N.44.21.1. 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 and/or J1708/J1587 with forward and backward compatibilities or other open protocols.

N.44.22. DIAGNOSTICS, FAULT DETECTION AND DATA ACCESS

N.44.22.1. Drivetrain performance, maintenance and diagnostic data, and other electronic messages shall be formatted and transmitted on the communications networks.

N.44.22.2. 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.

N.44.23. PROGRAMMABILITY (SOFTWARE)

N.44.23.1. The drivetrain level components shall be programmable by the Agency with limitations as specified by the sub-system Supplier.

N.45. MULTIPLEX LEVEL

N.45.1. DATA ACCESS

N.45.1.1. 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 Agency.

N.45.2. DIAGNOSTICS AND FAULT DETECTION

N.45.2.1. 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.

N.45.2.2. 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 handheld 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.

N.45.3. PROGRAMMABILITY (SOFTWARE)

N.45.3.1. 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:

N.45.3.1.1. password protection

N.45.3.1.2. limited distribution of the configuration software

N.45.3.1.3. limited access to the programming tools required to change the software

N.45.3.1.4. hardware protection that prevents undesired changes to the software

N.45.3.2. 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:

N.45.3.2.1. hardware component identification where labels are included on all multiplex hardware to identify components

N.45.3.2.2. hardware series identification where all multiplex hardware displays the current hardware serial number and firmware revision employed by the module

N.45.3.2.3. software revision identification where all copies of the software in service displays the most recent revision number

N.45.3.2.4. a method of determining which version of the software is currently in use in the multiplex system

N.45.4. ELECTRONIC NOISE CONTROL

N.45.4.1. Electrical and electronic sub-systems 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.

N.45.4.2. Electrical and electronic sub-systems on the buses 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, A/C or D/C power lines and RFI/EMI emissions from other vehicles.

N.46. OPERATOR PROVISIONS, CONTROLS AND INSTRUMENTATION

N.46.1. OPERATOR'S AREA CONTROLS

N.46.1.1. GENERAL

N.46.1.1.1. In general when designing the operator's area, it is recommended that SAE J833, "Human Physical Dimensions," be used.

N.46.1.1.2. 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."

N.46.1.2. GLARE

N.46.1.2.1. The operator's work area shall be designed to minimize glare to the extent possible. Objects within and adjacent to this area shall be matte black or dark gray in color wherever possible to reduce the reflection of light onto the windshield. The use of polished metal and light-colored surfaces within and adjacent to the operator's area shall be avoided.

N.47. VISORS/SUNSHADES

N.47.1. FRONT AND SIDE SUN SHADE/VISOR

N.47.1.1. An adjustable roller type sunscreen shall be provided over the operator's windshield and/or the operator's side window. The sunscreen shall be capable of being lowered to the midpoint of the operator's window. When deployed, the screen shall be secure, stable and shall not rattle, sway or intrude into the operator's field of view due to the motion of the bus or as a result of air movement. Once lowered, the screen shall remain in the lowered position until returned to the stowed position by the operator. Sunscreen shall be shaped to minimize light leakage between the visor and windshield pillars to the extent possible.

N.47.1.2. Visors shall store out of the way and shall not obstruct airflow from the climate control system or interfere with other equipment, such as the radio handset or the destination control. Deployment of the visors shall not restrict vision of the rearview mirrors. Visor adjustments shall be made easily by hand with positive locking and releasing devices and shall not be subject to damage by over-tightening. Sun visor construction and materials shall be strong enough to resist breakage during adjustments.

N.47.2. OPERATOR'S CONTROLS

N.47.2.1. 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.

N.47.2.2. 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.

N.47.2.3. 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.

N.47.3. NORMAL BUS OPERATION INSTRUMENTATION AND CONTROLS

N.47.3.1. 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.

N.47.3.2. 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.

N.47.3.3. 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.

N.47.3.4. 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.

N.47.3.5. Consideration shall be provided for future additions of spare indicators as the capability of onboard diagnostic systems improves. Blank spaces shall contain LEDs.

N.47.3.6. TABLE 6

N.47.3.6.1. 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
HVAC	Switch or switches to control HVAC	Upper Sawthooth	Permits selection of passenger ventilation: off, cool, heat, low fan, high fan or full auto with on/off only	
Operator'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	Right Side of Steering Wheel	Permits kneeling activation and raise and normal at front door remote location	Amber or red dash indicator. Ext alarm and Amber light
Driver's Seat Alarm	Pressure switch	Seat Wiring	Activate an audible alarm If the door is open the bus in gear and or park brake not set.	Red Light Blinking
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 operator to override activation of rear door passenger tape switches	
Engine shutdown override	Momentary switch with operation protection	Side console	Permits operator 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 operator to override and manually discharge fire suppression system	Red light
Mobile data terminal	Mobile data terminal bus operator interface panel	Above right dash wing	Facilitates operator 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 operator 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 operator to manually activate public address microphone	
Low profile microphone	Low-profile discrete Mounting	Steering column	Permits operator to make announcements with both hands on the wheel and focusing on road conditions	
High beam	Detented push button	In approved location	Permits operator to toggle between low and high beam	Blue light
Parking brake	Pneumatic PPV	Side console or Dash left wing	Permits operator to apply and release parking brake	Red light
Park brake release	Pneumatic PPV	Vertical side of the side console or dash center	Permits operator 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 operator override to disable door and brake/throttle interlock	Red light
Warning interlocks deactivated	Red indicator light	Dash panel center	Illuminates to warn drive that interlocks have been deactivated.	Red light
Retarder disable	Multi-pole switch detented	Within reach of Operator or approved location	Permits operator override to disable brake retardation/regeneration	Red light
Alarm acknowledge	Push button momentary	Approved location	Permits operator to acknowledge alarm condition	
Rear door passenger sensor disable	Multi-pole toggle, detented	In sign compartment or Operator's barrier compartment	Permits operator to override rear door passenger sensing system	

Indicator / alarm test button	Momentary switch or programming ¹	Dash center panel	Permits operator to activate test of sentry, indicators and audible alarms	All visuals and audibles
Auxiliary power	110-volt 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	Bus operator display	Property specific or dash center	Indication of fire detection activation by zone/location	Buzzer and red light
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 operator'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 operator'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 operator'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	
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

N.47.3.6.2. Indicate area by drawing. Break up switches control from indicator lights.

N.47.4. OPERATOR FOOT CONTROLS

N.47.4.1. Accelerator and brake pedals shall be designed for ankle motion. Foot surfaces of the pedals shall be faced with wear-resistant, nonskid, replaceable material.

N.47.5. PEDAL ANGLE

N.47.5.1. 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 degrees at the point of initiation of contact and extend downward to an angle of 10 to 18 degrees at full throttle.

N.47.5.2. 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.

N.47.6. PEDAL DIMENSIONS AND POSITION

N.47.6.1. The floor-mounted accelerator pedal shall be 10 to 12 inches long and 3 to 4 inches wide. Clearance around the pedal must allow for no interference precluding operation.

N.48. OPERATOR FOOT SWITCHES

N.48.1. FLOOR-MOUNTED FOOT CONTROL PLATFORM

N.48.1.1. The angle of the turn signal platform shall be determined from a horizontal plane, regardless of the slope of the cab floor. The turn signal platform shall be angled at a minimum of 10 degrees and a maximum of 37 degrees. It shall be located no closer to the seat front than the heel point of the accelerator pedal.

N.48.2. TURN SIGNAL CONTROLS

N.48.2.1. Turn signal controls shall be floor-mounted, foot-controlled, water-resistant, heavy-duty, momentary contact switches.

N.48.3. FOOT SWITCH CONTROL

N.48.3.1. The control switches for the turn signals shall be mounted on an inclined, floor-mounted stainless steel enclosure or metal plate mounted to an incline integrated into the operator's platform, 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. The inclined mounting surface shall be skid-resistant. All other signals, including high beam and public address system shall be in approved location.

- N.48.4.** The foot switches shall be UL-listed, heavy-duty type, of a rugged, corrosion-resistant metal construction. The foot switches for the directionals shall be momentary type, while those for the PA system and the high beam shall be latching type. The spacing of the switches shall be such that inadvertent simultaneous deflection of switches is prevented.

N.49. OPERATOR'S AMENITIES

N.49.1. COAT HOOK

- N.49.1.1.** A hook and tie-back loop shall be provided to secure the operator's coat. It shall be mounted above and to the left rear of the operator's head level behind the operator's seat.

N.50. WINDSHIELD WIPERS AND WASHERS

N.50.1. WINDSHIELD WIPERS

- N.50.1.1.** 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. Electric wipers will be used.

N.50.2. INTERMITTENT WIPER WITH VARIABLE CONTROL

- N.50.2.1.** A variable-speed feature shall be provided to allow adjustment of wiper speed for each side of the windshield between approximately five (5) and twenty-five (25) cycles per minute.

N.50.3. NON-SYNCHRONIZED WIPERS

- N.50.3.1.** For non-synchronized wipers, separate controls for each side shall be supplied.

N.50.4. WINDSHIELD WASHERS

- N.50.4.1.** The windshield washer system, when used with the wipers, shall deposit washing fluid evenly and completely wet the entire wiped area.

- N.50.4.2.** The windshield washer system shall have a minimum 3-gallon reservoir, located for easy refilling from outside of the bus. Reservoir pumps, lines and fittings shall be corrosion-resistant and must include a means to determine fluid level.

N.51. OPERATOR'S SEAT

N.51.1. DIMENSIONS

- N.51.1.1.** The Operator'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.

- N.51.1.2.** The seat like a Recaro Ergo Metro with a two point seat belt.

- N.51.1.3.** An operator's seat alarm will be installed to indicate if the vehicle is in gear and or the park brake not set an audible alarm will sound.

N.51.1.4. OPERATOR'S SEAT

N.51.1.4.1. Head rest

N.51.1.4.2. Seat back

N.51.1.4.3. Arm rest

N.51.1.4.4. Seat belt

N.51.1.4.5. Seat base

N.51.1.4.6. Seat back lumbar support seat pan

N.51.2. SEAT PAN CUSHION LENGHT

- N.51.2.1.** 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 inches at its minimum length and no more than 20.5 inches at its maximum length.

N.51.3. SEAT PAN CUSHION HEIGHT DIMENSIONS

N.51.3.1. Measurement shall be from the cab floor to the top of the level seat at its center midpoint. The seat shall adjust in height from a minimum of 14 inches, with a minimum 6 inches vertical range of adjustment.

N.51.4. SEAT PAN CUSHION SLOPE

N.51.4.1. Measurement is the slope of the plane created by connecting the two high points of the seat, one at the rear of the seat at its intersection with the seat back and the other at the front of the seat just before it waterfalls downward at the edge. The slope can be measured using an inclinometer and shall be stated in degrees of incline relative to the horizontal plane (0 degrees). The seat pan shall adjust in its slope from no less than plus 12 degrees (rearward "bucket seat" incline), to no less than minus 5 degrees (forward slope).

N.51.5. SEAT BASE FORE/AFT ADJUSTMENT

N.51.5.1. Measurement is the horizontal distance from the heel point to the front edge of the seat. The minimum and maximum distances shall be measured from the front edge of the seat when it is adjusted to its minimum seat pan depth (approximately 15 inches). On all low-floor buses, the seat-base shall travel horizontally a minimum of 9 inches. It shall adjust no closer to the heel point than 6 inches.

N.51.6. SEAT PAN CUSHION WIDTH

N.51.6.1. Measurement is the horizontal distance across the seat cushion. The seat pan cushion shall be 17 to 21 inches across at the front edge of the seat cushion and 20 to 23 inches across at the side bolsters.

N.51.7. SEAT SUSPENSION

N.51.7.1. The operator'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.

N.51.7.2. Rubber snubbers shall be provided to prevent metal-to-metal contact.

N.51.8. SEAT BACK WIDTH

N.51.8.1. 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 inches. Seat back will include dual recliner gears on both sides of the seat.

N.51.9. SEAT BACK LUMBAR SUPPORT

N.51.9.1. 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 inches.

N.51.10. SEAT BACK ANGLE ADJUSTMENT

N.51.10.1. The seat back angle shall be measured relative to a level seat pan, where 90 degrees is the upright position and 90 degrees-plus represents the amount of recline.

N.51.10.2. The seat back shall adjust in angle from a minimum of no more than 90 degrees (upright) to at least 105 degrees (reclined), with infinite adjustment in between.

N.51.11. SEAT BELT

N.51.11.1. The belt assembly should be an auto-locking retractor (ALR) lap seat belt only. All seat belts should be stored in automatic retractors. The belts shall be mounted to the seat frame so that the operator may adjust the seat without resetting the seat belt.

N.51.11.2. The seat and seat belt assemblies as installed in the bus shall withstand static horizontal forces as required in FMVSS 207 and 210. Seatbelt webbing shall be black in color.

N.51.12. SEAT CONTROL LOCATIONS

N.51.12.1. While seated, the operator shall be able to make seat adjustments by hand without complexity, excessive effort or being pinched. Adjustment mechanisms shall hold the adjustments and shall not be subject to inadvertent changes.

N.51.13. SEAT STRUCTURE AND MATERIALS

N.51.13.1. CUSHIONS

N.51.13.1.1. Cushions shall be fully padded with at least 3 inches of materials in the seating areas at the bottom and back.

N.51.13.2. CUSHION MATERIALS

N.51.13.2.1. All materials used on the seat assembly, passenger and operator's seat shall meet the flammability requirements of the FMVSS #302. Proof of Compliance must be submitted with proposals.

N.51.14. Pedestal

N.51.14.1. Exposed portions of frame and hardware shall be stainless steel or chrome plated.

N.52. MIRRORS

N.52.1. EXTERIOR MIRRORS

N.52.1.1. Exterior mirrors like Lucerix (Metagal) 8" x 15" 2-piece flat and convex. Mirrors or B&R 10" x 11" 2-piece flat and convex, heated and remote w/ stainless steel and cast aluminum arms shall be remote controlled motorized with black powder coated stainless steel arms that return to original position when moved. Left mirror shall be mounted near the front or upper edge of the operator's window. Right mirror shall be viewed through the upper right corner of windshield and mounted so as to provide maximum practical clearance to the ground. Mirrors must fold out of way of automatic washer. Metal mirror parts to be chrome plated or stainless steel. Exterior mirrors must utilize a "quick disconnect" for electrical wiring or approved equal.

N.52.2. INTERIOR MIRRORS

N.52.2.1. Mirrors shall be provided for the operator to observe passengers throughout the bus without leaving the seat and without shoulder movement. The operator shall be able to observe passengers in the front/entrance and rear/exit areas, anywhere in the aisle, and in the rear seats.

N.52.2.2. A (min) 8½" x 16" rear view mirror shall be provided on the front sign header.

N.52.2.3. A 6" diameter adjustable convex mirror over and forward of the front door shall be provided. An adjustable convex mirror shall be provided over/above and to the rear of the rear exit door. (Convex mirrors described above are to be used in conjunction with each other.) The glass in this mirror shall be replaceable.

N.53. WINDOWS

N.53.1. WINDSHIELD

N.53.1.1. 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 ft. high no more than 2 ft. 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.

N.53.1.2. The 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.

N.53.2. GLAZING

N.53.2.1. The windshield glazing material shall have a 1/4 inch nominal thickness laminated safety glass conforming to the requirements of ANSI Z26.1 Test Grouping 1A and the Recommended Practices defined in SAE J673.

N.53.3. OPERATOR'S SIDE WINDOW

N.53.3.1. The operator's side window shall be the sliding type, requiring only the rear half of sash to latch upon closing, and shall open sufficiently to permit the seated operator to easily adjust the street-side outside rearview mirror. 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 tint.

N.53.3.2. The operator's view, perpendicular through operator's side window glazing, should extend a minimum of 33 inches (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 inches (560 mm) above the operator's floor to ensure visibility of an under-mounted convex mirror.

N.53.3.3. Operator's window construction shall maximize ability for full opening of the window.

N.53.3.4. The operator's side window glazing material shall have a 1/4 inch nominal thickness laminated safety glass conforming with the requirements of ANSI Z26.1-1996 Test Grouping 2 and the Recommended Practices defined in SAE J673.

N.53.3.5. The design shall prevent sections from freezing closed in the winter. Light transmittance shall be 75 percent on the glass area below 53 inches from the operator platform floor. On the top fixed over bottom slider configuration, the top fixed area above 53 inches may have a maximum 5 percent light transmittance.

N.53.4. PASSENGER SIDE WINDOWS

- N.53.4.1.** The side windows shall be full sliders. With the exception of the upper portion of first right-hand and /or left hand window where the side destination sign shall be located, all other shall be tinted 7/32" 28% gray tinted safety glass and frame windows will have black (dark) polyester powder coat aluminum frames inside and out. Windows shall be flat panel, transit application with approved laminated safety glass (ANSI 25.1). Glazing in the sash shall be easily replaced without removing the sash from the bus. Side window sliders shall be equipped with metal latches. All windows shall be of glass shall be mounted in removable rubber retaining strips/seals.
- N.53.4.2.** A positive lock type emergency latch meeting the FMVSS-217 shall be furnished on each window frame. Each window shall have a permanent decal describing emergency window operation procedures.
- N.53.4.3.** Side windows shall be designed to prevent the entrance of air and water when windows are closed. The window seal rubber must be installed so that passengers cannot remove it and rubber shall be of such quality to resist adhering to other sash sill.

N.54. HEATING, VENTILATING AND AIR CONDITIONING

N.54.1. CAPACITY AND PERFORMANCE

- N.54.1.1.** The Heating, Ventilation and Air Conditioning (HVAC) climate control system shall be rear-mounted Thermo King T-14(616) Screw Compressor, Brushless Evaporator & Condenser Motors with R134a Freon capable of maintaining the interior of the bus at the temperature and humidity levels defined in the following paragraphs. Accessibility and serviceability of components preferably shall be provided without requiring maintenance personnel to climb up on the roof of the bus.

- N.54.1.2.** The following climatic factors shall be used as design guidelines and shall be considered as operational requirements.

N.54.1.3. Temperature and Solar Load

N.54.1.3.1.AMBIENT AIR TEMPERATURE, EXTERNAL EQUIPMENT

MINIMUM	-20°F
MAXIMUM	120°F

N.54.1.3.2.HUMIDITY

MINIMUM	5%
MAXIMUM	100%

N.54.1.3.3.PRECIPITATION

MAXIMUM RAINFALL RATE	6 IN/HOUR
MAXIMUM SNOWFALL RATE	5 IN/HOUR
MAXIMUM SNOW ACCUMULATION	18 IN

- N.54.1.4.** 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 maintain an average passenger compartment temperature within a range between 65° and 80°F, while controlling the relative humidity to a value of 50 percent or less. The system shall maintain these conditions while subjected to any outside ambient temperatures within a range of 10° to 95°F and at any ambient relative humidity levels between 5 and 50 percent. Reheat system water control valve to be pulsing type to provide even heat distribution.

- N.54.1.5.** When the bus is operated in outside ambient temperatures of 95° to 115°F, the interior temperature of the bus shall be permitted to rise one degree for each degree of exterior temperature in excess of 95°F. When bus is operated in outside ambient temperatures in the range of -10°F to +10°F, the interior temperature of the bus shall not fall below 55°F while bus is running on the Design Operating Profile.

- N.54.1.6.** System capacity testing, including pull down/warm-up, stabilization and profile, shall be conducted in accordance to the APTA "Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System". Temperature measurements shall be made in accordance to this document with the following modifications:

- N.54.1.6.1.** The temperatures measured from a height of 6 inches below the ceiling shall be within plus or minus 3°F of the average temperature at the top surface of the seat cushions.

- N.54.1.6.2.** Temperatures measured more than 3 inches above the floor shall be within plus or minus 5°F of the average temperature at the top surface of the seat cushions. The interior temperatures, from front to rear of the bus, shall not vary more than plus or minus 3°F from the average.

N.54.1.6.3. The recommended locations of temperature probes are only guidelines and may require slight modifications to address actual bus design. Care must be taken to avoid placement of sensing devices in immediate path of air duct outlet. In general, the locations are intended to accurately represent the interior passenger area.

N.54.1.7. 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 that may be activated by an operator-controlled device. During the cool-down period the refrigerant pressure shall not exceed safe high-side pressures and the condenser discharge air temperature, measured 6 inches from the surface of the coil, shall be less than 45°F above the condenser inlet air temperature. 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 HFC R134a. The climate control blower motors and fan shall be designed such that their operation complies with the interior noise level requirements. There shall be manual shut off valves to isolate the drier, receiver, and compressor.

N.54.1.8. NOTE: Air conditioning requirements for hybrid drive batteries, if necessary, shall not activate or degrade the efficiency of the passenger HVAC system.

N.54.1.9. NOTE: As an option, the Thermo King TK 14 will be made available and priced separately.

N.54.1.10. NOTE: As an option, the Thermo King X430 Compressor will be made available and priced separately.

N.54.2. CONTROLS AND TEMPERATURE UNIFORMITY

N.54.2.1. The HVAC system excluding the operator'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.

N.54.2.2. Hot engine coolant water shall be delivered to the HVAC system operator's defroster/heater and other heater cores by means of an auxiliary coolant pump, sized for the required flow, which is brushless and sealless having a minimum maintenance free service life for both the brushless motor and the pump of at least 40,000 hours at full power.

N.54.3. MANUAL MODE SELECTION OF CLIMATE CONTROL SYSTEM

N.54.3.1. After manual selection and/or activation of climate control system operation mode, all interior climate control system requirements for the selected mode shall be attained automatically to within plus or minus 2°F of specified temperature control set-point.

N.54.4. MANUALLY ADJUSTABLE TEMPERATURE CONTROL SET POINT

N.54.4.1. The climate control system shall have the provision to allow the operator to adjust the temperature control set-point at a minimum of between 68° and 72°F. From then on, all interior climate control system requirements shall be attained automatically, unless re-adjusted by operator.

N.54.4.2. 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 fans. The interior climate control system shall switch automatically to the ventilating mode if the refrigerant compressor or condenser fan fails.

N.54.4.3. Interior temperature distribution shall be uniform to the extent practicable to prevent hot and/or cold spots. After stabilization with doors closed, the temperatures between any two points in the passenger compartment in the same vertical plane, and 6 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 plus or minus 5°F from the front to the rear from the average temperature determined in accordance with APTA's "Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System." Variations of greater than plus or minus 5°F will be allowed for limited, localized areas provided the majority of the measured temperatures fall within the specified requirement.

N.55. AIR FLOW

N.55.1. PASSENGER AREA

N.55.1.1. 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.

- N.55.1.2.** 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 120°F under any normal operating conditions.
- N.55.1.3.** The climate control blower motors and fan shall be designed such that their operation complies with the interior noise level requirements.

N.55.2. OPERATOR'S AREA

- N.55.2.1.** The bus interior climate control system shall deliver at least 100 cfm of air to the operator's area when operating in the ventilating and cooling modes. Adjustable nozzles shall permit variable distribution or shutdown of the airflow. Airflow in the heating mode shall be reduced proportionally to the reduction of airflow into the passenger area. The windshield defroster unit shall meet the requirements of SAE Recommended Practice J382, "Windshield Defrosting Systems Performance Requirements," and shall have the capability of diverting heated air to the operator's feet and legs. The defroster or interior climate control system shall maintain visibility through the operator's side window.

N.55.3. CONTROLS FOR THE CLIMATE CONTROL SYSTEM (CCS)

- N.55.3.1.** The controls for the operator's compartment for heating, ventilation and cooling systems shall be integrated and shall meet the following requirements:
- N.55.3.1.1. The heat/defrost system fan shall be controlled by a separate switch 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 Agency, an "on-off" switch shall be located to the right of or near the main defroster switch.
- N.55.3.1.2. A manually operated control valve shall control the coolant flow through the heater core.
- N.55.3.1.3. If a cable-operated manual control valve is used, 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 concurrence of the Agency project manager.

N.55.4. OPERATOR'S COMPARTMENT REQUIREMENTS

- N.55.4.1.** The heating, ventilation and defroster system for the operator's area shall be controlled by the operator. The system shall meet the following requirements:
- N.55.4.1.1. 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 be able to draw air from the bus body interior and/or the exterior 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 the operator's area.
- N.55.4.1.2. The defroster supply outlets shall be located at the lower edge of the windshield. These outlets shall be durable and shall be free of sharp edges that can catch clothes during normal daily cleaning. The system shall be such that foreign objects such as coins or tickets cannot fall into the defroster air outlets. Adjustable ball vents or louvers shall be provided at the left of the operator's position to allow direction of air onto the side windows.
- N.55.4.2.** The bus interior climate control system shall deliver at least 100 cubic feet per minute of air to the operator's area when operating in the ventilation, heating, and cooling modes without use of the operator's booster fan. The climate control system blower motors will operate at the set speed during all operating modes. All return air ducts will be protected by guards constructed of a sturdy mesh which will resist damage.
- N.55.4.3.** Adjustable nozzles shall permit variable distribution or shut down of all air flow. The defroster and/or interior climate control system shall maintain visibility through the operator's side window. A booster fan with operator control shall be provided in the ductwork at the operator's area, forward of the operator's position, for increased air flow to the operator. The windshield defroster unit shall meet or exceed all requirements of SAE Recommended Practice J382, Windshield Defrosting Systems Performance Requirements, and shall have the capability of diverting heated air to the operator's feet and legs.

N.55.5. AIR FILTRATION

- N.55.5.1.** Air shall be filtered before discharge into the passenger compartment. The filter shall meet the ANSI/ASHRAE 52.1 requirement for 5 percent or better atmospheric dust spot efficiency, 50 percent weight arrestance, and a minimum dust holding capacity of 120 g per 1000 cfm cell. Air filters shall be easily removable for service.

N.55.6. FILTERS

- N.55.6.1.** Hogs Hair filters shall be provided or approved equals.

N.55.7. ROOF VENTILATORS

- N.55.7.1.** One roof ventilator shall be provided in the roof of the bus, approximately over or just forward of the front axle of the bus.
- N.55.7.2.** The 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. inches and shall be capable of being positioned as a scoop with either the leading or trailing edge open no less than 4 inches, or with all four edges raised simultaneously to a height of no less than 3½ inches. An escape hatch shall be incorporated into the roof ventilator. Roof ventilator shall be sealed to prevent entry of water when closed.

N.56. EXTERIOR PANELS, FINISHES AND EXTERIOR LIGHTING

N.56.1. DESIGN

- N.56.1.1.** The bus shall have a clean, smooth, simple transit bus design, primarily derived from bus performance requirements and passenger service criteria. 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.
- N.56.1.2.** 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 on windows and mirrors.

N.56.2. MATERIALS

- N.56.2.1.** 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.

N.56.3. ROOF-MOUNTED EQUIPMENT

- N.56.3.1.** A non-skid, walkway shall be incorporated on the roof to provide access to equipment without climbing or over any equipment.

N.56.4. PEDESTRIAN SAFETY

- N.56.4.1.** Exterior protrusions along the side and front of the bus greater than 1/2 inch and within 80 inches of the ground shall have a radius no less than the amount of the protrusion. The exterior rearview mirrors, cameras and required lights and reflectors are exempt from the protrusion requirement. Advertising frames shall protrude no more than 7/8 inch from the body surface. Grilles, doors, bumpers and other features on the sides and rear of the bus shall be designed to minimize toeholds or handholds.
- N.56.4.2.** Exterior protrusions shall not cause a line-of-sight blockage for the operator.

N.56.5. EASILY REPLACEABLE LOWER SIDE BODY PANELS

- N.56.5.1.** The lower section of the side body panels (low-floor buses) shall be made of aluminum can be quickly material and shall be easily and quickly replaceable.

N.56.6. RAIN GUTTERS

- N.56.6.1.** Rain gutters shall be provided to prevent water flowing from the roof onto the passenger doors and operator's side window. When the bus is decelerated, the gutters shall not drain onto the windshield, operator's side window or door boarding area. Cross-sections of the gutters shall be adequate for proper operation.

N.56.7. LICENSE PLATE PROVISIONS

- N.56.7.1.** Provisions shall be made to mount standard-size U.S. license plates per SAE J686 on the 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 rear license plate provision shall be illuminated per SAE J587.

N.56.8. FENDER SKIRTS

- N.56.8.1.** 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.

N.56.9. STANDARD SPLASH APRONS

N.56.9.1. Splash aprons, composed of 1/4 inch minimum composition or rubberized fabric, shall be installed behind and/or in front of wheels as needed to reduce road splash and protect under floor components. The splash aprons shall extend downward to within 6 inches 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. An approved method of grounding static electricity shall be provided on each bus such as a conductive nylon grounding strap.

N.57. SERVICE COMPARTMENTS AND ACCESS DOORS

N.57.1. ACCESS DOORS

N.57.1.1. 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 and transmission fluid. Access openings shall be sized for easy performance of tasks within the compartment, including tool operating space.

N.57.1.2. 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. All access doors shall be retained in the open position by props or counterbalancing with over-center or gas-filled springs with safety props and shall be easily operable by one person. Springs and hinges shall be corrosion resistant. 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.

N.57.1.3. If precluded by design, the manufacturer shall provide door design information specifying how the requirements are met.

N.57.2. ACCESS DOOR LATCH/LOCKS

N.57.2.1. The engine compartment, including the exhaust duct plenum, shall be completely sealed to prevent smoke or fumes from entering the bus interior. The engine bulkhead and exhaust duct plenum shall be insulated adequately to prevent discomfort to passengers due to heat, to minimize hazard in case of fire in the engine compartment, and to aid in controlling noise to meet required levels.

N.57.2.2. An engine air intake designed to minimize noise shall be provided. Insulation shall be provided as needed in the engine compartment area for sound suppression.

N.57.2.3. An adequate number of fire detectors shall be furnished in the engine compartment, as determined by the bus manufacturer. The detectors shall activate an alarm (visual as well as audible) at the operator's station.

N.57.2.4. Access panels to the left and right side of the engine compartment shall be provided with expanded metal inserts to provide heat dissipation in the engine compartment. Panels shall also be constructed so that maintenance personnel can easily reach all under the floor and engine compartment equipment requiring access from outside the bus body. Access panels will be hinged to swing up and out of the way, and be secured with a 5/16 inch square latch.

N.57.2.5. Gas operated shocks with safety locks shall secure access doors in the open position during inspection and servicing. The engine compartment doors will be equipped with handles. Louvers shall be provided in the rear engine compartment door to optimize airflow. Access doors are not required in the engine door.

N.57.2.6. Forward edge hinges with positive action hold open springs shall be provided on the fuel connector and lay flat against the adjacent panel when fully opened. The battery access door shall have top edge hinges with gas operated shocks with safety devices when the battery is being serviced. A small access door shall be provided to the battery disconnect switch. Battery disconnect switch, fuel and air tank drain valve doors will be equipped with a well type securing latch.

N.58. BUMPERS

N.58.1. LOCATION

N.58.1.1. Bumpers shall provide impact protection for the front and rear of the bus with the top of the bumper being 27 inches, plus or minus 2 inches, above the ground. Bumper height shall be such that when one bus is parked behind another, a portion of the bumper faces will contact each other.

N.58.2. FRONT BUMPER

N.58.2.1. 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-degree angle to the longitudinal centerline of the bus.

N.58.2.2. 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 inches. Mounting provisions will be made for integrating bike rack if necessary.

N.58.2.3. NOTE: As an option, a 2-position stainless steel and black powder coated bike rack will be made available and priced separately.

N.58.2.4. NOTE: As an option a mounting bracket for a bicycle rack only shall be made available and priced separately.

N.58.3. REAR BUMPER

N.58.3.1. 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 inch high, and at accelerations up to 2 mph/sec. The rear bumper shall protect the bus, when impacted anywhere along its width by the common carriage with contoured impact surface defined in Figure 2 of FMVSS 301 loaded to 4000 lbs., at 4 mph parallel to or up to a 30-degree angle to, the longitudinal centerline of the bus.

N.58.3.2. The rear bumper shall be shaped to preclude unauthorized riders standing on the bumper. The bumper shall not require service or maintenance or in normal operation during the service life of the bus. The bumper may increase the overall bus length specified by no more than 7 inches.

N.58.4. BUMPER MATERIAL

N.58.4.1. Bumper material shall be corrosion-resistant and withstand repeated impacts of the specified loads without sustaining damage. Visible surfaces shall be black. These bumper qualities shall be sustained throughout the service life of the bus.

N.59. FINISH AND COLOR

N.59.1. APPEARANCE

N.59.1.1. All exterior surfaces shall be smooth and free of wrinkles and dents. Exterior surfaces to be painted shall be properly prepared as required by the paint system Supplier prior to application of paint to assure a proper bond between the basic surface and successive coats of original paint for the service life of the bus. Drilled holes and cutouts in exterior surfaces shall be made prior to cleaning, priming and painting, where possible, to prevent corrosion. Body filler materials may be used for surface dressing, but not for repair of damaged or improperly fitted panels.

N.59.1.2. Paint shall be applied smoothly and evenly with the finished surface free of visible dirt and the following other imperfections:

N.59.1.2.1. blisters or bubbles appearing in the topcoat film

N.59.1.2.2. chips, scratches, or gouges of the surface finish

N.59.1.2.3. cracks in the paint film

N.59.1.2.4. craters where paint failed to cover due to surface contamination

N.59.1.2.5. overspray

N.59.1.2.6. peeling

N.59.1.2.7. runs or sags from excessive flow and failure to adhere uniformly to the surface

N.59.1.2.8. chemical stains and water spots

N.59.1.2.9. dry patch due to incorrect mixing of paint activators

N.59.1.2.10. buffing swirls

N.59.1.3. 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.

- N.59.1.4.** Proper adhesion between the basic surface and successive coats of the original paint shall be measured using an Elcometer adhesion tester as outlined in ASTM D4541-85. Adhesion shall be a minimum 300 ft.-lb. The bus manufacturer shall supply test samples of the exterior surface for each step of the painting process that may be subject to adhesion testing per ASTM G4541-87 and ASTM D4145-85. ASTM D4541-93 may be used for inspection testing during assembly of the vehicle.
- N.59.1.5.** Bus exteriors shall be painted and numbered to include numbers on the roof to the general design to be provided with each order. Minor variations to this color scheme may be required in order to accommodate the specific styling of the Contractor's buses.
- N.59.1.6.** Within 30 days of execution of contract, the Contractor shall supply to Procuring Agency the detailed drawings of the front, rear, both sides, and roof of the bus that will be supplied. Within 60 days of execution of the contract, the Procuring Agency will return these drawings to the Contractor with details of the color schemes included.
- N.59.1.7.** The bus exterior shall be primed as recommended by the manufacturer of the final finish, and shall be finished with the color scheme specified in the order. Proposers should provide listings of available colors. Current color schemes used by the various Procuring Agencies are publicly available.
- N.59.1.8.** There shall be no bare or exposed metal surfaces showing on the exterior of the bus, exclusive of ornamentation and accessories. The display of manufacturer's name or insignia on the exterior of the bus will be as specified in the individual order.

N.59.2. DECALS, NUMBERING AND SIGNING

- N.59.2.1.** Monograms, numbers 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. They may be painted signs, 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 C.F.R. Part, Subpart B, 38.27.
- N.59.2.2.** Buses shall have fleet numbers applied both on the interior and exterior of the bus in sequence with factory serial numbers. Each individual order will include the correct starting number and the location, size and color of numbers.

N.59.3. PASSENGER INFORMATION

- N.59.3.1.** ADA priority seating signs as required and defined by 49 C.F.R., Part 38.27 shall be provided to identify the seats designated for passengers with disabilities.
- N.59.3.2.** Requirements for a public information system in accordance with 49 C.F.R., Part 38.35 shall be provided.
- N.59.3.3.** Interior decals such as but not limited to the following, "No Smoking", "Exit" door, "Emergency Exit", "Watch Your Step", Wheelchair instructions and "Reserved for Wheelchairs," etc. shall be provided. All decals shall be in English and Spanish. Optional Tri-Lingual decals will be made available, with the three languages being verified at the pre-production meeting. Decals containing identification of windows, hatches, etc., shall also be provided. All decals shall conform to Oklahoma state law.

N.59.4. EXTERIOR LIGHTING

- N.59.4.1.** Exterior lighting and reflectors shall comply, as applicable, with Part 393, Subpart B of the FMCSA and FMVSS 108.
- N.59.4.2.** All exterior lights shall be designed to prevent entry and accumulation of moisture or dust. Commercially available LED-type lamps shall be utilized at all exterior lamp locations except headlights. 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. 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.
- N.59.4.3.** Exterior lighting shall comply with all applicable State and Federal regulations. Replacement lamps shall be readily available from commercial sources; they shall not be a bus manufacturer unique item. Those applications which will not accommodate an LED lamp shall have a replaceable bulb with access to the bulb by removing the lens from outside the bus.
- N.59.4.4.** LED headlights are required with high and low beams controlled from a sealed, moisture-protected foot switch located on the floor in the operator's station. The sealed beam units shall be of the latest heavy-duty type and be ruggedly mounted to maintain adjustment under transit operating conditions. Headlights shall be wired to operate on reduced voltage in the run position.
- N.59.4.5.** All other lights shall be LED as allowed by applicable State Laws. The stop lights and tail light shall be 4" diameter. Rear turn indicator lights shall be separate from the stop-tail lights.

- N.59.4.6.** The LED marker lights at the front and rear upper corners of the bus shall be of flush mounted type to preclude breakage by tree limbs, bus washers, etc.
- N.59.4.7.** Each doorway shall have an outside LED light(s) which, when the door is open, provides at least one foot candle of illumination of the street surface for a distance of three feet perpendicular to the bottom step tread outer edge. Light (s) shall be located below window level and shielded to protect the eyes of entering and exiting passengers.

N.59.5. BACKUP LIGHT/ALARM

- N.59.5.1.** 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.

N.59.6. DOORWAY LIGHTING

- N.59.6.1.** Lamps at the front and rear passenger doorways shall comply with ADA requirements and shall activate only when the doors open. These lamps shall illuminate the street surface to a level of no less than 1 foot-candle for a distance of 3 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.

N.60. SERVICE AREA LIGHTING (INTERIOR AND EXTERIOR)

- N.60.1.** 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.
- N.60.2.** Additional 7" amber alternating Hazard flashers - Required, located @ upper corners of HVAC door.

N.61. INTERIOR PANELS AND FINISHES

N.61.1. GENERAL REQUIREMENTS

- N.61.1.1.** Materials shall be selected on the basis of maintenance, durability, appearance, safety, flammability and tactile qualities. Materials shall be strong enough to resist everyday abuse and be vandalism and corrosion resistant. Trim and attachment details shall be kept simple and unobtrusive. Interior trim shall be secured to avoid resonant vibrations under normal operational conditions.
- N.61.1.2.** Interior surfaces more than 10 inches below the lower edge of the side windows or windshield shall be shaped so that objects placed on them fall to the floor when the bus is parked on a level surface. Any components and other electrical components within close proximity to these surfaces shall also be resistant to this cleaning method.
- N.61.1.3.** Vendor shall provide a list of available colors at their quoted price and may also include a list of colors available at additional cost.

N.61.2. INTERIOR PANELS

- N.61.2.1.** 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.

N.61.3. OPERATOR AREA BARRIER

- N.61.3.1.** A barrier or bulkhead between the operator 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. 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 passenger from reaching the operator by standing behind the operator's seat. The lower area between the seat and panel must be accessible to the operator. The partition must be strong enough in conjunction with entire partition assembly for mounting of such equipment as flare kits, fire extinguishers (1.2 kg), microcomputer, public address amplifier, etc. Dark or black panels are preferred behind the operator's head. The panel should be isolated for noise control and attached with rubber grommets.

N.61.4. MODESTY PANELS

- N.61.4.1.** 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.
- N.61.4.2.** Design and installation of modesty panels located in front of forward-facing seats shall include a handhold or grab handle along its top edge. These dividers shall be mounted on the sidewall and shall

project toward the aisle no farther than passenger knee projection in longitudinal seats or the aisle side of the transverse seats. Modesty panels shall extend from at least the window opening of the side windows, and those forward of transverse seats shall extend downward to 1 and 1½ inches above the floor. Panels forward of longitudinal seats shall extend to below the level of the seat cushion. Dividers positioned at the doorways shall provide no less than a 2½ inches clearance between the modesty panel and a fully open, inward opening door, or the path of a deploying flip-out ramp to protect passengers from being pinched. Modesty panels installed at doorways shall be equipped with grab rails if passengers assist are not provided by other means.

N.61.4.3. The modesty panel and its mounting shall withstand a static force of 250 lbs. applied to a 4 x 4 inch area in the center of the panel without permanent visible deformation.

N.61.5. FRONT END

N.61.5.1. The entire front end of the bus shall be sealed to prevent debris accumulation behind the dash and to prevent the operator'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 operator'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 with a surface that reduces glare. Any mounted equipment must have provision to support the weight of equipment.

N.61.6. REAR BULKHEAD

N.61.6.1. 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.

N.61.6.2. 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 litter being thrown or drawn through the grille. If it is necessary to remove the panel to service components located on the rear bulkhead, the panel shall be hinged 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.

N.61.7. HEADLINING

N.61.7.1. 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.

N.61.8. FASTENING

N.61.8.1. 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.

N.61.9. INSULATION

N.61.9.1. Any insulation material used between the inner and outer panels shall minimize the entry and/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.

N.61.9.2. 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 operator or passengers cannot feel drafts during normal operations with the passenger doors closed. Insulation shall meet the requirements of FMVSS 302.

N.61.10. FLOOR COVERING

N.61.10.1. The floor covering shall be RCA rubber floor material. 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 inch wide and shall extend across the bus aisle. This line and the edge of the steps shall be Yellow. The color and pattern shall be consistent throughout the floor covering.

N.61.10.2. 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.

N.61.10.3. 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.

N.61.10.4. The floor under the seats shall be covered with smooth surface flooring material. The floor covering shall closely fit the sidewall in a fully sealed butt joint or extend to the top of the cove.

N.62. INTERIOR LIGHTING

N.62.1. PASSENGER

N.62.1.1. The passenger interior lighting system shall be an I/O Controls LED lighting system. The interior lighting system shall provide a minimum 15 foot-candle illumination on a 1 square foot plane at an angle of 45 degree from horizontal, center 33 inches above the floor and 24 inches in front of the seat back at each seat position. Allowable average light level for the rear bench seats shall be 7 foot-candles. Floor surface in the aisles shall be a minimum of 10 foot-candles, vestibule area a minimum of 4 foot-candles with the front doors open and minimum of 2 foot-candles with the front doors closed. 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.

N.62.1.2. Step lighting for the intermediate platform between lower and upper floor levels shall be provided and shall illuminate in all engine run positions. The step lighting shall be low-profile to minimize tripping and snagging hazard for passengers and shall be shielded as necessary to protect passengers' eyes from glare.

N.62.1.3. 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 bus shall be equipped with interior advertising card tracks on each side of the interior passenger compartment, running the length of the bus, to hold 11 inches high ad cards. Photo sensor detects and adjusts light level automatically relative to ambient light for passenger comfort.

N.62.1.4. Lens material shall be clear polycarbonate. Lens shall be designed to effectively "mask" all individual LED's to make them invisible and there shall be no "hot spot" or "dark spot". Lens shall be sealed to inhibit incursion of dust and insects yet are easily removable for service. If threaded fasteners are used they must be held captive in the lens. Access panels shall be provided to allow servicing of components located behind light panels.

N.62.1.5. Individual operator module shall be provided for each light fixture. Operator module shall have built-in self-protection of thermal shut-down and restart, PWM (Pulse Width Modulation) output to regulate light level, reverse polarity protect and rebuild able.

N.62.1.6. When the master switch is in the RUN or NITE/RUN mode, the first light module on each side of the bus shall slowly fades to darkness when the front door is in the closed position and light output shall gradually illuminate to reach maximum light level when the door is opened. Solid state LED lighting shall have unlimited on-off cycles.

N.62.1.7. The light system may be designed to form part of the entire air distribution duct.

N.62.1.8. Emergency backup system shall keep the light fixtures over the front and rear doors illuminated at minimum light output under a separated battery power for 10 to 15 minutes allowing passengers visibility and timely evacuation from the vehicle during emergency conditions.

N.62.2. OPERATOR AREA

N.62.2.1. The operator's area shall have a light to provide general illumination, and it shall illuminate the half of the steering wheel nearest the operator to a level of 5 to 10 foot-candles. This light shall be controlled by a toggle switch that is convenient to the operator. Light fixture shall be mounted in the ceiling above the farebox location. The fixture shall be capable of projecting a concentrated beam of light on the farebox. 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.

N.62.3. VESTIBULES/DOORS

N.62.3.1. 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. 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 the rear door is unlocked.

N.62.4. STEP LIGHTING

N.62.4.1. Step 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.

N.62.5. RAMP LIGHTING

N.62.5.1. Exterior and interior ramp lighting shall comply with C.F.R. Part 49, Sections 19.29 and 19.31.

N.62.6. FARE COLLECTION

N.62.6.1. If selected, a farebox shall be installed in a space as far forward as practicable, and/or structural provisions shall be made for installation of a farebox (if not installed by manufacturer). Location of this fare collection device shall not restrict traffic in the vestibule and shall allow the operator to easily reach the coin levers and view the change platform. The farebox shall not restrict access to the operator's area and shall not restrict operation of operator controls. Farebox location shall permit accessibility to the vault for easy manual removal or attachment of suction devices. A 20 amp, 12-volt, DC, protected lead will be made available to power the farebox.

N.62.6.2. Farebox shall be of Diamond manufactured SV Model Rectangular Farebox with an additional vault, mounted using a heavy duty stanchion (or approved equal).

N.62.7. INTERIOR ACCESS PANELS AND DOORS

N.62.7.1. 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 or mechanical 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. Access doors shall be secured with hand screws or latches. All fasteners that retain access panels shall be captive in the cover.

N.62.8. FLOOR PANELS

N.62.8.1. 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 Agency 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.

N.62.8.2. The number of special fastener tools required for panel and access door fasteners shall be minimized.

N.62.9. SAFETY EQUIPMENT

N.62.9.1. 5 lb. Fire Extinguisher -Mounted behind driver's seat

N.62.9.2. Safety Triangle Kit -Mounted behind driver's seat

N.62.9.3. Medical Aid Kit

N.62.9.4. Blood borne Pathogens Kit

N.63. PASSENGER ACCOMMODATIONS

N.63.1. PASSENGER SEATING

N.63.1.1. Arrangements and Seat Style - American Seating Insight passenger seats 9or approved equal) shall be arranged in the bus shall be such that seating capacity is maximized and shall accommodate as many forward facing seats as possible. Hip-to-knee room shall be a minimum of 26.50". Passenger seating shall be molded shell seats with vandal resistant fabric inserts. Installation shall be with cantilever mount and no closeout where possible.

N.63.1.2. Proposers shall indicate standard seating layout for each size bus.

N.63.1.3. Any exposed metal of the frame will be powder coated, color coordinated to match the seat inserts, or brushed aluminum, or brushed stainless steel.

N.63.1.4. NOTE: Proposers shall provide a proposed seating layout with their proposal.

N.63.1.5. The handholds shall be stainless steel.

N.63.1.6. The top area of the seat back shell will wrap around the upper portion of the seat back (below the grab rail) in a "bubble" to form a crash pad on the rear of each seat. The crash pad will be of continuous construction with the back.

N.63.1.7. Rear seat platform shall be hinged to gain access to engine compartment.

N.63.1.8. Proposers shall submit a certified test report as evidence of compliance with all testing activities, test diagrams, test equipment as well as test data related to loads, deflections and permanent deformation of the seat assembly as defined in the APTA Standard Bus Procurement Guidelines manual

N.63.2. HIP-TO-KNEE ROOM

N.63.2.1. 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 vertical surface immediately in front, shall be a minimum of 26 inches. At all seating positions in paired transverse seats immediately behind other seating positions, hip-to-knee room shall be no less than 27 inches.

N.63.3. FOOT ROOM

N.63.3.1. Foot room, measured at the floor forward from a point vertically below the front of the seat cushion, shall be no less than 14 inches. Seats immediately behind the wheel housings and modesty panels may have foot room reduced.

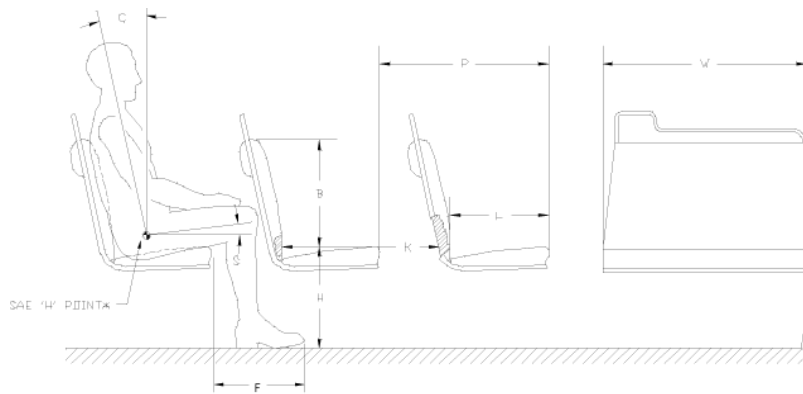
N.63.4. AISLES

N.63.4.1. The aisle between the seats shall be no less than 20 inches wide at seated passenger hip height. Seat backs shall be shaped to increase this dimension to no less than 24 inches at 32 inches above the floor (standing passenger hip height).

N.63.5. DIMENSIONS

N.63.5.1. FIGURE 7

N.63.5.1.1. Seating Dimensions and Standard Configuration



N.63.6. STRUCTURE AND DESIGN

N.63.6.1. 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.

N.63.6.2. Seats, structures and restraints around the securement area should not infringe into the mobility device envelope or maneuverability.

N.63.6.3. 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 inches of the aisle shall be at least 10 inches above the floor.

N.63.6.4. In locations at which cantilevered installation is precluded by design and/or structure, other seat mounting may be allowed.

N.63.6.5. 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 inches, measured at the aisle side of the seat frame at height H. The seat back should not deflect more than 14 inches, measured at the top of the seat back, in a controlled manner to minimize passenger injury. Structural failure of any part of the seat or sidewall shall not introduce a laceration hazard.

N.63.6.6. 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 1/4 inch 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 1/4 inch permanent deformation in the seat or its mountings. The seat backs at the aisle position and at the window position shall withstand repeated impacts of two 40-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-inch pendulum and shall strike the seat back 10,000 times each from distances of 6, 8, 10 and 12 inches. Seats at both seating positions shall withstand 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 inches. Seat cushions shall withstand 100,000 randomly positioned 3½ inch drops of a squirring, 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.

N.63.6.7. The back of each transverse seat shall incorporate a handhold no less than 7/8 inch in diameter for standees and seat access/egress. The handhold shall not be a safety hazard during severe decelerations. The handhold shall extend above the seat back near the aisle so that standees shall have a convenient vertical assist, no less than 4 inches long that may be grasped with the full hand. This handhold shall not cause a standee using this assist to interfere with a seated 50th-percentile male passenger. The handhold shall also be usable by a 5th-percentile female, as well as by larger passengers, to assist with seat access/egress for either transverse seating position. 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.

N.63.6.8. 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.

N.63.6.9. 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 operator'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 inches of the end of the seat cushion. Armrests shall be located from 7 to 9 inches above the seat cushion surface. The area between the armrest and the seat cushion shall be closed by a barrier or panel. The top and sides of the armrests shall have a minimum width of 1 inch and shall be free from sharp protrusions that form a safety hazard.

N.63.6.10. Seat back handhold and armrests shall withstand static horizontal and vertical forces of 250 lbs. applied anywhere along their length with less than 1/4 inch permanent deformation. Seat back handhold and armrests shall withstand 25,000 impacts in each direction of a horizontal force of 125 lbs. with less than 1/4 inch permanent deformation and without visible deterioration.

N.63.7. CONSTRUCTION AND MATERIALS

N.63.7.1. 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.

N.63.7.2. 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 1/4 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, allow the passenger to deform the seating materials in the impact areas. Complete seat assemblies shall be interchangeable to the extent practicable. Agency to select seat fabric.

N.63.8. PASSENGER ASSISTS

N.63.8.1. Passenger assists in the form of full grip, vertical stanchions or handholds shall be provided for the safety of standees and for ingress/egress. Passenger assists shall be convenient in location, shape, and size for both the 95th-percentile male and the 5th-percentile female standee. Starting from the entrance door and moving anywhere in the bus and out the exit door, a vertical assist shall be provided either as the vertical portion of seat back assist 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 stanchions shall be powder coated yellow steel finish.

N.63.9. ASSISTS

N.63.9.1. 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 1/4 inch. All passenger assists shall permit a full hand grip with no less than 1½ inches 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.

N.63.9.2. 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 12 inch lineal dimension in any direction normal to the assist without permanent visible deformation. All passenger assist components, including brackets, clamps, screw heads and other fasteners used on the passenger assists shall be designed to eliminate pinching, snagging and cutting hazards and shall be free from burrs or rough edges.

N.63.10. FRONT DOORWAY

N.63.10.1. Front doors, or the entry area, shall be fitted with ADA-compliant assists. Assists shall be as far outward as practicable, but shall be located no farther inboard than 6 inches from the outside edge of the entrance step and shall be easily grasped by a 5th-percentile female boarding from street level. Door assists shall be functionally continuous with the horizontal front passenger assist and the vertical assist and the assists on the wheel housing or on the front modesty panel.

N.63.11. VESTIBULE

N.63.11.1. The aisle side of the operator's barrier, the wheel housings, and when applicable the modesty panels shall be fitted with vertical passenger assists that are functionally continuous with the overhead assist and that extend to within 36 inches of the floor. These assists shall have sufficient clearance from the barrier to prevent inadvertent wedging of a passenger's arm.

N.63.11.2. 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 inches above the floor. The assists at the front of the bus shall be arranged to permit a 5th-percentile female passenger to easily reach from the door assist, to the front assist, to vertical assists on the operator's barrier, wheel housings or front modesty panel.

N.63.12. OVERHEAD

N.63.12.1. 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 inches above the floor.

N.63.12.2. There shall be fourteen (14) vinyl coated nylon grab straps (35' and 40' bus) and ten (10) on (30' bus) positioned throughout the bus interior mounted to the horizontal stanchions. A deduct will be made available for those agencies not desiring grab straps.

N.63.12.3. Overhead assists shall simultaneously support 150 lbs. on any 12-inch length. No more than 5 percent of the full grip feature shall be lost due to assist supports.

N.63.13. LONGITUDINAL SEAT ASSISTS

N.63.13.1. Longitudinal seats shall have vertical assists located between every other designated seating position, except for seats that fold/flip up to accommodate wheelchair securement. Assists shall extend from near the leading edge of the seat and shall be functionally continuous with the overhead assist. Assists shall be staggered across the aisle from each other where practicable and shall be no more than 52 inches apart or functionally continuous for a 5th percentile female passenger.

N.63.14. WHEEL HOUSING BARRIERS/ASSISTS

N.63.14.1. Unless passenger seating is provided on top of wheel housing, passenger assists shall be mounted around the exposed sides of the wheel housings which shall also be designed to prevent passengers from sitting on wheel housings. Such passenger assists shall also effectively retain items, such as bags and luggage, placed on top of wheel housing.

N.63.15. PASSENGER DOORS

N.63.15.1. The front door shall be a "slide glide" type inward opening, operator controlled, of corrosion-resistant construction. Minimum clear opening shall be 31.75" inches. The front door shall have a minimum height of 78 inches. The overhead clearance between the top of the door opening and the highest point of the ramp shall be a minimum of 68 inches. The step height shall not exceed 16.5 inches at either doorway without kneeling and shall not exceed 15.5 inches at the step. A maximum of two steps is allowed to accommodate a raised aisle floor in the rear of the bus.

N.63.15.2. Operation of, and power to, the front door shall be controlled by the operator. Door shall be opened completely in 1 to 3.5 seconds from the time of control actuation, and shall be subject to adjustment requirements of this specification. A control 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.

N.63.15.3. The rear or exit door shall be a two panel swing out type designed to provide a minimum clear opening of 30 inches panel to panel and a minimum height of 78 inches. Rear doors shall be operator opened and spring closed. The closing of the door shall begin after the control has been moved to the closed position, and after the door has been fully opened. Door opening and closing speeds shall be adjustable. The rear door shall be equipped with a sensitive edge which will open the door automatically if an object is trapped between the doors.

N.63.15.4. The doors shall have handrails (1.25 inches or equivalent surface area with a 1.50 inches knuckle clearance) mounted on the door panels and/or a modesty panel in the door well/step well. The clear opening dimension shall apply inside these handrails. Handrails whether on the door panel or in the body, shall be part of the systematic set of passenger assists.

N.63.15.5. To preclude movement of the bus, an accelerator interlock shall lock the accelerator in the closed position and a brake interlock shall engage the rear axle service brake system when the front and rear door control is activated and the vehicle is moving below 3 mph. When vehicle is moving above 3 mph the rear door shall remain locked. The braking effort shall be to the maximum capability of the rear axle brakes.

N.63.15.6. Locked doors shall require a force of more than 300 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.

N.63.16. EMERGENCY OPERATION

N.63.16.1. 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.

N.63.17. DOOR CONTROL

N.63.17.1. The door control shall be located in the operator's area within the hand reach envelope described in SAE Recommended Practice J287, "Operator Hand Control Reach." The operator's door control shall provide tactile feedBack to indicate commanded door position and resist inadvertent door actuation.

N.63.18. DOOR CONTROLLER

N.63.18.1. TWO-POSITION OPERATOR'S DOOR CONTROLLER

N.63.18.1.1. The control device shall be protected from moisture. Mounting and location of the door control device handle shall be designed so that it is within comfortable, easy arm's reach of the seated operator. The door control device handle shall be free from interference by other equipment and have adequate clearance so as not to create a pinching hazard.

N.63.18.2. Position of the door control handle shall result in the following operation of the front door:

N.63.18.2.1. Center position: Front door closed, closed or set to lock.

N.63.18.2.2. First position forward: Front door open,

N.63.18.2.3. First position back: Front door open or set to open.

N.63.19. LOADING SYSTEMS

N.63.19.1. The bus shall be equipped with a front door Lift –U LU 18 ramp (or approved equal) mechanism that conforms to all requirements of the Americans with Disabilities Act (ADA). It is to be an all electrically operated system which will assume the normal entrance configuration when stowed. When stowed, the ramp should not exceed any of the normal bus undercarriage clearances. All ramp components and mechanisms shall be constructed of corrosion resistant materials and incorporate a design which affords maximum protection from the elements during normal bus operations. Ease of maintenance and servicing shall be a prime consideration in system design and construction.

N.63.19.2. The wheelchair ramp shall have a manual release, deploy, and stow mechanism. The components involved with manual operation shall be completely accessible. If ramp provides for a nylon strap, it must be located on the forward side of the ramp to preclude a trip hazard.

N.63.19.3. The ramp shall be controlled by toggle switches, master on-off, up-down and stow-deploy. The control switches shall be of the spring loaded to a safe position type so that constant manual pressure is required by the operator during ramp operation. All controls shall be clearly identified by function and present a reasonably foolproof and natural sequence of operation.

N.63.19.4. Visual and audible warning devices shall be located immediately to the rear of the front door. The audible warning device shall be activated only when the ramp is functioning. Interlocking and fast idle provisions shall be incorporated so the ramp cannot be extended unless the entrance door is in the full open position, the transmission in neutral, and the parking brake engaged. The entrance door cannot be closed unless the ramp is in the fully stowed position. The bus service brakes shall be automatically applied when the ramp is in any position other than the stowed and locked position. All ramp components mounted under the bus shall be protected from dirt, debris, and road splash through the use of appropriate enclosures, mud flaps, or sealed compartments, subject to approval by each Procuring Agency.

N.63.19.5. Weatherproof access panels/doors shall be provided to allow for servicing and troubleshooting both ramp and under-floor bus components. Lubing the ramp shall be accomplished without removing the belly pan. The electrical interfacing connections between the bus and the ramp shall be of the quick disconnect type to facilitate ramp removal and installation.

N.63.20. TWO FORWARD-FACING WHEELCHAIR SECUREMENT LOCATIONS

N.63.20.1. Two 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.

N.63.21. Wheelchair Securing System

N.63.21.1. The wheelchair securement shall be the American Seating Company telescoping ARM with Q'Strain belts in the front and Q'Strain Belts and Retractors in the rear. At a minimum, all restraint systems must meet C.F.R. 49, FMVSS, FTA and ADA standards (or approved equal).

N.64. SIGNAGE AND COMMUNICATION

N.64.1. DESTINATION SIGNS

N.64.1.1. A Luminator all LED Amber automatic electronic destination sign system (or approved equal) shall be furnished and installed in each bus by the manufacturer. The destination sign system shall consist of:

N.64.1.1.1. One (1) Front sign 16 rows x 160 columns; display height minimum 7.9 inches, display width 63 inches, or a 24 rows x 200 columns sign.

N.64.1.1.2. One (1) Side sign, on the curb side, 14 rows x 120 columns; display height minimum 4.2 inches, display width 42 inches.

N.64.1.1.3. One (1) Rear sign 16 row X 48 columns (Amber)

N.64.1.1.4. Operators Control Unit (OCU)

N.64.2. CABLES AND ACCESSORIES

N.64.2.1. The Front Sign shall be mounted on the front of the Bus, near the top edge of the body, behind windshield protection, and in an enclosed but accessible compartment. The Side Sign shall be located on the right side (curb side) of the bus near the front door, mounted near the top of an existing window. The Rear Sign (external) shall be mounted on the rear of the vehicle on an appropriate sized cutout.

N.64.2.2. The entire display area of all signs shall be readable in direct sunlight, at night, and in all lighting conditions between those two lighting extremes, with evenly distributed illumination appearance to the unaided eye.

N.64.2.3. The system shall be microprocessor-based; utilizing approved bi-directional serial communications, such as SAE J1708 or IBIS, EIA RS-485, between system components, and shall utilize error detection techniques within the communication protocol.

N.64.2.4. Independent Controller Boards shall be mounted in the front & side destination Sign. The system shall be capable of communicating with additional information devices, such as interior information Signs, Voice Annunciation devices, fare box, etc. The system shall provide for destination and/or Public Relations (P/R) message entry.

N.64.2.5. Flash memory integrated circuits shall be capable of storing and displaying up to 10,000 message lines. Message memory shall be changeable by the use of a PCMCIA Card of not less than one (1) megabyte memory capacity but sized according to the message listing noted herein.

N.64.2.6. The System shall have the ability to sequentially display multi-line destination messages, with the route number portion remaining in a constant "on" mode at all times, if so programmed. It shall also be capable of accepting manual entry of Route Alpha/Numeric information on any/all signs.

N.64.2.7. The various Signs shall be programmable to display independent messages or the same messages; up to two destination messages and one public relations message shall be pre-selectable. The operator shall be able to quickly change between the pre-selected messages without re-entering a message code. Public relations messages shall be capable of being displayed alternately with the regular text and route messages or displayed separately.

- N.64.2.8.** An emergency message shall be activated by a push button or toggle switch. The emergency message shall be displayed on signs facing outside the vehicle while signs inside the vehicle, including the OCU display, remain unchanged. The emergency message shall be canceled by entering a new destination code, or power cycling (after removal of the emergency signal).
- N.64.2.9.** The programming software shall provide means of adjusting the length of time messages are displayed in 0.1 second increments up to twenty-five seconds.
- N.64.2.10.** Power to the Sign system shall be controlled by the Master Bus Run Switch. The signs shall operate in all positions of this switch except off. The signs shall be internally protected against voltage transients and RFI interference to ensure proper operation in the local environment.

N.64.3. DISPLAY AND DISPLAY ILLUMINATION

- N.64.3.1.** All Sign displays shall consist of pixels utilizing High Intensity Light Emitting Diodes ("LED"), for superior outdoor environmental performance, (of Amber illumination appearance of light wavelength of 590 NM). LED should be made of AlInGaP II, superior UV resistant Epoxy lens and superior resistance to the effects of moisture. Each pixel shall have a dedicated LED for illumination of that pixel in all lighting conditions. The sign system shall have multi-level intensity changes, which adjust automatically as a function of ambient lighting conditions. There shall be no requirement for any fan or any specialized cooling or air circulation.
- N.64.3.2.** This LED shall be mounted such as to be visible directly to the observer positioned in the viewing cone, allowing for full readability 65 degrees either side of the destination sign centerline. The LEDs shall be the only means of illumination of the sign system. The LED illumination source shall have an operating life M.T.B.F. of not less than 100,000 hours. Each LED shall not consume more than 0.02 Watts.
- N.64.3.3.** The characters formed by the System shall meet the requirements of the Americans with Disabilities Act (ADA) of 1990 Reference 49 C.F.R. Section 38.39.

N.64.4. SIGN ENCLOSURES

- N.64.4.1.** All Signs shall be enclosed in a manner such as to inhibit entry of dirt, dust, water and other contaminants during normal operation or cleaning. Access shall be provided to clean the inside of the bus window(s) associated with the Sign and to remove or replace the Sign components. Access panels and display boards shall be mounted for ease of maintenance/replacement. Any exterior Rear Sign enclosure used shall be made of Polycarbonate material containing fiberglass reinforcement. The vehicle manufacturer shall comply with the Sign manufacturer's recommended mounting, mounting configuration, and installation procedures to assure optimum visibility and service accessibility of the Sign System and System components.

N.64.5. ELECTRONIC SYSTEM REQUIREMENTS

- N.64.5.1.** All electronic circuit boards used in the Sign System shall be conformal coated to meet the requirements of military specification MIL-I-46058C. All Sign System components shall be certified to have been subjected to a "burn-in" test of a minimum of twelve (12) hours operation in a temperature of 150°F prior to final inspection.

N.64.6. OPERATOR CONTROL UNIT (OCU)

- N.64.6.1.** The OCU Unit shall be used to view and update display messages. It shall be recess mounted on the Bus vehicle front Sign compartment access cover or door. The OCU shall utilize a multi-key conductive rubber pad keyboard and be designed for transit operating conditions. Other mounting locations for the OCU shall be made available, with selection made at the pre-production meeting.
- N.64.6.2.** Only one switch is required to activate the 3 systems (radio, surveillance and sign.) Integration is required if the Twin Vision Sign and the Digital Recorders Talking Bus System are selected with a single OCU to control both systems.
- N.64.6.3.** The OCU Unit shall contain a display of at least two-lines of 20-character capability. The OCU Unit shall contain an audio annunciation that beeps indicating that a key is depressed. The OCU Unit shall continuously display the message associated with the selected destination readings (except the emergency message feature as noted above).
- N.64.6.4.** If the IBIS interface is required in the Destination Sign System, an auxiliary RS232 (DB9) port shall be made optionally available on the OCU under frame for inputs from any wireless technology that might be envisioned in the future. This auxiliary RS232 port shall operate at 9600 baud and accept commands from a wireless source (such as Spread Spectrum receivers) and will set destination sign addresses as if manually operated by the OCU operator.
- N.64.6.5.** If the J1708 interface is selected for the Destination Sign System, an auxiliary J1708 port shall be made available on the J1708 OCU so that auxiliary J1708 commands may be provided to the Destination Sign system from a wireless source that conforms to the J1708 command structure.

N.64.7. INTERCONNECTING CABLING

N.64.7.1. Data Communication Single twisted pair (two conductors) cable

N.64.7.2. Power Cabling - three conductor cable connecting to the switched and unswitched (battery) power and a return (battery)

N.64.7.3. OCU Unit cable single twisted pair cable between the OCU and front

N.65. PASSENGER INFORMATION AND ADVERTISING

N.65.1. INTERIOR DISPLAYS

N.65.1.1. Advertising media 11 inches high and 0.09 inch 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.

N.65.2. PASSENGER STOP REQUEST/EXIT SIGNAL

N.65.2.1. The ambulatory passenger signal shall be clear pull cords conveniently located so standing and seated passengers can easily reach it, this includes down the mullions. The pull cords shall be accessible from the exit door area. There shall be a lighted display sign which indicates "STOP REQUESTED" when the signal is activated. The signal chime shall operate once, and the sign shall light and remain lit with the chime disabled until the next stop when the front doors or rear doors have been opened, resetting the system.

N.65.2.2. There shall be a second passenger signal of a different tone that meets the ADA requirements mounted to the bottom of the flip seat for the mobility aid users to alert the operator when a mobility aid user wishes to disembark. One such system that meets these minimum requirements is the Tape Switch Corp. 3.5" x 7" yellow push pad. There shall be two lights on the operator's front dash that indicate when an ambulatory or non-ambulatory passenger wishes to disembark.

N.65.3. VIDEO SURVEILLANCE SYSTEM

N.65.3.1. The system will require pre-wiring for (6) six internal cameras, (1) external camera, and (1) one GPS antenna and wired to the secured electrical cabinet in support of an Apollo System. The GPS antenna shall be roof mounted. An event / status indicator switch shall be located on the right side of the operator's dash. The DVR will be installed by transit agency.

N.65.4. ELECTRONICS/EQUIPMENT COMPARTMENT

N.65.4.1. Each bus shall be equipped a fully sealed compartment located on the left front wheelhouse to provide a mounting location for radio equipment, video recording equipment, APC equipment and other electronic equipment. The compartment shall be lockable, completely water resistant and of steel construction. It shall be accessible from inside the bus, shall have 3 slide trays that automatically lock into place for easy maintenance of the equipment. The compartment shall be water resistant when the service door is secured. The compartment shall be supplied with power and ground circuit requirements.

N.65.4.2. A location convenient to the operator shall be provided for the radio control head, speaker and handset. The antenna mounting and lead termination shall be accessible from the bus interior. Conduit shall lead to the radio compartment and shall have a minimum bend radius adequate for easy pulling of coaxial cable. An access plate shall be provided in the ceiling. The compartment door shall have a lock. A sealing provision (gasket) shall be incorporated in the door of this compartment. The radio compartment finish shall be powder coated Black, standard black, or agency designated color.

N.65.5. VOICE ANNUNCIATION AND ITS

N.65.5.1. A Luminator automated voice announcement system shall be integrated into the ITS solution. Proposers will be required to contact Luminator for detailed requirements of procuring agencies architecture and pricing.

N.65.5.2. NOTE: As an option, the TFT INFOtransit system will be made available and priced separately.

N.66. WARRANTY REQUIREMENTS

N.66.1. The contractor warrants and guarantees to the original Agency submitting PO, each complete bus and specific subsystem and components for 100% parts and labor as follows:

N.66.1.1. OEM standard factory warranties for chassis and engine.

N.66.1.2. Add-on components shall have component manufacture's standard warranty.

N.66.1.3. Warranty shall begin on the date that the vehicle delivery is accepted by the agency issuing the purchase order.

N.67. PRE-AWARD AUDIT:

N.67.1. The vehicles are not considered delivered to the purchasing agency until the required FTA documents are completed by an ODOT staff member. A Pre-Award Audit shall be conducted to determine if the bid proposal specifications. The bidder shall submit documents, which include certification of the manufacturer's compliance with the Federal Transit Administration (FTA) Pre-Award Buy America Audit Requirements. The document submitted shall include the following information for each major component used on vehicle bid:

N.67.1.1. Name and address of each supplier.

N.67.1.2. Cost of each major component and subcomponent. In order to protect proprietary information, the document may reflect the percentage of total cost each item represents instead of the actual cost.

N.67.1.3. Country of origin of each major component and subcomponent.

N.67.1.4. Name and address of company where final assembly occurs.

N.67.1.5. Cost of final assembly

N.67.1.6. Signature of authorized representative of vehicle manufacturer.

N.68. POST- DELIVERY AUDIT

N.68.1. A Post Delivery Audit of the vehicle(s) shall be conducted at the purchaser's facility, to determine that the completed vehicle(s) meets specifications. Once this process has been satisfactorily completed, the vehicle(s) shall be considered acceptable.

N.69. ACCESSIBILITY REQUIREMENTS

N.69.1. When submitting a bid for an accessible vehicle for the disabled, the vendor shall provide a list of the vehicle related equipment illustrating the component cost and related installation charges. The purpose of this list is to reflect an accurate cost for those vehicle related items, which are required to make the vehicle accessible to the disabled.

N.70. ACCEPTANCE OF VEHICLES

N.70.1. Upon delivery at the designed location specified within this document the final acceptance will occur after the vehicles have been inspected, road tested and all FTA required post audit delivery requirements have been met.

N.70.2. All vehicles shall be insured by the bidder until the post audit delivery has been conducted at minimum.

N.70.3. The Offeror shall submit for review by the agency a completely filled-in Vehicle Technical Information form to confirm his proposed vehicle and components are in compliance with the requirements. A separate form is to be completed for each length and/or fuel type of bus proposed. Brochures/Manufacture specification sheet will not be accepted for the following items.

N.70.4. BUS MANUFACTURER

BUS MANUFACTURER	
MODEL NUMBER	

N.70.5. DIMENSIONS

OVERALL VEHICLE LENGTH	
OVERALL VEHICLE LENGTH (OVER BUMPERS)	
OVERALL VEHICLE LENGTH (OVER BODY)	
OVERALL VEHICLE WIDTH	
OVERALL VEHICLE WIDTH (EXCLUDING MIRRORS)	
OVERALL VEHICLE WIDTH (INCLUDING MIRRORS)	
OVERALL VEHICLE HEIGHT	
OVERALL HEIGHT (MAXIMUM)	

N.70.6. ENGINE

MANUFACTURER	
TYPE	
MODEL NUMBER	
NET SAE HORSEPOWER	

NET SAE TORQUE	
----------------	--

N.70.7. TURBO CHARGER

MAKE	
MODEL	

N.70.8. TRANSMISSION

MANUFACTURER	
TYPE	
MODEL NUMBER	
SPEEDS	

N.70.9. VOLTAGE REGULATOR

MANUFACTURER	
MODEL	

N.70.10. VOLTAGE EQUALIZER

MANUFACTURER	
MODEL	

N.70.11. ALTERNATOR

MANUFACTURER	
TYPE	
MODEL	

N.70.12. STARTER MOTOR

MANUFACTURER	
TYPE	
MODEL	

N.70.13. AIR COMPRESSOR

MANUFACTURER	
TYPE	

N.70.14. AXLE, FRONT

MANUFACTURER	
TYPE	
MODEL	

N.70.15. AXLE, REAR

MANUFACTURER	
TYPE	
MODEL	

N.70.16. SUSPENSION SYSTEM

MANUFACTURER	
TYPE: FRONT	
TYPE: REAR	
SPRINGS: FRONT	
SPRINGS: REAR	

N.70.17. WHEELS AND TIRES**N.70.17.1. Wheels**

MAKE	
SIZE	
CAPACITY (LBS)	
MATERIAL	

N.70.17.2. Tires

MAKE	
SIZE	
CAPACITY (LBS)	
MATERIAL	

N.70.18. STEERING, POWER**N.70.18.1. Pump**

MANUFACTURER	
MODEL NUMBER	
TYPE	
RELIEF PRESSURE (PSI)	

N.70.19. BOOSTER/GEAR BOX

MANUFACTURER	
TYPE	
MODEL	

N.70.20. STERRING WHEEL

MANUFACTURER	
DIAMETER	

N.70.21. BRAKES

MADKE OF FUNDATMENTAL BREAK SYSTM	
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N.70.22. COOLING SYSTEM

MANUFACTURER	
TYPE	
MODEL NUMBER	
TOTAL COOLING AND HEATING SYSTEM CAPACITY (GALS)	

N.70.23. AIR RESERVOIR CAPACITY

SUPPLY RESERVOIR (CUBIC INCHES)	
PRIMARY RESERVOIR (CUBIC INCHES)	

N.70.24. HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

HEATING SYSTEM CAPACITY (BTU)	
AIR CONDITIONING CAPACITY (BTU)	
VENTILATING CAPCITY (CFM)	

N.70.25. DOORS:**N.70.25.1. Front**

MANUFACTURER OF OPERATING EQUIPMENT	
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TYPE OF DOOR	
TYPE OF OPERATING EQUIPMENT	

N.70.25.2. Rear

MANUFACTURER OF OPERATING EQUIPMENT	
TYPE OF DOOR	
TYPE OF OPERATING EQUIPMENT	

N.70.26. PASSENGER WINDOWS

MANUFACTURER	
MODEL	
TYPE	

N.70.27. SEATS

MANUFACTURER	
MODEL	
TYPE	

N.70.28. PAINT

MANUFACTURER	
TYPE	

N.70.29. WHEELCHAIR RAMP EQUIPMENT

MANUFACTURER	
MODEL NUMBER	
TYPE	
CAPCITY (LBS)	
WIDTH OF PLATFORM (IN)	
LENGTH OF PLATFORM (IN)	

N.70.30. WHEELCHAIR SECUREMENT EQUIPMENT

MANUFACTURER	
MODEL NUMBER	

N.70.31. DESTINATION SIGNS

MANUFACTURER	
MODEL	
TYPE	

N.70.32. MULTIPLEX SYSTEM

MANUFACTURER	
MODEL NUMBER	

N.70.33. BATTERIES

MANUFACTURER	
MODEL	
TYPE	

N.70.34. PASSENGER INTERIOR LIGHTING

MANUFACTURER	
MODEL	

N.70.35. GPS

MANUFACTURER	
MODEL	

N.70.36. P.A. System

MANUFACTURER	MODEL NUMBER
AMPLIFIER	
MICROPHONE	
INTERNAL SPEAKERS	

N.70.37. BASE COST PER BUS

BASE VEHICLE	COST PER UNIT
30 FOOT TRANSIT BUS	
35 FOOT TRANSIT BUS	
40 FOOT TRANSIT BUS	

N.71. PROPOSAL EXCEPTIONS

Supplier must list any exceptions here to be used as a part of the proposal evaluation and analysis. Please list the roman numerical on the standard specs or the number for the options when listing any proposal exceptions.

O. SOLICITATION SPECIFICATIONS FOR FRONT RAMP FULL-SIZE CONVERSION VAN

O.1. DELIVERY

- O.1.1.** Vehicle must be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following:
 - O.1.1.1.** The vehicle must have a full tank of fuel when delivered.
 - O.1.1.2.** Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
 - O.1.1.3.** All parts added, as part of the modification process shall be new.
 - O.1.1.4.** Headlights properly aligned
 - O.1.1.5.** Engine Tuned
 - O.1.1.6.** All accessories properly adjusted
 - O.1.1.7.** Electrical, braking and suspension systems inspected
 - O.1.1.8.** Both batteries Charged
 - O.1.1.9.** Front-end aligned, all wheels balanced, including spare
 - O.1.1.10.** All lubricants checked, and greased if needed
 - O.1.1.11.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
 - O.1.1.12.** Warranty papers and owner's guide
 - O.1.1.13.** Exterior and interior cleaned and washed.
 - O.1.1.14.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.
 - O.1.1.15.** Under no circumstances are tow vehicles to be attached to any buses.
 - O.1.1.16.** Each vehicle must be delivered to the agency submitting the P.O.

O.2. CERTIFICATE OF ORIGINS

- O.2.1.** Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order **five** business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery **is not acceptable**.

O.3. NOTIFICATION

- O.3.1.** Vendor shall notify buyer of vehicle delivery **ten** business days prior. If these specifications contradict any listed in the Federal Regulations, they are superseded by those of the Federal Regulations.

O.4. NO PROTOTYPES

- O.4.1.** Vehicle must be a ccurrent production Model type van that has been in Production for a minimum of one year.

O.5. BODY STRUCTURE

- O.5.1.** Standard van body shall meet all stated specification. The vehicle shall be reinforced such that the structural of the basic van is not degraded.
- O.5.2.** Absolutely No cutting, Welding, or drilling will be allowed on high strength chassis structure such as Structural high strength Boron Steel.
- O.5.3.** Vehicles shall meet all applicable requirements of the Americans with Disabilities Act (ADA As set forth in CFR 37 and 38, issued September 6, 1991, with respect to the body.

O.6. OEM CHASSIS FRAME AND BODY

- O.6.1.** Dodge Ram Pro Master 3500 extended body with H2 rood VF3L17, 159" wheelbase wagon with single rear wheels or Approved Equal. Vehicle must have deluxe interior and exterior trim.

O.7. DOORS

- O.7.1.** Vehicle must have a Bus Style Entry Doorway with Dark Deep tinted privacy glass on Bus Doorway.

- O.7.1.1.** A bus style entry doorway shall be included rear of the curbside B pillar.
- O.7.1.2.** The bus style entry doorway shall be A & M Brand or Approved Equal.
- O.7.1.3.** The minimum clear entry width shall be 32"
- O.7.1.4.** There shall be no steps to enter the vehicle and the floor shall be a maximum of 10" from the ground.
- O.7.1.5.** The left and right vertical sides of the doorway shall be cut and fit to match the contour of the chassis body. No metal edge should extend outward from the contour of the chassis body more than 2".
- O.7.1.6.** No cutting of chassis reinforcing structural steel, such as Boron Steel will be allowed.
- O.7.1.7.** Stainless Steel Assist Handrails on the Interior Left and Right of the Doorway Structure shall be Included. Stainless steel grab rails shall be installed parallel to the ramp on left and right panels of passenger entrance door for use by passengers entering and exiting the van.
- O.7.1.8.** An L.E.D. Light that automatically illuminates when the Doorway is opened shall be Included.

O.8. WHEELCHAIR LIFT DOORS

- O.8.1.** A manually operated wheel chair ramp shall be mounted in the passenger entrance door opening and shall swing away and stow to allow ambulatory passenger ingress and egress.
- O.8.1.1.** Ramp shall have a minimum clear opening of 32" and have a rated capacity of at least 800 lbs.

O.9. DOOR LOCKS

- O.9.1.** All doors shall be equipped with a lock.

O.10. DRIVER'S DOOR AND CO-PILOT'S DOOR

- O.10.1.** Must have Power windows and Power door locks

O.11. RUNNING BOARDS

- O.11.1.** Vehicle must have Extra Heavy-duty Running Boards for Driver door and Co-Pilot's door.
- O.11.1.1.** The steps shall be constructed of galvanized one inch square 11 gauge steel tubing or angle iron and have cross center braces and be tested at 800 lbs.
- O.11.1.2.** The steps surface shall be made of expanded galvanized steel to allow debris and water run-off.
- O.11.1.3.** The steps shall be properly braced and secured to the van and be capable of supporting a minimum of 800 lbs.

O.12. HANDRAIL

- O.12.1.** Handrails must be stainless Steel that will not rattle or Flex and mounting bolts shall be bolted into stainless steel.
- O.12.1.1.** Handrails (left and right) of the front passenger door shall be provided. Cross-sectional diameter of handrail shall be between 1 ¼" and 1½".
- O.12.1.2.** Entrance handrails shall not be padded.
- O.12.1.3.** Must have at minimum a wall thickness of 18 gauge steel.
- O.12.1.4.** Wood mounting is not allowed.

O.13. INTERIOR

- O.13.1.** All interior panels, materials, and treatments shall meet all FMVSS 302 requirements.
- O.13.2.** Interior wall and ceiling paneling in passenger compartment shall be molded ABS plastic.
- O.13.3.** The Drivers Side Ejection Mitigation Air Bag shall be retained.
- O.13.4.** Vendor shall provide a list of available colors at their quoted price and may also include a list of colors available at additional cost.
- O.13.5.** The headliner shall be OEM.

O.14. FLOOR ASSEMBLY

- O.14.1.** The lowered subfloor structure shall consist of 2" x 2" tubular steel with ¼" plate steel subfloor. The use of plywood for a subfloor will not be accepted.
- O.14.1.1.** The floor covering shall be wall-to-wall hard fire-resistant slip-resistant, transit quality flooring securely bonded to the plate floor with waterproof adhesive.
- O.14.1.2.** Acceptable Flooring Brands are Altro, or other Approved Equal.

O.15. SLIP-RESISTANT FLOOR COVERING

- O.15.1.** Floor covering shall be slip resistant vinyl flooring, constructed with aluminum oxide, silicon carbide and optional PVC chip blended throughout a high quality vinyl wear surface.
 - O.15.1.1.** Top coating is not acceptable.
 - O.15.1.2.** Backing to be polyester/cellulose material with fiberglass fiber reinforced center scrim for additional durability.
 - O.15.1.3.** Bacteriostats will be incorporated providing all exposed surfaces with excellent anti-bacterial properties.
 - O.15.1.4.** Must be Altro Chroma with a minimum thickness of 2.2 millimeters or equivalent
 - O.15.1.5.** Color to be selected from current Altro color range by each agency.
 - O.15.1.6.** The whole floor will be a uniform thickness throughout the vehicle, eliminating the need for ribbed surfaces, while exceeding the ADA minimum slip resistance standard rating of .06 static coefficient of friction under dry or wet conditions.
 - O.15.1.7.** Seams must be heat welded to provide a permanent waterproof seal against water penetration leading to premature sub-floor failure or curling leading to possible tripping hazards.
 - O.15.1.8.** Landing area and step edgings are to be Altro yellow safety vinyl edging.
 - O.15.1.9.** Edging is to be heat welded to the main floor and step tread to provide for a long lasting seam.
 - O.15.1.10.** The floor must be installed according to manufacturer's directions using proper tools, accessories and adhesives.
- O.15.2.** NOTE: If the flooring is not installed according to the flooring manufacture (heat welded and adhesives) specifications the vehicle will not be accepted.

O.16. DRIVER CONTROLS

- O.16.1.** Instrument panel, dash controls and features to be included;
 - O.16.1.1.** Dash shall be color coordinated with interior trim color.
 - O.16.1.2.** Glove box with light and lock to be provided, if available from chassis Mfr.
 - O.16.1.3.** All controls and switches shall be within easy reach of the driver.
 - O.16.1.4.** Overhead switches or controls must be in easy reach of driver.
 - O.16.1.5.** Lights in lieu of gauges are not acceptable except where noted.
 - O.16.1.6.** Power door locks with remote entry and Two Keys and Two Fobs are required
 - O.16.1.7.** Power windows are required
 - O.16.1.8.** Power / Heated mirrors with turn signal flashers are required
 - O.16.1.9.** Mirrors must have OEM power fold in option.
 - O.16.1.10.** A tilting telescopic steering wheel shall be included
 - O.16.1.11.** Chassis OEM Cruise Control is required
 - O.16.1.12.** AM/FM/CD/MP3 stereo system shall be provided. This system must be touch screen and have an incorporated backup camera monitor and blue tooth connectivity.
 - O.16.1.13.** Instrument panel and dash shall be equipped with the following OEM instruments, gauges, and controls:
 - O.16.1.13.1.** Tachometer , Speedometer with odometer and trip odometer
 - O.16.1.13.2.** Oil pressure gauge
 - O.16.1.13.3.** Engine coolant temperature
 - O.16.1.13.4.** Fuel gauge
 - O.16.1.13.5.** Upper beam head lamp indicator (light)
 - O.16.1.13.6.** Dual-note horn
 - O.16.1.13.7.** Directional signals (light)
 - O.16.1.13.8.** Parking brake on (light)

- O.16.1.13.9. Headlight switch
- O.16.1.13.10. Inside hood release
- O.16.1.13.11. Controls for heater, defroster, and air conditioner
- O.16.1.13.12. 12 Volt Power outlet
- O.16.1.13.13. OEM chassis manufacturer's radio (see above for spec)
- O.16.1.13.14. Digital clock
- O.16.1.13.15. Windshield wiper w/two speed, intermittent, and washer
- O.16.1.13.16. Emergency flashers

O.17. BUMPERS

- O.17.1.** A Bumper Front and rear must be OEM Manufacture's standard.

O.18. AIR CONDITIONING AND HEATING

- O.18.1.** Vehicle shall have the following;
 - O.18.1.1.** OEM chassis front and rear heating and A/C system required.
 - O.18.1.2.** Front/Rear heater and front defroster shall be OEM chassis with the maximum BTU rating available from chassis mfr.
 - O.18.1.3.** Front/Rear, high capacity A/C system required.
 - O.18.1.4.** Dash unit shall be separately controlled from auxiliary system.

O.19. SAFETY EQUIPMENT

- O.19.1.** All miscellaneous equipment must be secured to the vehicle and easily accessible.
 - O.19.1.1.** First aid kit: (24M – National Standard School Bus Metal
 - O.19.1.2.** Must be Certified Safety Mfg. Model S203-045 or equivalent.
 - O.19.1.3.** Fire extinguisher – Multi-purpose Stored Pressure Dry Chemical Extinguisher.
 - O.19.1.4.** Must be a 5 lb. type 3A:40B: C Pro Line, Kiddie Model # FXBND9 or equivalent.
 - O.19.1.5.** Must have a gauge to indicate state of charge and mounted to vehicle using a bracket and having a heavy duty vinyl cover.
 - O.19.1.6.** Triangle warning devices (3), with storage container.
 - O.19.1.7.** must meet FMVSSP # 125
 - O.19.1.8.** Blood borne Pathogens infection control kit.
 - O.19.1.8.1. Must be Certified Safety Mfg. Model #FK200-931, or equivalent.
 - O.19.1.8.2. Seat belt cutter

O.20. MIRRORS

- O.20.1.** Vehicle exterior mirrors;
 - O.20.1.1.** OEM chassis power /heated dual exterior rearview mirrors shall be included
 - O.20.1.1.1. Black matt or stainless finish
 - O.20.1.1.2. For Safety an Integrated Turn signal is Required
 - O.20.1.1.3. A Convex Lower Mirror shall be Included.
- O.20.2.** Vehicle interior mirrors;
 - O.20.2.1.** Vehicle must have OEM windshield mounted mirror
 - O.20.2.2.** OEM chassis driver's and Co-pilot sun visor, rear view mirror, and airbag required.

O.21. SEATS

- O.21.1.** Driver's Seat and Co-pilot Seat:
 - O.21.1.1.** Driver's and co-pilot seats shall be deluxe high back, fully padded, Cloth contoured bucket types of heavy-duty construction with an armrest.
 - O.21.1.2.** The driver's seat shall be easily adjusted forward and backward without the use of tools.

O.21.1.3. OEM three point restraint system is required. Upholstery shall be color- keyed to the passenger seats.

O.21.2. NOTE: Bidder must supply seating diagram reflecting all listed dimensions for approval.

O.22. PASSENGER SEATS

O.22.1. Seating shall be provided for seven (7) ambulatory passengers and one wheelchair securement station. (See options for additional wheelchair securement station and fold down seats and floor plans).

O.22.1.1. All seats shall be cloth.

O.22.1.2. Fixed or Folding seats may be Chassis OEM, Freedman, or approved equal and shall be a minimum of 17.5" wide and 16" deep.

O.22.1.3. The seat back cushion shall measure a minimum of 17", shall provide lumbar support and utilize channeling to aid lateral stability.

O.22.1.4. When any aftermarket seat is used. Seating shall be Freedman series GO-ES or approved equal, and be compliant with FMVSS 208.

O.22.1.5. Bolting seats to plywood floor without bolting into structural steel under floor is NOT ALLOWED.

O.23. PASSENGER RESTRAINT SYSTEM

O.23.1. All restraints and retractors must meet all FMVSS 208 regulations.

O.23.1.1. Wheelchair occupant restraint systems shall be compliant with FMVSS 49.38.

O.23.1.2. Successful Pull Test results from an A2LA Accredited Laboratory, including Pictures shall be included with all RFP Responses.

O.24. COLOR OF SEATS

O.24.1. Bid must include all colors available

O.24.2. Successful vendor shall coordinate with the agency issuing this purchase order in the selection of material and color of the seats.

O.25. PRIORITY SEATING SIGNS

O.25.1. Each vehicle shall contain a sign which indicates that the seats in the front of the vehicle are priority seats for people with disabilities.

O.25.2. Each wheelchair station location shall be designated as such.

O.25.3. The signs shall be in compliance with CFR 38, subpart 38.27 and the appendix to it.

O.26. LIGHTING

O.26.1. Vehicle interior Lightings;

O.26.1.1. The interior of the vehicle shall be illuminated by OEM interior lighting.

O.26.1.2. The lighting fixtures shall be controlled by the chassis OEM lighting switch.

O.26.1.3. The instrument panel must be illuminated to allow the driver to see all the controls at night.

O.26.1.4. Chassis OEM instrument panel switch shall control the intensity of the lights.

O.26.1.5. All door lights and the side passenger door shall illuminate automatically when doors are opened.

O.26.1.6. L.E.D. Lighting shall be required to illuminate on the lift.

O.26.2. Vehicle exterior Lighting;

O.26.2.1. Exterior lighting shall meet all State and Federal Regulations.

O.26.2.2. A Third High Mounted Center Brake Lamp shall be Included

O.27. ELECTRICAL WIRING

O.27.1. Vehicle wiring shall be ran inside the body and be located in a protected area.

O.27.2. Any wiring that is exposed to the elements shall be non-metallic loomed and securely clipped every 18" for maximum protection.

O.27.3. Clips shall be rubber or plastic coated to prevent their cutting thru the wiring insulation.

O.27.4. Protective grommets shall be installed at all points where wiring penetrates metal and other materials.

O.27.5. Circuit breakers and electrical panels shall be in easily accessible location.

- O.27.6.** No lock wire connectors will be allowed.
- O.27.7.** Grounding off components shall be thru polarized shielded terminals wired to main structural ground points.
- O.27.8.** All accessories and electrical equipment except head and parking lights, emergency flashers, dome light(s), and wheelchair lift shall be wired through the vehicle ignition switch so as to be operative only with the switch in "on" or accessory" position.

O.28. WINDOWS

- O.28.1.** Windshield and front most doors: Chassis OEM standard with standard tint and remainder of windows must have;
 - O.28.1.1.** Dark OEM deep privacy tint.
 - O.28.1.2.** An Electric Defogger shall be included on the rear windows
 - O.28.1.3.** OEM chassis safety glass and capable of venting
 - O.28.1.4.** FMVSS: All windows (including windshield) and tinting shall meet all applicable FMVSS requirements.
- O.28.2.** NOTE: All windows and emergency exits must meet the performance and operational requirements as outlined in the Federal Motor Vehicle Safety Standards and Procedures.

O.29. SAFETY BACK-UP EQUIPMENT

- O.29.1.** An Audible Back-up Warning Device shall be included. The following shall be equipped If Chassis OEM, is available;
 - O.29.1.1.** A Rear View Camera with Dashboard Monitor that activates when the Transmission is placed in Reverse.
 - O.29.1.2.** A Back-Up Sensor System with Audible Alert Warnings.

O.30. WHEELCHAIR SECUREMENT

- O.30.1.** Wheelchair parking space shall have clear floor area of 30" wide by 52" long and be equipped with a four-point wheelchair securement tie-down.
- O.30.2.** Occupant restraint system must be Q'Straint Q-8306-SC or equivalent. Shall have a Retractable lap/shoulder belt combo with a Retractable height adjuster that are anchored to floor and wall that meet SAE J2249 and ADA requirements.
- O.30.3.** Slide N Click anchors must be bolted to structural steel.
- O.30.4.** Bolting to plywood floor without bolting into structural steel under floor IS NOT ALLOWED.
- O.30.5.** Wheel Chair Securement system must be Q'Straint QRT MAX Automatic Retractor System Q-8306-SC with Slide N Click anchorage system and J-Hooks, or equivalent.
- O.30.6.** There must be 52" at minimum and 54" maximum measured from center to center between front and rear Slide N Click anchor points. And be fully assembled and ready to use.
- O.30.7.** A metal Storage bin shall be provided to store belts when not in use
- O.30.8.** Must include eight (8) Q'Straint Q5-7580 Webbing Loops or equivalent for Securing Scooters. Wheelchair location must be in the rear of bus, one beside the other.

O.31. WHEELCHAIR STATIONS

- O.31.1.** At a minimum, one wheelchair station shall be provided in each vehicle. (See options for additional wheelchair securement station and fold down seats and floor plans)
- O.31.2.** Wheelchair stations are the spaces inside the vehicle for transporting people in wheelchairs and are to be provided on all vehicles.
- O.31.3.** Each wheelchair station shall consist of usable floor area in which a passenger in a wheelchair may be positioned and where the wheelchair occupant restraint systems and wheelchair securement devices are located.
- O.31.4.** Wheelchair stations will secure wheelchairs in a forward facing position only.
- O.31.5.** NOTE: Each wheelchair securement location shall have sign designating it as such. Lettering size and type on these signs shall comply with the Americans with disabilities Act Regulations.

O.32. WHEELCHAIR ACCESSIBILITY SYMBOL

- O.32.1.** The vehicle will display the international wheelchair accessibility symbol of a person in a wheelchair that is outlined in white on blue background.
- O.32.2.** This symbol will be placed on all four sides of the bus.

O.33. VEHICLE COLORS

O.33.1. Vendor to supply list of colors and prices available.

O.34. VEHICLE FLOOR PLAN

O.34.1. A proposed floor plan including all pertinent interior dimensions such as overall length, width, distance between seats, etc.

O.34.2. Shall be submitted with the bid proposal.

O.35. CHASSIS SPECIFICATIONS

O.35.1. Bidder must list chassis specs must be listed the spaces provided below:

SPECIFICATIONS	MINIMUM/MAXIMUM IN INCHES	SUPPLIER'S RESPONSE
OVERALL VEHICLE LENGTH	235" minimum	
OVERALL VEHICLE LENGTH	272" maximum	
OVERALL VEHICLE LENGTH EXTERIOR	80" minimum	
OVERALL VEHICLE LENGTH INTERIOR	70" minimum	
HEIGHT EXTERIOR	100" minimum	
HEIGHT EXTERIOR	120" maximum	
HEIGHT INTERIOR	73" minimum	
WHEELBASE	146" minimum	
WHEELBASE	150" maximum	

O.35.2. GVWR, axle, spring and tire:

O.35.2.1. 9,250 lb. GVWR minimum

O.35.2.2. NOTE: It is the bidder's responsibility to calculate the actual loaded weight, spring and axle ratings so that the vehicle is engineered for safety.

O.36. WHEELS AND TIRES

O.36.1. Wheel rim shall be mfr's standard for GVWR.

O.36.2. Tires – Seven (7, inc. full spare) steel belted, all season radial, to meet GVWR.

O.36.3. All tires shall be the same make or brand, shall be mounted on rims, and shall be balanced.

O.36.4. Hubcaps – Set of 2 required for front wheels.

O.37. ENGINE: GASOLINE

O.37.1. The engine shall be an electronically fuel injected six cylinder gasoline powered engine with the minimum displacement of 3.6 liters.

O.37.2. The engine shall be designed to have a useful life of at least 100,000 miles.

O.37.3. The engine shall be equipped with the largest external oil cooler available from the OEM MFR of the base van.

O.37.4. NOTE: The engine shall have a CNG/LPG gaseous engine prep package, if OEM is available.

O.38. RADIATOR

O.38.1. Heavy-duty radiator with capacity to prevent engine overheating while operating in stop and go transit operation in ambient temperatures as high as 110 degrees F and provide protection to -30 degrees F.

O.39. TRANSMISSION

O.39.1. Vehicle transmission shall be heaviest duty transmission available from OEM.

O.39.2. OEM auxiliary transmission oil-to-air cooling.

O.39.3. Dipstick and add oil filler tube shall be easily identifiable.

O.39.4. Automatic 6-speed with overdrive.

O.40. DRIVE SHAFT

- O.40.1.** The driveshaft shall be rated and capable of transmitting the torque multiplication of the engine/transmission to the drive wheels.
- O.40.2.** The chassis OEM shall balance the drive-shaft.
- O.40.3.** To prevent the driveshaft from hitting the ground a driveshaft guard shall be provided. A Chassis OEM guard is preferred.

O.41. BRAKES

- O.41.1.** Two (2) braking systems are required for the vehicle. Service brakes shall be dual hydraulic, disc front and disc rear.
- O.41.2.** The parking brake system shall be operated by a cable to the rear wheels, or Drive Shaft Drum Brake.
- O.41.3.** The braking system shall be adequate for the GVWR of the vehicle.

O.42. GEAR RATIO

- O.42.1.** OEM Standard gear ratio

O.43. FUEL CAPACITY

- O.43.1.** Fuel capacity must be largest available from chassis manufacture.

O.44. SUSPENSION SYSTEM

- O.44.1.** Suspension system shall be heavy duty and load rated for GVWR of the vehicle.
- O.44.2.** Shock absorbers shall be extra heavy duty gas and load rated, capable of controlling the ride when empty, as well as when loaded to maximum GVWR.
- O.44.3.** Independent MacPherson-strut
- O.44.4.** Leaf with Rear stabilizer bar required if available from OEM
- O.44.5.** A Chassis OEM Electronic Anti-Rollover System shall be included.

O.45. STEERING

- O.45.1.** Must have power-assisted steering

O.46. AIR CLEANER

- O.46.1.** Must have a heavy duty, dry type air cleaner

O.47. OIL FILTER

- O.47.1.** Must have a heavy duty, throw away type oil filter.

O.48. ALTERNATOR

- O.48.1.** Vehicle shall have OEM 220-amp Alternator.

O.49. BATTERIES

- O.49.1.** Two (2) heavy duty, maintenance free, OEM Batteries

O.50. STABILIZER BAR

- O.50.1.** Heavy Duty Front and rear

O.51. HORN

- O.51.1.** Must have a dual, electric horn.

O.52. SIGNAL

- O.52.1.** Directional and self-canceling with hazard warning flashers.

O.53. WINDSHIELD WIPERS

- O.53.1.** Minimum two speeds with intermittent feature and washer.

O.54. KEYS

- O.54.1.** Vehicle must include two (2) sets of keys and fobs.

O.55. RADIO

O.55.1. Must have an AM & FM CD radio

O.55.1.1. Radio must be of same manufacture as chassis. Radio must be mounted in the Chassis OEM Location in dash.

O.56. PAINTING, DECALS AND MONOGRAMS

O.56.1. All signs required by State and federal law shall be affixed to each vehicle exterior and interior.

O.56.2. It is up to the bus dealer/manufacture to add such signs and decals upon delivery of vehicle.

O.56.3. No decals, name plates, or painted identification of the bus dealer/manufacture are to be added to the vehicle.

O.57. WARRANTY REQUIREMENTS

O.57.1. The contractor warrants and guarantees to the original Agency submitting PO, each complete bus and specific subsystem and components for 100% parts and labor as follows:

O.57.1.1. OEM standard factory warranties for chassis and engine.

O.57.1.2. Add-on components shall have component manufacture's standard warranty.

O.57.1.3. Warranty shall begin on the date that the vehicle delivery is accepted by the agency issuing the purchase order.

O.58. GENERAL

O.58.1. All equipment cataloged as standard for the basic vehicle, unless superseded by these specifications, must be furnished and included in the purchase price of each vehicle. Complete printed specifications, published literature, and photos, or illustrations of the basic units that the bidder proposes to furnish with this bid must accompany each bid.

O.59. QUALITY OF MATERIALS

O.59.1. All materials and equipment used shall be built and/or attached in accordance with all applicable safety codes and design standards including but not limited to;

O.59.1.1. Society of Automotive Engineers (Electrical components and wiring, hydraulic components, fasteners)

O.59.1.2. American National Standards Institute (Chain drive and wire rope components)

O.59.1.3. American Welding Society (Welding code and recommended practices)

O.59.1.4. FMVSS

O.59.1.5. All parts shall be new.

O.59.1.6. All necessary servicing and adjustments shall be made on the equipment prior to delivery of the vehicle.

O.59.1.7. All exposed metal surfaces shall be painted or shall be corrosion-resistant.

O.60. PUBLICATIONS AND PRINTED MATERIALS

O.60.1. Each vehicle shall have a complete set of operation, quality assurance, and warranty publications. The information shall be organized in a three ring binder format with each sections clearly identified.

O.60.2. As built wiring diagram and as built parts manuals for body and all auxiliary equipment.

O.60.3. Maintenance and inspection schedule incorporating the required maintenance and inspection of the basic vehicle and its sub-systems.

O.60.4. Operator's manual: A complete operations manual and troubleshooting guide with a detailed manufacturer's parts list that covers the conversion features on the vehicle as listed in this specification. The manual will provide complete, comprehensive instructions for the wheelchair accessories, wheelchair list deployment, air conditioning system, tie downs, heater, deployment of seats, wiring diagram and related equipment.

O.60.5. Warranty papers for chassis, body, and additional equipment.

O.60.6. Warranty Information: Each vehicle must have a published listing of contractor warranty repair locations, including address, telephone number, and contact names for the State of Oklahoma.

O.61. PRE-AWARD AUDIT

O.61.1. The vehicles are not considered delivered to the purchasing agency until the required FTA documents are completed by an ODOT staff member. A Pre-Award Audit shall be conducted to determine if the bid proposal specifications. The bidder shall submit documents, which include certification of the manufacturer's compliance

with the Federal Transit Administration (FTA) Pre-Award Buy America Audit Requirements. The document submitted shall include the following information for each major component used on vehicle bid:

O.61.1.1. Name and address of each supplier.

O.61.1.2. Cost of each major component and subcomponent. In order to protect proprietary information, the document may reflect the percentage of total cost each item represents instead of the actual cost.

O.61.1.3. Country of origin of each major component and subcomponent.

O.61.1.4. Name and address of company where final assembly occurs.

O.61.1.5. Cost of final assembly

O.61.1.6. Signature of authorized representative of vehicle manufacturer.

O.62. POST- DELIVERY AUDIT

O.62.1. A Post Delivery Audit of the vehicle(s) shall be conducted at the purchaser's facility, to determine that the completed vehicle(s) meets specifications. Once this process has been satisfactorily completed, the vehicle(s) shall be considered acceptable.

O.63. ACCESSIBILITY REQUIREMENTS

O.63.1. When submitting a bid for an accessible vehicle for the disabled, the vendor shall provide a list of the vehicle related equipment illustrating the component cost and related installation charges. The purpose of this list is to reflect an accurate cost for those vehicle related items, which are required to make the vehicle accessible to the disabled.

O.64. ACCEPTANCE OF VEHICLES

O.64.1. Upon delivery at the designed location specified within this document the final acceptance will occur after the vehicles have been inspected, road tested and all FTA required post audit delivery requirements have been met.

O.64.2. All vehicles shall be insured by the bidder until the post audit delivery has been conducted at minimum.

O.64.3. All vehicles shall be insured by the bidder until the post audit delivery has been conducted at minimum.

O.65. TWO-WAY RADIO SYSTEM - UHF

O.65.1. ICOM F6021 UHF two-way Radio System with a PCTEL MUF4505 UHF antenna and coax or approved equal.

O.65.2. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

O.65.3. Radio must be mounted in an easy accessible location for the driver.

O.65.4. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

O.66. TWO-WAY RADIO SYSTEM - VHF

O.66.1. ICOM F5021 VHF two-way Radio System with a PCTEL MHB5800 VHF antenna and coax or approved equal.

O.66.2. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

O.66.3. Radio must be mounted in an easy accessible location for the driver.

O.66.4. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

O.67. TWO-WAY RADIO SYSTEM - 800 MHZ

O.67.1. Kenwood NX-900K 800 mhz two-way Radio System with a PCTEL MUF8003 antenna and coax or approved equal.

O.67.2. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

O.67.3. Radio must be mounted in an easy accessible location for the driver.

O.67.4. Radio must be programmed with the correct Frequencies and the antenna tuned for agency issuing this purchase.

O.68. BODY STRIPE

O.68.1. 4" Body Strip, painted or vinyl.

O.69. OUTSIDE PASSENGER DOOR SWITCH

O.69.1. Outside keyed electric passenger door switch outside. Switch must be water proof.

O.70. BUS CAMERA SYSTEM

O.70.1. REI Bus-Watch R4001 with 500GB Hard drive and four cameras or approved equal. Successful vendor shall coordinate with the agency issuing this purchase for location of Camera's.

O.71. INTEGRATED CHILD SEAT

O.71.1. Integrated Child Restraint Seat must be a **Freedman** Seating ICS-10 or equivalent

O.71.2. Must have an integrated 4-point **safety harness**. for children 22-78 Lbs with under seat retractor **seat belts** for adults

O.72. VINYL SEATS DELETE

O.72.1. This will be a price deduction from the durable transit style cloth fabrics.

O.72.2. Vinyl deduction is for passenger seats only

O.72.3. Pilot and co-pilot seats shall be XLT OEM cloth fabric

O.73. DIESEL ENGINE

O.73.1. 3.0L Turbo Diesel I5 with Manual Regen Initiation with Active Regen inhibitor.

O.74. 2 PASS. CLOTH BENCH

O.74.1. 2 passenger cloth bench seat with 3 point occupant restraints

O.75. 1 PASS. CLOTH BENCH

O.75.1. 1 passenger cloth bench seat with 3 point occupant restraints

O.76. CNG CONVERSION CHASSIS

O.76.1. OEM engine shall be converted to operate on dedicated CNG. A World NGV or approved equal shall be provided. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional control module will be accepted. Dual fuel systems will not be accepted. System must comply with the following;

O.76.1.1. Closed-loop fuel control

O.76.1.2. Sequential fuel injection (SFI)

O.76.1.3. Optimized ignition timing

O.76.1.4. Must maintain original fault codes (DTCs)

O.76.1.5. Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner

O.76.1.6. CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.

O.76.1.7. The minimum CNG tank capacity on the conversion vans should be at least 19 Gasoline Gallon Equivalent.

O.76.1.8. Must provide a detailed floor plan of the placement of the CNG tanks and any seats that have to be deleted.

O.76.1.9. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

O.77. 2 ADDITIONAL KEYS WITH REMOTE FOBS

O.78. REAR MOUNTED A/C EVAPORATOR

O.78.1. A/C evaporator mounted in rear of can in lieu of in bulkhead. This option allows OEM storage compartment in bulkhead to be utilized.

O.79. ADDITIONAL WHEELCHAIR SECUREMENT POSITION

O.79.1. OEM engine shall be converted to operate on dedicated CNG. A World NGV or approved equal

O.80. BUS BODY IN LIEU OF VAN BODY, VENDOR MUST SUBMIT PROPOSED FLOOR PLAN(s) AND SPECIFICATIONS

O.80.1. The vehicle chassis meeting all chassis specs mentioned within specs but with a bus body in lieu of the complete can body.

O.81. MEMO/PAMPHLET RACK

O.81.1. The memo/Pamphlet rack will be bolted to inside side wall of bus. (See Figure 2)

O.82. TDSS FOLD AWAY SEAT

O.82.1. Seat will be bolted to structural steel. (See Figure 3)

O.83. METAL BOX

O.83.1. Metal box should be bolted and placed between the passenger and driver's seat. (See Figure 4)

O.84. SEAT BELT EXTENSIONS

O.84.1. Extra Seat belt Extensions

SECTION “O”

FRONT RAMP FULL-SIZE CONVERSION VAN

RESPONSE SHEET

BASE VEHICLE COST PER UNIT

BASE VEHICLE	COST PER UNIT
TRANSIT VAN (GAS ENGINE)	\$

CHASSIS SPECIFICATIONS

Specify Overall Vehicle Length (outside of front bumper to outside of Rear bumper): _____

OPTIONAL ITEMS	COST PER ITEM
TWO-WAY RADIO (UHF)	
TWO-WAY RADIO (VHF)	
TWO-WAY RADIO (800 MHZ)	
BODY STRIPE	
OUTSIDE PASSENGER DOOR SWITCH	
BUS CAMERA SYSTEM	
INTEGRATED CHILD SEATS	
VINYL SEATS	
DIESEL ENGINE 2 PASSENGER CLOTH BENCH SEAT	
DIESEL ENGINE 1 PASSENGER CLOTH BENCH SEAT	
DIESEL ENGINE OEM EXTERIOR COLOR OTHER THAN WHITE	
10 WAY POWER DRIVERS SEAT	
CNG CONVERSION	
2 ADDITIONAL KEYS WITH REMOTE FOBS	
REAR MOUNTED A/C EVAPORATOR	
ADDITIONAL WHEELCHAIR SECUREMENT POSITION	
BUS BODY IN LIEU OF VAN BODY	
MEMO/PAMPHLET RACK	
FREEMAN SEATING TDSS (OR EQUIVALENT) FOLD AWAY SEAT	
METAL BOX	
EXTRA SEAT BELT EXTENSIONS	

A LIST OF OPTIONAL EQUIPMENT AND/OR ACCESSORIES SHALL BE PROVIDED. THE LIST MUST CONTAIN:

- Item
- Description and functionality detail
- Cost of item installed in final delivery of vehicle
- Any changes to listed specifications as outlined above to accommodate options

BID EXCEPTIONS

Supplier must list any exceptions here to be used as a part of the Proposal evaluation and analysis. Please list the roman numerical on the standard specs or the number for the options when listing any Proposal exceptions.

FIGURE 1

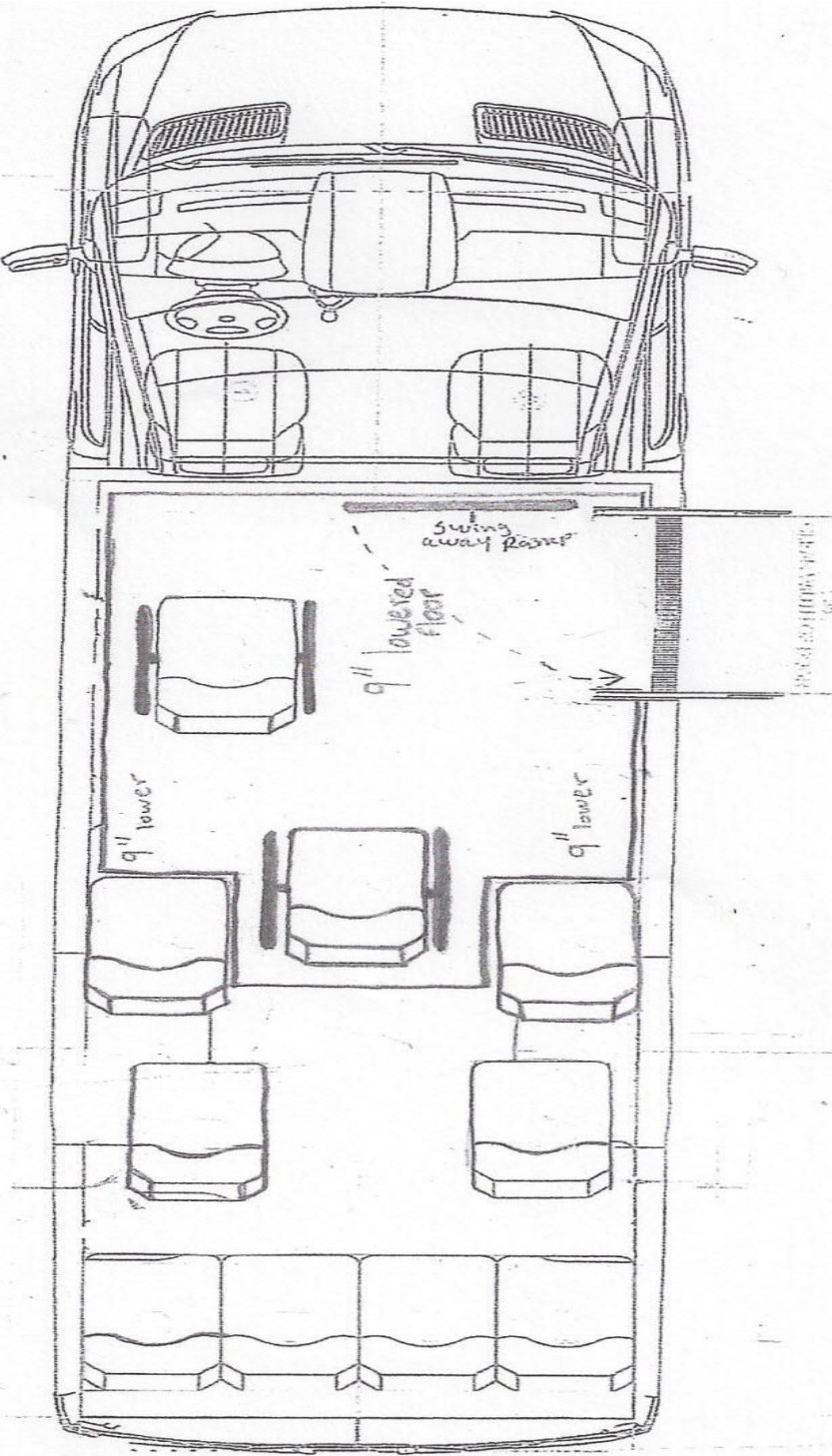


FIGURE 2



FIGURE 3



FIGURE 4



P. SOLICITATION SPECIFICATIONS FOR LOW FLOOR ADA TROLLEY

P.1. DELIVERY

- P.1.1.** Vehicle to be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following:
- P.1.1.1.** The vehicle must have a full tank of fuel when delivered.
 - P.1.1.2.** Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
 - P.1.1.3.** All parts added, as part of the modification process shall be new.
 - P.1.1.4.** Headlights properly aligned
 - P.1.1.5.** Engine Tuned
 - P.1.1.6.** All accessories properly adjusted
 - P.1.1.7.** Electrical, braking and suspension systems inspected
 - P.1.1.8.** Both batteries Charged
 - P.1.1.9.** Front-end aligned, all wheels balanced, including spare
 - P.1.1.10.** All lubricants checked, and greased if needed
 - P.1.1.11.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
 - P.1.1.12.** Warranty papers and owner's guide
 - P.1.1.13.** Exterior and interior cleaned and washed.
 - P.1.1.14.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.
 - P.1.1.15.** Under no circumstances are tow vehicles to be attached to any buses.
 - P.1.1.16.** Each vehicle must be delivered to the agency submitting the P.O.

P.2. CERTIFICATE OF ORIGINS

- P.2.1.** Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order **five** business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery **is not acceptable**.

P.3. NOTIFICATION

- P.3.1.** Vendor shall notify buyer of vehicle delivery **ten** business days prior. NOTE: If these specifications contradict any listed in the Federal Regulations, they are superseded by those of the Federal Regulations.

P.4. NO PROTOTYPES

- P.4.1.** Vehicle must be a ccurrent production Model type van that has been in Production for a minimum of one year.

P.5. TROLLEY BUS TECHNICAL SPECIFICATIONS

- P.5.1.** The new trolley buses shall be a low floor configuration compatible with an urban transit service environment and conform as closely as possible to the following physical requirements:

P.5.2. Principal Dimensions

LENGTH OVERALL – EXCLUDING COWCATCHER	34'
BODY WIDTH-EXCLUDING MIRRORS	99"
HEIGHT OVERALL	129"
INTERIOR HEADROOM - OVER AISLE	98"
GROSS VEHICLE WEIGHT RATING	29,000 LBS
WHEELBASES	196" & 228"
REAR BODY OVERHANG	121"

FIRST STEP HEIGHT	15"
KNEELING	11"
DROP FLOOR ENTRANCE WITH KNEELING	8"
STEP RISERS	N/A
FLOOR HEIGHT	15.5" MAXIMUM
aisle width	22" MINIMUM
CLEAR DOOR OPENING	42" MINIMUM
PASSENGER CAPACITIES	28-40
TURNING RADIUS	52°
FUEL CAPACITY	65 GALLONS

P.6. PHYSICAL CHARACTERISTICS

HVAC	MOBILE CLIMATE CONTROL RM35
FRONT/REAR AXLE	MERITOR
WHEELS	ALUMINUM DURABRITE
TIRES	MECHELIN 225/OR22.5 TO 305/85R22.5
ABS BRAKES	WABCO
MOISTURE EJECTOR/AIR DRYER	GRAHM WHITE OR WABCO
ENGINE	CUMMINS ISB
TRANSMISSION	ALLISON B300
FLOOR COVERING	ALTRO GERFLOR
SUB FLOOR	SYTHETIC COMPOSITE
STANCHIONS/HANDLES/GRAB RAILS	BRASS OR BRUSHED STAINLESS
DOOR CONTROL	DRIVER CONTROLLED
WHEEL CHAIR LIFT/RAMP	LIFT U18 OR RICON 621S RAMP
SEATING	TRAM WITH OAK OR MAHOGANY STATS
DRIVER SEAT	USSC 9100ALX3 OR EQUAL
FIRE SUPPRESSION	ALFEX OR EQUAL
SECURITY SYSTEM	SAFETY VSION RR7000 OR EQUAL
FARE COLLECTION	GENFARE OR DIAMOND D
PAINT	TRI COLOR WITH CLEARCOAT
BIKE RACKS	SPORTWORKS DL2 OR DL3
DESTINATION SIGNS	LUMINATOR OR EQUAL
PASSENGER COUNTER	TRAPEZE OR TSO
CAD/AVL SYSTEMS	TRAPEZE OR TSO

P.6.1. The Manufacture shall provide detailed parts and maintenance manuals for trolley buses and subsystems as specified herein.

P.7. GENERAL

P.7.1. These specifications cover requirements for Low Floor Trolley Buses which are to be used for urban transit service operations in the general environmental and climatic conditions prevailing throughout the geographical location service area of intended use. It is intended for the widest possible spectrum of passengers, youth, adult, elderly, and handicapped.

P.7.2. The trolley bus shall be fully compliant with the applicable requirements of the American with Disabilities Act (ADA) and any revisions published by the Architectural and Transportation Barriers Compliance Board or Federal Transit Administration (FTA) for fixed route operations. Where these specifications exceed the requirements of ADA, the specifications shall apply.

P.8. CONFORMITY

P.8.1. All Manufacture's must conform to these specifications and the product they furnish shall be of first class quality and the workmanship shall be the best obtainable in various trades.

P.8.2. The design of the body, chassis, and equipment the Manufacture furnishes shall be of the latest design and model so as to produce a vehicle of substantial and durable construction in all respects.

P.8.3. No advantage shall be taken by the Manufacture in the omission of any part or detail which is required to make the trolley buses fully serviceable and durable operational vehicles in all respects even though such parts or detail are not mentioned in theses specifications.

- P.8.4.** All units or parts not specified shall be manufacturer's standard units. In all cases materials and dimensions must be furnished as specified, but if the term, "approved equal" is used.
- P.8.5.** The vehicle and all related equipment provided under this Contract shall meet all applicable State and Federal laws, vehicle codes, regulations, and standards.

P.9. RESPONSIBILITY

- P.9.1.** The Manufacturer shall assume responsibility for all design and satisfactory construction and operability of the vehicle; furnishing and delivering all vehicles, materials, and accessories whether or not the same are manufactured by the Manufacturer or purchased ready-made from an outside source.
- P.9.2.** The Manufacturer shall assume responsibility and all costs to deliver the trolley buses and related items to designated location(s).
- P.9.3.** The cost of, lodging and coach air fare, associated with the pre-build conference at the Manufacturer's facility shall be the responsibility of the Manufacturer. For the purpose of pricing travel for up to four (4) representatives shall be considered.

P.10. VEHICLE DESCRIPTION

P.10.1. GENERAL DESCRIPTION

- P.10.1.1.** It is the intent of this specification to describe the design requirements for Low Floor Trolley Bus vehicle capable of withstanding rigorous intensive daily transit service operations with a minimum of maintenance and repair time. The trolley bus shall exhibit maximum passenger appeal in appearance, comfort and safety, combined with the excellence in reliability operating characteristics, efficiency and economy of operation. It is understood that this trolley bus will have different external and internal features from other revenue service buses in fleet. These features shall include authentic cupola style roof interior and exterior, specialized lighting, vintage slat type passenger seating, brass fittings, alternative mirror arrangements, specialized chimes, operational trolley gong, and interior globe style lighting. Regardless of required or optional features, however, the trolley bus configuration shall include provisions for adequate component access and maintenance in accordance with these specifications.
- P.10.1.2.** Trolley buses shall incorporate features and ergonomics essential for safe, fast efficient and comfortable operation by the operator, features that ensure excellent road and traffic visibility under all driving conditions, and adequate means for safe passenger movement. The trolley bus shall be made capable of easy maneuvering in normal and heavy traffic.
- P.10.1.3.** The trolley bus shall achieve normal operation in the environmental conditions normally occurring in the area which located, in ambient temperatures ranging of 0°F to 105°F, at relative humidity between five percent (5%) and one hundred percent (100%), and at altitudes up to 200 feet above sea level.
- P.10.1.4.** Trolley buses are too used in urban areas, but at the same time must be able to maintain speeds up to sixty-two (62) miles per hour (mph) for deadhead travel to/from bus depot facilities for special service operations. Trolley buses shall be able to maintain a minimum of ten (10) mph on fifteen percent (15%) grade when loaded to Gross Vehicle Weight Rating (GVWR).
- P.10.1.5.** Scheduled maintenance tasks shall be related and shall be grouped in maximum mileage intervals. Routine scheduled maintenance actions, such as filter replacement and adjustment, shall not be required of less than 6,000 miles, except for routine daily service performed during fueling operations. Higher levels of scheduled maintenance tasks shall occur at even multiples for lower level tasks.
- P.10.1.6.** The trolley bus, at GVWR and under static conditions, shall not exhibit deformation or deflection that impairs operation of doors, windows or other mechanical elements. Static conditions included the vehicle at rest with any wheel or dual set of wheels in a six-inch deep hole or with any one (1) tires or any dual set completely deflated.
- P.10.1.7.** All Failures involving basic body, structure, axles and suspension are considered structurally related failures for purposes of this specification.
- P.10.1.8.** The trolley bus shall be new and unused, of current production model, with the latest design features. The unit shall be delivered fully operational and ready for revenue service with all necessary equipment and accessories.
- P.10.1.9.** The general overall low floor vehicle specifications and dimensions are generally described in the previous section.

P.10.2. TESTING

- P.10.2.1.** The vehicle provided shall be fully tested to assure compliance with the performance and safety requirements of these specifications. The Manufacturer may be required to provide test results and /or certifications insuring compliance with the requirements. Certifications or written documentation outlining test procedures and results shall be prepared by a Professional Engineer and/or test laboratory certifying compliance with the requirements of the appropriate section of the technical specification.

P.10.2.2. Manufacture may be required to demonstrate compliance with any of the performance requirements of the specifications. Minimum testing that shall be required shall include the following:

P.10.2.2.1. Cooling System Performance

P.10.2.2.2. A/C Performance

P.10.2.2.3. Acceleration

P.10.2.2.4. Gradability

P.10.2.2.5. Internal Noise

P.10.2.2.6. External Noise

P.10.2.2.7. Passenger Door(s) Opening and Closing Speed

P.10.2.2.8. Lighting Levels

P.10.2.2.9. Turning Radius

P.10.2.2.10. Water Test

P.10.3. INTERNAL NOISE

P.10.3.1. Maximum internal noise shall not exceed eighty (80) dBA in Sections c.i.ii., and c.iii., and no more than eighty-three (83) dBA in Section c.iv.. as described below. Sound levels within the trolley bus shall be measured with all doors and windows closed and all vehicle equipment operating. IF some equipment operates on a cyclic basis, the sound level shall be measured with all equipment functioning simultaneously to determine the worst case noise level.

P.10.3.2. Measurements shall be made with the vehicle empty, except for the test personnel and equipment. Not more than three (3) persons shall occupy the vehicle during the measurements.

P.10.3.3. Measurements shall be made at height of four feet (4') above the floor and directly above the centerline of the seats at the following locations:

P.10.3.3.1. The operator's seat

P.10.3.3.2. The foremost passenger seat at the centerline of the trolley bus;

P.10.3.3.3. The seat nearest the center of the trolley bus and at the trolley bus centerline

P.10.3.3.4. The rear-most seat at the centerline of the trolley bus

P.10.3.4. Accelerate the trolley bus at full throttle from the standstill to automatic transmission shift speed. Gear or range must be selected so that terminating test speed is sixty-two (62) mph. Observe and record maximum sound level during this operating mode. The sound level recorded shall be the average of at least four (4) readings.

P.10.3.5. Measurements shall be taken where there is no reflecting or absorbing surfaces to change the sounds emitting from the vehicle.

P.10.4. EXTERNAL NOISE

P.10.4.1. Airborne noise generated by the trolley bus and measured from either side shall not exceed 83 dBA under full power acceleration when operated at or below 35 mph at curb weight and just prior to transmission upshift. The maximum noise level generated by the trolley bus pulling away from a stop at full power shall not exceed 83 dBA. The trolley bus generated noise at curb idle shall not exceed 65 dBA. If noise contains an audible discrete frequency, a penalty of 5 dBA shall be added to the sound level measured. All noise readings shall be taken fifty feet (50') from the perpendicular to the centerline of the trolley bus with all accessories operating. Instrumentation, test sites and other general requirements shall be in accordance with the Society of Automotive Engineers (SAE) Standard J366. The pull-away test shall begin with the front bumper even with the microphone. The curb idle test shall be conducted with the rear bumper even with the microphone.

P.10.5. CRASHWORTHINESS

P.10.5.1. The trolley bus body and roof structure shall withstand a static load equal to one hundred fifty percent (150%) of the curb weight evenly distributed on the roof with no more than a six inch (6") reduction in any interior dimension. Windows shall remain in place and shall not open under such a load.

P.10.5.2. The trolley bus shall withstand a 25 mph impact by a 4,000 pound post-1973 American automobile at any point, excluding doorways, along either side of the trolley bus with no more than three inches (3") of permanent structural deformation at seated passenger hip height. This impact shall not result in sharp edges or protrusions in the trolley bus interior.

- P.10.5.3.** Exterior panels and their supporting members shall withstand a static load of 2,000 pounds applied perpendicular to the trolley bus anywhere by a pad no larger than five (5) square inches. This load shall not result in deformation that prevents installation of new exterior panes to restore the original appearance of the trolley bus.
- P.10.5.4.** The trolley bus at GVWR and under static conditions, shall not exhibit deformation or deflection that impairs the operation of the doors, windows, or other mechanical elements. Static conditions include the vehicle at rest with any one (1) wheel or dual set of wheels on a six inch (6") curb or in a six inch (6") deep hole.
- P.10.5.5.** 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, visual, or sensible resonant vibrations during normal service.
- P.10.5.6.** To protect passengers seated in the low floor area, the basic low floor trolley bus structure shall incorporate a substantial side impact barrier. The barrier shall include a steel plate, continuous between the front wheel arches and the rear suspension (except in the width of the exit door opening). The impact barrier shall be an integral welded part of the undercarriage portion of the trolley bus structure, and shall be angled such that vehicles impacting the trolley bus side will tend to subvert. To further increase both passenger safety and vehicle repair, robust welded structures are required between angled barrier and the trolley bus side skins. These shall be designed to dissipate collision energy.

P.10.6. MATERIALS

- P.10.6.1.** All Materials used in construction of the trolley bus and all its parts shall conform in all respects to the American Society of Testing Materials 9ASTM), SAE, or similar association standards. Materials used shall be duplicated in manufacturer, design, and construction on each trolley bus model.
- P.10.6.2.** Reinforced fiberglass and plastic materials shall be excluded from the basic body construction, except for replacement panels, doors, and front and rear end caps.
- P.10.6.3.** All lumber shall be thoroughly kiln dried, free from knots, and checks, and shall be of clear straight grain, dressed on all sides.
- P.10.6.4.** All painted sheets shall be thoroughly cleaned and coated on the outside according to Sikkens guidelines using DPU low Volatile Organic Compounds (VOC) protective paint, or approved equal, prior to assembly in the trolley bus.
- P.10.6.5.** All joints shall be protected by application of zinc-chromate metallic compound, Butyl Tape Sealer, or approved equal, at assembly.
- P.10.6.6.** Composite flooring material shall be of a transit grade with sealed waterproof edges.
- P.10.6.7.** All bolts, nuts, washers and exposed linkage shall be stainless steel, zinc, cadmium plated or phosphate coated to prevent corrosion.
- P.10.6.8.** All bolts, nuts and washers shall be domestic manufacture and SAE Grade 5 or better.
- P.10.6.9.** To the greatest extent possible, low maintenance composite materials shall be substituted for natural materials, such as wood, provided that manmade materials meet or exceed the natural materials properties and can authentically maintain the nostalgic look of the trolley.

P.11. CORROSION/UNDERCOATING

- P.11.1.** The vehicle shall resist corrosion from atmospheric conditions and road salts. It shall maintain structural integrity and maintain nearly original appearance throughout its service life. Materials exposed to the elements and all joints and connections of dissimilar metals (and remote from each other in the galvanic series), shall be corrosion-resistant and shall be protected from galvanic corrosion.
- P.11.2.** The entire body frame assembly, access doors, fenders, cab, underbody, wheel housings, lower skirt panels (including closed-off body panel sections), and all welds shall be treated and rust –proofed with a commercial grade heavy-duty rust-proofing material. All metal body parts shall be given a thorough multi-stage anti-corrosion treatment. The product used shall be listed as a qualified product under Mil Spec C-62218, Mil Spec C-0083933AA (MR). Zinc chromate or zinc phosphate prime paint shall be applied to both aluminum and steel. Body panels that are aluminum or tin coated, etc., or treated in any other method or procedure currently accepted by the commercial vehicle industry, are acknowledged as meeting this requirement need no further treatment, except for finish prime/paint or undercoating where applicable. Representative samples shall withstand a 2week salt spray test in accordance with ASTM Procedure B-227 with no visual or structural detrimental effects to normally visible surfaces, and no significant structural degradation or weight loss of over one percent (1%) for other members or components. Understructure/frame, chassis, fenders, wheel housings, and lower skirt panels shall be completely undercoated with a black, silver, or light grey colored undercoating.
- P.11.3.** Undercoating shall be composed of a non-volatile/non-flammable grit and abrasive free material, providing a homogenous formulation, MIL-TD specification grade undercoating material. Undercoating shall be applied to a

uniform thickness throughout with no bare spots. Bidder shall indicate methods to be used in meeting this requirement.

- P.11.4.** Items and components that shall not be undercoated include non-metallic fender and stepwells, engine, transmission, driveshaft(s) differential/axle housing, brakes, lube fittings, exhaust system, and power steering heat shields.

P.12. UNDERCARRIAGE

- P.12.1.** Both front and rear axles shall have the load rating from the gross loads equal to or greater than the trolley bus builder requires them to carry. The gross load shall include curb weight plus seated and standee passengers with the average weight of each passenger to be 150 pounds. Front and rear axles for the trolley bus shall have the highest GVWR capacity available. Front and rear hubs shall be of steel construction.

P.12.2. FRONT AXLE

- P.12.2.1.** Front axles shall be Meritor – Meritor heavy-duty standard axle design with proper wheel and axle geometry so that imperfect front axle operation will not be encountered in service.

- P.12.2.2.** Front axle shall be rated at 16,000 pounds GVWR load of trolley bus design.

- P.12.2.3.** The front axle shall be set back with a deep drop style axle and shall have a left and right inside wheel cut angle of 52 degree. The front axle Caster Angle shall be set in a position that automatically helps turn the front wheels and tires to a straight or center position after turning.

P.12.3. REAR AXLE

- P.12.3.1.** Rear axle shall be Meritor – Meritor with a minimum rated capacity compatible with the design GVWR. The rear axle shall be Meritor ARS -20 with a load capacity of 20,000 pounds.

P.12.4. REAR AXLE GEAR RATIO

- P.12.4.1.** The differential gear ratio is subject to approval by the (Agency) Project Manager prior to the production after reviewing the specifications of the trolley bus.

P.12.5. WHEELS AND TIRES

- P.12.5.1.** The trolley bus shall be equipped with single front and dual rear wheels. Front wheels and tires shall be balances and counter weighted where necessary. Aluminum wheels with "Dura-Brite" surface treatment, R22.5, stud piloted wheels, or approved equal shall be provided. One (1) spare wheel of each type shall be provided per trolley bus.

- P.12.5.2.** All low floor trolley buses shall be capable of using standard size 255/70R22.5, 275/70R22.5, or equivalent mileage tires.

P.12.6. AIR SUSPENSION

- P.12.6.1.** Trolley bus shall be equipped with an air-suspension system. Leveling valves, if used, shall be installed in such a manner that will prevent leveling valve roll over.

- P.12.6.2.** Air bellows shall act as a flexible connection between body and axle to absorb and cushion road shocks.

- P.12.6.3.** Metal air chambers, if used shall be guaranteed by the manufacturer for the life of the trolley bus. Methods of construction and the materials used shall be of such manufacture as to permit easy and convenient replacement of bellows. Bellows shall be mounted to provide easy replacement under trolley bus.

- P.12.6.4.** Rubber axle stops shall be provided between the axle and frame on each side of the axles to prevent axle and/r frame damage in severe bounce condition and to allow operation of the trolley bus if one or more air bellows are deflated.

- P.12.6.5.** The front suspension system shall be Arvin Meritor tower with air bellow air ride design emphasis to maximize ride comfort. The suspension system shall be rated at 16,000 pounds and include two (2) tuned shock absorbers.

- P.12.6.6.** Neway ADL-SD series air suspension, 20,000 pounds with tuned shock absorbers consisting of integral transverse beam design providing stability and eliminates axle roll. The rear suspension system consists of two high volume air springs combined with a ping tank to maximize ride and comfort. The rear suspension will have an adjustable torque rod and track bar for easy alignment and to minimize vibration.

P.12.7. STEERING SYSTEM

- P.12.7.1.** Power steering shall be Ross Model TAS65, TRW, or approved equal. Steering gear shall be an integral type.

- P.12.7.2.** Steering effort and number of turns "lock-to-lock" shall be designed and coordinated to minimize driver fatigue. Steering forces and characteristics in the event of failure of the power boost shall enable the trolley bus to be safely driven in this condition.
- P.12.7.3.** Steering mechanism shall be mounted so that all adjustments can be made without dismounting parts. Mounting of gear assembly shall be engineered to reduce road shock and vibration.
- P.12.7.4.** Steering units shall have hex head filler and drain plugs.
- P.12.7.5.** Hydraulic lines shall be individually and rigidly supported to prevent chafing damage, fatigue failures, and tension strain on the lines and fittings.
- P.12.7.6.** The hydraulic systems shall be configured and/or shielded so that failure of any flexible line shall not allow hydraulic fluid to spray or drain onto any component operable above the auto-ignition temperature of the fluid.
- P.12.7.7.** A priority system shall prevent the loss of power steering during operation of the trolley bus if other devices are powered by the same hydraulic system.
- P.12.7.8.** The drag link assembly shall have a horizontal socket for attachment at Pitman arm, and a vertical stud for attachment at steering knuckle arm. Both ends shall have internal springs and lubrication fittings. The assembly shall have plus or minus 0.50-inch length adjustment.
- P.12.7.9.** Front axles tie rod ends shall be threaded into the tube for adjustment without removable. Lubrication fittings shall be provided on the non-serviceable end assemblies.
- P.12.7.10.** The steering wheel shall be between eighteen inches (18") and twenty inches (20") in diameter and shall be black color plastic or synthetic resin construction with a metal core. It shall be provided with puller holes in the hub.
- P.12.7.11.** Shall be adjustable tilt range of no less than 40 degrees.

P.13. BRAKES

P.13.1. GENERAL

- P.13.1.1.** The vehicle's air brake system shall be equipped with both service and emergency brakes that conform to the Federal Motor Vehicle Safety Standards (FMVSS) 121 as applicable. An Anti-lock Brake System (ABS) operating in conjunction with the air brake system shall be standard with each trolley bus. Prior to delivery of the first trolley bus, the Manufacturer shall supply documentation certifying the air brake system conforms to FMVSS 121. If the Manufacturer has no documentation certifying that the vehicles furnished under this contract conforms to FMVSS 121, (Agency) will require the manufacturer to perform stopping tests on one (1) trolley bus at full GVWR and measure stopping distances, in accordance with FMVSS 121. The test shall be completed prior to delivery of any trolley buses to (Agency). If the test vehicle fails any portion of the testing, the vehicle will be re-tested after modifications until all tests are successfully completed.

P.13.2. BRAKE CHAMBERS

- P.13.2.1.** Brake chambers shall be equipped with manufacturer's standard diaphragm and spring. Brake system shall be balanced to provide safe stop operation.
- P.13.2.2.** The air brakes shall be ABS with Front: Meritor 15 x 4 Q+ Rear: Meritor 16.5 x 7 Q+ Bendix AD-9 air dryer with electric heater. Using a Volumetric Air Spring to increase air volume in the air springs to soften ride. Integral Transverse (Anti Sway) beam shall be used to provide 85% of roll stability.
- P.13.2.3.** Rigid bolt together equalizing beams shall be used to lighten and adjustable axle alignment will be provided at pivot connections on both sides. Cast Frame brackets shall be used as splicer plates between rails.
- P.13.2.4.** Adjustable torque rod shall be used at pinion angle settings to minimize driveline vibrations. Adjustable track bar shall be used to position axle at exact lateral of the axle. Heavy Duty Fleet Guard Gas tuned shocks shall be installed.

P.13.3. SERVICE BRAKES

- P.13.3.1.** Trolley buses shall be equipped with Cummins VG Turbo brake systems which conform to the requirements of all Federal regulations, designed so such conformance can be maintained throughout the normal adjustment cycle. A supplemental brake (transmission retarder) may also be provided. The supplemental braking shall not be used in meeting regulatory criteria. The braking system shall include service brakes, a parking brake and emergency brake.
- P.13.3.2.** The driver's brake pedal shall control the service brake and the supplemental brake in a coordinated manner to give a total braking effort depending on the position of the pedal up to the maximum capability of the braking system. Braking forces shall be proportioned among the axles to assure balanced braking and equalize lining life between axles.

P.13.3.3. Brake lights shall be activated as soon as the brake pedal is depressed and when any auxiliary braking (transmission retarder) is applied.

P.13.4. BRAKE INTERLOCK

P.13.4.1. The primary service brake system shall incorporate a double check valve, pressure regulator, and a solenoid valve to provide a rear brake and throttle interlock while the rear door of the trolley bus is open. Release occurs when the rear door is closed and the Operator's control is deactivated. Additionally, the actuation must occur when kneeling and/or wheelchair lift is used in conjunction with the front door. The front door operation shall not be interlocked with the brake system.

P.13.5. BRAKE HOSES

P.13.5.1. All brake hoses shall be installed in locations where the possibility of damage is minimized. Hoses shall be clamped and supported by the trolley bus structurer to minimize long unsupported hose lengths and to eliminate rubbing and/or chafing.

P.14. AIR SYSTEM

P.14.1. AIR COMPRESSOR

P.14.1.1. Air compressor shall be a WABCO, or approved equal, sized by the bus manufacture for the air system requirements and duty cycle of the bus.

P.14.1.2. The compressor shall be gear driven by the engine and shall have a minimum output of 14 CFM.

P.14.1.3. The air compressor shall be lubricated and cooled from the vehicle engine. The air storage system shall consist of four (4) tanks with the combined capacity of 5,500 cubic inch minimum.

P.14.1.4. Compressor shall be gear driven by the engine. The compressor shall be equipped with an inlet check valve to minimize the blow by of oil through the compressor.

P.14.2. AIR TANKS

P.14.2.1. Air reservoirs shall be of adequate capacity for supplying the air volume need of the trolley bus.

P.14.2.2. There shall be low-air pressure switches located on the air tanks. They shall monitor the primary and secondary reservoir air pressure.

P.14.2.3. There shall be dedicated bally type drain valves for each air tank mounted at a convenient location for everyday maintenance access.

P.14.3. AIR DRYER

P.14.3.1. The air system shall be equipped mounted in a location approved by the manufacturer.

P.14.3.2. The air dryer shall be Bendix AD-9 with removable cartridge, vertically mounted, cooled and heated by heater elements. It shall have an automatic purge and drain cycle and be serviceable.

P.14.4. BRAKE LINES, BODY MOUNTED

P.14.4.1. All air lines shall meet the requirements of SAE type J844. The supply lines shall be 2807 stainless steel braid, Teflon inner core for heat resistance. Lines shall be securely mounted to frame to prevent chafing or wear. Clamps shall be of proper size. Lines shall be protected at clamps with heat resistant material.

P.14.4.2. Rubber grommets shall be used at all points where air lines pass through bulkheads or any supports.

P.14.4.3. All clamps, fittings, etc. must be easily accessible and installed in such a manner that they are easily removed and replaced.

P.14.5. BRAKE LINES AT WHEELS

P.14.5.1. Flexible brake lines shall have nut and sleeve type fittings. They shall be of adequate length to prevent any strain, regardless of relative motion between brake and brake chamber, without allowing chafing or rubbing.

P.14.6. INTERLOCK VALVES, DOOR, ACCELERATOR AND BRAKE

P.14.6.1. Door, accelerator, and rear brake interlock valve shall be mounted to minimize length of air lines.

P.14.7. TOWING-AIR LINE CONNECTOR

P.14.7.1. An airline connector (Schrader or approved equal) shall be installed on the front and rear end of the trolley bus.

P.14.8. SWITCH, LOW AIR PRESSURE

P.14.8.1. The switches shall be connected in parallel and shall trigger red indicator "LOW AIR" light and an audible alarm when the air pressure of any reservoir is below recommended operating levels.

P.14.9. KNEELING

P.14.9.1. A driver actuated kneeling device shall lower the curbside front of the bus during loading or unloading operations regardless of load to step up from street level not to exceed 10 inches measured at the longitudinal centerline of the front door.

P.14.9.2. Brake and throttle interlock shall prevent movement when the bus is kneeled. The bus shall kneel and rise at a maximum rate of 1.25 inches per second at essentially a constant rate. After kneeling the bus shall rise within two (2) seconds to a height permitting the bus to resume service, when the interlocks release and shall rise to the correct operating height within seven (7) seconds.

P.14.9.3. An indicator visible to the driver shall be illuminated during the kneeling operation and shall remain illuminated until the bus is raised to a height adequate for safe street travel. Visual and audible warning devices that operate with the kneeling system shall be included.

P.14.9.4. One amber LED light shall be installed near the entrance door and flash instantaneously upon activation of kneeling system and remain operational until system is deactivated. The audible alarm shall activate instantaneously upon activation of the kneeling system and remain on only during the lowering portion of the kneeling cycle.

P.15. PROPULSION SYSTEM

P.15.1. The power plant shall be arranged so that accessibility for all routine maintenance is assured. No special tools, other than dollies and hoists, shall be required to remove the power plant. Two (2) mechanics shall be able to remove, replace and prepare the engine and transmission assembly for service in less than 20 total combined man hours. The muffler, exhaust system, air cleaner, air compressor, starter, alternator, radiator, all accessories, and any other component requiring service or replacement shall also be easily removable independent of the engine and transmission removal.

P.15.2. ENGINE

P.15.2.1. Trolley bus shall be rear mounted fully electronic powered by a Cummins ISB 6.7 liter 6 cylinder inline heavy-duty diesel engine, with a minimum 280 Boiler Horse Power (BHP), with 620 lb./ft. torque at 1600 rpm. The engine shall include a Phillips 750 watt/115 volt block heater.

P.15.2.2. Power Plant shall be a complete unit; mountable and demountable unit installed in the "I" or inline configuration. The engine installation shall include motor mounts and related accessories that provide proper vibration isolation and control of engine movement in all axes to prevent premature wear and failure of engine accessories, drive belts, piping, hoses and related hardware pertain to diesel engine. Engine shall be designed for normal operation on Ultra Low Sulfur Diesel fuel.

P.15.2.3. The engine installation shall contain the latest available specific provision for emission and sound control per State/Federal regulations for the year the trolley bus is delivered. The installation must meet the requirements as established under Sections 6.3 Internal Noise and 6.4 External Noise of these technical specifications.

P.15.2.4. Fleet guard spin-on oil filter shall be mounted to the engine.

P.15.2.5. A Spinner II, Model 76, transit by-pass filter shall be provided and mounted in an easily accessible area. Use of this system and the installation design shall be authorized by the engine manufacturer.

P.15.2.6. The oil filler tube and oil dipstick shall be accessible through the engine compartment door. Both shall be readily accessible without the removal of belt guards for engine servicing.

P.15.2.7. The engine shall meet all applicable Federal and State clean air standards. 29.1.2 The engine furnished, through its electronic control system shall allow unaided starting of the engine at temperatures down to 10 degrees F. The engine shall incorporate a heated intake warmer.

P.15.2.8. The engine shall also include an internal warning and de-rate system with separate low coolant level light and buzzer.

P.15.2.9. The engine shall include a high idle system intended to maintain battery charging under heavy demand, provide adequate engine cooling and maintain air-conditioning capacity when the vehicle is stationary. With transmission in park/neutral, a driver controlled switch shall be capable of increasing engine idle to the OEM recommended rpm. The fast idle will automatically disengage when the vehicle is placed in forward, reverse gears or when the vehicle brakes are applied.

P.15.3. ENGINE PROTECTION

P.15.3.1. The engine shall be protected from failures by electronic module and sensors consisting of no less than "Low Coolant", Low Oil Pressure, and "Oil Over Temperature", Coolant Over-Temperature" will provide

information to the control module regarding the engine's condition. Engine idle shut down shall be set at fifteen (15) minutes.

P.15.3.2. The Engine Control Module shall be equipped with a self-diagnostic system as well as engine system protection and engine performance diagnostics. A failure shall be retained by the control unit for evaluation by garage personnel by using a diagnostic reader.

P.15.3.3. The engine Control Module (ECM) shall be remote mounted to allow easy access to service and diagnose.

P.15.4. ENGINE THROTTLE SYSTEM

P.15.4.1. Accelerator shall be compatible with transmission and engine. The throttle pedal shall be mounted so that it is equal to or higher than brake pedal.

P.15.5. AIR CLEANER

P.15.5.1. The air cleaner shall be a unit compatible with, and as recommended by the engine manufacturer. All filters shall be cartridge types that are easily accessible for replacement.

P.15.5.2. The engine air intake duct shall be shaped so as to minimize water entrance into the air induction system and the element shall be easily replaceable. A passage shall be provided so that any water that does enter the system can be drained prior to entry into the air cleaner element.

P.15.6. ENGINE COMPARTMENT LINES

P.15.6.1. Flexible lines (air, fuel, and oil) in the engine compartment shall be used with stainless steel reusable fittings. All lines shall be sufficiently secured so that there will be no abrasive movement.

P.15.7. CLAMPS

P.15.7.1. All support clamps in the engine compartment and/or on the power module, which have direct contact with the wire, cable, harness hose or line, shall be stainless.

P.15.8. INSULATION

P.15.8.1. Engine side of the rear seat shall be sealed so as to prevent smoke and fumes from entering passenger area and shall be insulated against both heat and sound. Thermal insulation shall assure there will be a minimum 80°F temperature differential between the engine compartment and passenger area.

P.15.9. ENGINE COMPARTMENT

P.15.9.1. There shall be a side, top and rear air intake grille to provide sufficient air flow to the engine area and shall be designed to depict a vintage look, using a woven wire section.

P.15.9.2. The grille shall be finished to match the color of the body or painted in the standard black.

P.15.9.3. The engine compartment shall be fully insulated with a foil faced sand barrier material. There shall be a firewall of 11 gauge steel between engine compartment and passenger compartment. There shall be sufficient lighting for servicing in the engine compartment with a switch located in the engine compartment.

P.15.10. FUEL SYSTEM

P.15.10.1. The fuel tank shall be a single stainless steel fuel tank with a minimum 65 gallon capacity. The tank shall be mounted with proper shielding for safety and corrosion resistance. Filler neck shall be located on the curb side of the trolley. Fuel tank will be equipped with bottom mounted fuel drain plug.

P.15.10.2. The fuel tank shall be designed so as to not permit the spillage of any fuel, with the filler cap properly closed, when the floor of the trolley bus is at any angle from the horizontal through 22 degrees from horizontal in any direction for any period of time. This shall be accomplished with the fuel tank filled to capacity as defined by published capacity.

P.15.10.3. Fittings on fuel and oil lines shall be SAE flared or inverted flare type. Fuel filter and lines shall be installed in such a manner as to avoid excessive heat and fire hazard. Restriction fittings, if applicable, shall be in the fuel return line and of proper size so as to maintain fuel pressure under all conditions.

P.15.10.4. One (1) Fleet Guard, OptiGuard FS1020, or approved equal, remote mount fuel filter shall be provided in a location to be approved by (Agency) Project Manager.

P.15.10.5. Underbody fuel lines shall be sized to meet the requirements of the engine manufacture.

P.15.10.6. The engine fuel system shall have a RACOR 690p12 Fuel water separator with a spin on filter element with a 30 micron filter and see through bowl, heater and sensor light.

P.15.11. Exhaust System

- P.15.11.1.** The exhaust muffler shall be a stainless or aluminized steel type muffler designed with proper acoustical qualities and tailored to the engine requirements and installation.
- P.15.11.2.** The exhaust system shall meet all United States Environmental Protection Agency (USEPA) clean air standards in effect for the model year trolley bus offered.
- P.15.11.3.** Exhaust system shall be constructed so that it will not cause back pressure in the engine or damage to the paint on the trolley bus, and shall be anchored as near the end of the exhaust line as possible. It shall be mounted so as to maintain the integrity of its design throughout the life of the trolley bus.
- P.15.11.4.** Exhaust manifolds, muffler, and single tail pipe assemblies shall be tight and allow no emission of fumes or smoke other than from open end of tail pipe.
- P.15.11.5.** Access to test port on muffler shall be provided.
- P.15.11.6.** Exhaust tail pipes shall be constructed so that it complies with Federal Motor Vehicle Safety Standards (FMVSS) 108 pertaining to side marker and clearance lights. Exhaust shall be deflected to the left rear of the trolley bus at a minimum of sixteen inches (16") from ground level.
- P.15.11.7.** When the vehicle is under full acceleration from a stopped condition, maximum allowable exterior decibel rating shall not exceed 80 dBA of noise at 50 feet from the vehicle.
- P.15.11.8.** The muffler shall be constructed of aluminized steel type material in the design of the exhaust system

P.15.12. TRANSMISSION

- P.15.12.1.** The transmission shall be an automatic electronically controlled type Allison B300 with push button control. The transmission shall have six forward speeds with close ratio coverage; sixth gear shall be an Override gear. Integral Torque Converter lock-up shall occur in gear speeds two through four to assure maximum power and fuel economy. The gear selector shall be dash mounted above the driver knee area.
- P.15.12.2.** Transmission shall have a built-in oil pump, governor, and an external heat exchanger that utilizes water from the engine cooling system. The heat exchanger shall be located in an accident-free area.
- P.15.12.3.** The installation design shall allow for separate removal of the transmission without removal of the engine. Engine support and mounts shall not be located on the transmission to allow for easy transmission removal.
- P.15.12.4.** The transmission shall be cooled by water to oil cooler in the radiator end tank meeting all requirements of the transmission manufacture. Size and capacity ratings of the transmission shall be fully compatible with the engine furnished. A manufacture approved synthetic automatic transmission fluid shall be used.

P.15.13. TRANSMISSION CONTROLS

- P.15.13.1.** The transmission shall be governed by electronic controls, which provide basic transmission control function. The transmission electronic module shall be capable of communicating with the engine electronic module to maintain maximum efficiency.
- P.15.13.2.** The gear selector shall be completely electronic compatible with the transmission and be located on the console.
- P.15.13.3.** A back-up light switch shall be provided on the transmission to energize the back-up lights and back up alarm with the transmission in reverse.
- P.15.13.4.** The system shall incorporate various sensors which feed information regarding the shift selection, oil temperature, pressure, etc.

P.15.14. DRIVELINE

- P.15.14.1.** Driveline and universal joints shall be heavy duty, capable of handling both maximum engine horsepower and net input torque received from the transmission. The driveline shaft shall have a protector guard to prevent the driveline from penetrating the floor or contacting the pavement in the event of shaft or u-joint failure.
- P.15.14.2.** Lubrication fittings shall be provided for universal bearings.
- P.15.14.3.** Drive lines and U-joints shall be properly sized addressing both the maximum horsepower and the Net input Torque received from the transmission.
- P.15.14.4.** Pitch and angle of Drive Line assembly shall be as minimal as possible to maximize universal joint life. A safety drive line structural guard system shall be furnished designed to structurally prevent a section of drive line from either penetrating the floor structure or dropping to the roadway should a U-joint fail.

P.16. COOLING SYSTEM

P.16.1. Temperature of all operating fluids on the trolley bus shall be controlled by a water-based cooling system. The cooling system shall be sized to maintain fluids at safe, continuous operating temperatures during the most severe operations possible with the trolley bus loaded to GVWR and with ambient temperatures up to 110°F and relative humidity of ninety percent (90%). This pressure type cooling system shall not permit boiling or coolant loss during the operations described above. Engine thermostats shall be easily accessible for replacement. The engine cooling system shall be equipped with a properly sized coolant filter. All low points in the water-based cooling system shall be equipped with drain cocks. Air vent valves shall be fitted at high points in the cooling system, unless it can be demonstrated that the system is self-purging.

P.16.2. RADIATOR

P.16.2.1. The radiator shall be of durable corrosion resistant construction. Radiator core shall be aluminum or copper dimple type, and clog resistant. Radiator piping shall be stainless steel or brass tubing where possible; rubber hoses shall be utilized only where necessary and shall be premium silicone rubber impervious to all trolley bus fluids.

P.16.3. SURGE TANK FILLER NECK AND CAP

P.16.3.1. The sealed cooling system shall be provided with a self-unloading valve to prevent extreme pressure from injuring the cooling system.

P.16.4. WATER PUMP

P.16.4.1. Water pump shall have sufficient capacity to prevent any hot spots under all operating conditions.

P.16.5. Hose/Clamps

P.16.5.1. Engine water and heater hoses shall be premium quality Armet or Flex Fab silicone hose. All hoses shall be protected from engine heat which may cause premature failure. All hose clamps shall have constant tension. Hose clamps shall be ½" inch wide minimum, stainless steel worm type, and socket tightened with collar.

P.16.6. COOLANT

P.16.6.1. The cooling system shall be designed to be filled with coolant capable of protecting the engine from freezing down to 0°F.

P.16.7. WATER FILTER

P.16.7.1. If a water filter is used, a "Fleet guard" spin-on water filter (no pre-charged type) with brass shut-off valves both inlet and outlet, shall be installed in an easily accessible area.

P.16.8. FAN DRIVE SYSTEM

P.16.8.1. A thermostatically controlled fan shall be provided and shall be effectively power-driven only at engine temperature in excess of 180°F. The fan shall be mechanically belt driven.

P.16.9. RADIATOR

P.16.9.1. The radiator shall be of heavy duty assembly with an aluminum core. The total cooling area shall be 1260 square inch side mounted. The cooling fan shall be adequately sized to keep the engine from overheating.

P.16.9.2. The radiator water core and charge air cooler core shall be shock-mounted to both absorb and cushion road shock and vibration. These components shall be mounted in the rear of the chassis on street/left side of the trolley.

P.16.9.3. Coolant/Anti-Freeze furnished shall be an Ethylene Glycol base type designed to protect the engine from freezing down to 20 degrees F.

P.16.9.4. Silicone coolant hoses are required along with a rail mounted Fleet guard coolant filter.

P.17. ELECTRICAL

P.17.1. The trolley bus shall be equipped with a dual voltage 24/12 V power distribution system adequately sized for all electrical loads on the trolley buses as specified, including air conditioning and wheel chair ramp.

P.17.2. Electrical System Description

P.17.2.1. All wiring shall meet FMVSS. The electrical system shall be 12V, MUX modules, using relays to allow driver's console switches to operate at lower amperage.

P.17.2.2. A wiring diagram shall be submitted that will match the wiring for each vehicle.

P.17.2.3. All switches and wiring circuits shall be protected with resettable circuit breakers.

P.17.2.4. All circuit breakers shall be labeled for identification and installed in the sealed weather proof, lockable, electrical panel on the exterior of the driver's side.

- P.17.2.5.** All circuits shall have LED diagnostics for ease during troubleshooting.
- P.17.2.6.** All switches shall be of heavy-duty transit design, completely environmentally sealed for protection against spills water etc. All wiring shall meet SAE standard requirements.
- P.17.2.7.** All wiring shall be automotive stranded and shall be color-coded and labeled. All wiring shall be installed using quick disconnect harness junctions, Deutsch style using weather-proof connectors.
- P.17.2.8.** There shall be no more than 10 wires per harness and include 2 extra wires per harness for accessories.
- P.17.2.9.** All harnesses shall be secured at a maximum of two-foot intervals using rubber coated clamps to protect equipment from chafing.
- P.17.2.10.** Any wiring through wheel well area shall be protected by routing through metal convoluted tubing and flex loom.
- P.17.2.11.** All connectors are insulated; shrink-wrapped and soldered where necessary.
- P.17.2.12.** All wiring shall be protected by circuit breakers and a 200 ANL fast acting fuse shall be installed for added protection.

P.17.3. ALTERNATOR AND REGULATOR

- P.17.3.1.** The alternator shall be Leece Neville 270Amp sized to supply the entire nighttime operating electrical load of the trolley bus while providing at least twenty percent (20%) of its current output for battery charging when the battery is fully discharged. The amp shall have an internal voltage regulator.

P.17.4. BATTERY

- P.17.4.1.** The term battery means two (2) or more heavy duty, top quality lead acid battery units mounted side by side in battery compartment. The battery compartment shall be located in a separate compartment from the engine compartment.
- P.17.4.2.** Pull out stainless steel battery trays shall be provided.
- P.17.4.3.** The configuration for the battery is two (2) battery units size 8D, 12 volt. Batteries shall be stamped with the date of the manufacture. Batteries shall not be abused or quick charged before delivery. Batteries shall be new when the trolley bus is delivered.

P.17.5. BATTERY TERMINALS/WIRING/PROTECTION

- P.17.5.1.** The battery wiring shall be terminated with properly sized ring terminals. The batteries shall be top post terminals wired in parallel circuit. The cable shall be permanently marked with a "+" and a "-" at the battery end. Cables shall be extra flexible and routed in the battery box so as not to chafe or rub on the battery tray and other components. Cables shall allow dull slide out of the tray. Cable ends shall be sealed to eliminate corrosion from battery acid and/or fumes. Cable ends shall be attached to the battery studs with non-corroding flat washers, spring washers, and brass nuts. Cable ends shall be coated with a corrosion inhibitor after being attached to the batteries.
- P.17.5.2.** A circuit breaker capable of interrupting a major short circuit shall be supplied on the positive side of the batteries. The breaker shall be located near the batteries in an easily accessible enclosed area, sealed from water and battery fumes. The electrical main selector switch and a set shall be located in an easily accessible location in the engine compartment.
- P.17.5.3.** An electrical main master switch shall be provided to positively disconnect the battery from the electrical loads when the trolley bus is not in use or in emergency situations. The switch shall be located in an outside compartment which requires no tool(s) for access. The switch shall be completely sealed in its own sub-compartment. The switch handle be non-removable. If the switch handle is removable it must be attached to a corrosion proof metal cable. Emergency flasher and radio power circuitry shall be independent of the main switch.

P.17.6. VOLTAGE DROP

- P.17.6.1.** There shall be no more than a three percent (3%) voltage cumulative drop on any circuit, measured from the initiating source to the appliance load positive and from the appliance load negative to the reference ground with the load fully operational.
- P.17.6.2.** The initiating source for any 24 volt circuit is defined as the 24 volt output positive post of the series connected batteries.
- P.17.6.3.** The initiating source for any 12 volt circuit is defined as the 12 volt output positive post of the battery equalizer/splitter.
- P.17.6.4.** The reference ground is defined as the most negative post of the series connected batteries.

P.17.7. Starter

- P.17.7.1.** The engine starter shall operate from normal trolley bus voltage and be sized to provide sufficient torque to turn the engine reliably under all hot and cold engine or ambient conditions. The starter shall be as recommended by the engine manufacturer.
- P.17.7.2.** The starter solenoid switch shall be interlocked so that the engine can be started in neutral gear only with the transmission selector in neutral only. Starter will not operate when engine is running. The interlock shall be activated by fuel pressure or by other approved means. Other major electrical loads shall be disconnected while cranking.

P.17.8. ELECTRICAL PANEL

- P.17.8.1.** Circuit breakers shall be provided so sectionalize and protect all branch circuits of the electrical system of each trolley bus.
- P.17.8.2.** To maximum practical extent, electrical distribution and control devices shall be grouped on an electrical panel arranged for ease of access, test, and replacement of components. The panel shall be large enough to avoid crowding of the components and leads. Component heat buildup shall not affect the components or mounting locations. There shall be a test plug receptacle for electronically diagnosing the engine using portable instruments. There shall be cooling vents installed on the electrical panel door.
- P.17.8.3.** Electrical panel shall be located on exterior driver's side for ease of access. The electrical compartment shall have a double door configuration for a sealed enclosure to protect against moisture.
- P.17.8.4.** A durable diagram shall be mounted, in the electrical panel, which identified the components and their function. Relays and circuit breakers shall be permanently labeled to correspond to this diagram. Switch controlled lights shall be provided to illuminate the main electrical panel.

P.17.9. DIAGNOSTIC/MULTIPLEX SYSTEM ELECTRICAL

- P.17.9.1.** Each trolley bus shall be equipped with a diagnosis system I/O LED for ease in troubleshooting electrical and component failures.
- P.17.9.2.** The multiplex I/O system shall have a main accessible port for reprogramming and/or new updates that may be available from the
- P.17.9.3.** Manufacturer. Or the addition of optional component added at a later date.
- P.17.9.4.** Positions shall include power/ground leads in overhead for Fleet watch or other maintenance or diagnostic features.
- P.17.9.5.** Drivers LED display shall include safety features that will visually and audibly indicated when entrance doors are open and/or wheel chair lift is deployed and /or optional bike rack is deployed, bus kneeling and /or compartment doors are open.
- P.17.9.6.** Drivers LED display shall have interlock override push button with entry level 1 security access to allow maintenance mechanics to have access to change parameters such as interior lighting functions, kneeling times and back lighting.

P.17.10. WIRING

- P.17.10.1.** All wiring, including cables, shall be stranded copper and adequate in size to carry electrical load. Each harness shall contain identified spare wires (10 percent, minimum one) and shall be installed with consideration of possible future need to remove and replace it. All low voltage lighting shall run sufficiently cool so as to eliminate any damage to lamps, lenses, sockets, wiring, or surrounding areas. Electrical junction boxes shall have sealed covers and openings.
- P.17.10.2.** Wiring shall be insulated and meet FMVSS requirements. Insulation shall be moisture proof and heat resistant. It shall be a design objective to route wiring and harnesses in area with no temperature build up. If wiring must be run in areas of heat buildup it will withstand without deterioration, for the life of the trolley bus the highest temperature in the area serviced. Engine compartment wiring shall be heat, oil and flame resistant.
- P.17.10.3.** Wiring shall be protected from weather and mechanical injury. Cables shall be supported along their length and strain relieved near terminations so that connectors and terminals are not under stress. Wire and cable passing through holes in sheet metal, structural members, etc. shall be protected with a grommet. Wire and cable subject to flexing shall be extra flexible and shall be installed to allow for continual flexing without damage to the conductors or insulation. Wiring routed next to or bent over other materials shall be chafe protected.
- P.17.10.4.** All wire terminations loops shall have a minimum of two inches (2") of excess wire for additional end terminal installation which will allow at least one (1) replacement of termination without disrupting the wiring harness. Wires shall not be spliced between terminations.
- P.17.10.5.** All electronic components and boxes shall have quick disconnect plugs attached.

- P.17.10.6.** The conductor identification shall be developed by the Manufacture to give an individual identifying designation to each wire for circuit tracing and renewal of equipment and shall be shown on all electrical diagrams. All junction panel terminals shall be numbered.
- P.17.10.7.** All wiring shall be identified with wiring numbers printed on the insulation itself with no more than six inches (6") of space between the identifying printed numbers along the continuous run of wire. Numbers shall not be removable and be impervious to normal abrasion, oils, diesel, grease, antifreeze and water.
- P.17.10.8.** All under coach looms, cable runs, connectors, terminations and harnesses shall be completely sealed against, dirt, water and road hazards. Under coach wiring shall be run in sealed flexible plastic conduit.
- P.17.10.9.** All electrical connectors shall be replaceable. Engine and transmission harnesses shall have sealed, quick disconnect connectors to facilitate engine and transmission removal. All high current connection points shall be coated with conductive coating.

P.17.11. TOWING CONNECTOR

- P.17.11.1.** An Electrical receptacle shall be provided behind the front bumper of each trolley bus adjacent to the air connector to receive power for the illuminating the tail lights, stop lights and direction signals from a towing vehicle.
- P.17.11.2.** The receptacle shall be a 7 wire receptacle assembly "Cole-Hersee" No. 12063. The pins shall be coated with corrosion resistant paste. The termination end of the receptacle shall be strain relived and sealed against water entry.

P.17.12. RADIO POWER SUPPLY AND COMMUNICATIONS CABLING

- P.17.12.1.** A separate electrical circuit, initiated at the batteries and terminating at the radio box shall be supplied. This circuit shall be independent of the electrical main switch, be capable of delivering 40 continuous amperes at 12 volts, and be protected at the source with an adequate circuit breaker. No other electrical equipment shall be attached to this circuit. It shall be connected and placed to minimize electrical noise, hash and transients.
- P.17.12.2.** There shall be appropriate loom conduit for necessary radio accessories later installed of radio and control head.
- P.17.12.3.** An enclosed radio box with hinged, lockable cover shall be installed above the driver's seat in the interior of the vehicle. The box shall be sized for a future (ACS) Advanced Communication Radio system and/or other ITS electronic equipment.
- P.17.12.4.** There shall be three (3) coded Number 12 wires from behind the dash to this compartment wire to a terminal strip. One (1) wire shall be 12 volts at all times, one (1) wire shall be 12 volts switched to the master run switch, and one (1) wire shall have supply a constant ground.
- P.17.12.5.** The Manufacture shall supply under mounting plate located in the overhead compartment along with 12 volt power/ground lead for optional radio equipment and roof mounted antenna.
- P.17.12.6.** Manufacture shall supply mounting hole for future optional covert emergency alarm button in a convenient location to the driver.

P.17.13. CONSOLE ASSEMBLY AND INSTRUMENT PANEL

- P.17.13.1.** There shall be a front instrument and side console panel layout convenient for driver
- P.17.13.2.** Instrument panel shall be for heavy duty service with clear lettering and identification.

P.17.14. DOOR ELECTRICAL

- P.17.14.1.** A door controller shall be lever type with lift/kneeling control buttons incorporated. These controls shall be linked via CAN control with the multiplex system.
- P.17.14.2.** Locking and unlocking of doors shall be controlled by a door-controlled handle located on the driver's console. Door control handle, when in the "rear" position, shall energize a solenoid that unlocks the door handle.
- P.17.14.3.** Door shall have safety solenoid locks to prevent doors from opening while in motion. Locks shall be linked via CAN with speed sensor for additional safety.
- P.17.14.4.** Instrument panel shall include driver's display that will have external port for reprogramming multiplex system and troubleshooting.
- P.17.14.5.** LED lamps mounted on the exterior mounted in the step well shining down and outward shall be illuminated when the door is open. Front and rear stepwell illumination lamps shall operate in the same manner.

P.17.15. HORN AND TROLLEY GONG BELL

P.17.15.1. A12 volt dual horn shall be installed and mounted so as to be protected from road splash. Control shall be push button, located in the center of the steering wheel.

P.17.15.2. An electric bell shall be mounted on the top front of the vehicle for the driver to ring manually by a pull cord located to the left of the driver's seat.

P.17.16. BACK UP ALARM

P.17.16.1. An electrical back up alarm producing an intermittent sound or busser connected with backup LED lights shall be installed. It shall be loud enough to be heard when the engine is running.

P.17.17. EXTERIOR LIGHTING

P.17.17.1. All exterior lighting shall be 12V DC circuits in accordance with FMVSS 571.108.

P.17.17.2. (2)-Headlight assemblies shall be single high/low beam round sealed beam halogen lights and shall have a beauty ring of brass or chrome. (J1395).

P.17.17.3. (2)-Amber turn signals shall be provided in the front section of the trolley, as turn, and flasher, (J589, J590b).

P.17.17.4. (3)-Amber identification shall be centered on the top front of the trolley, (J592E)

P.17.17.5. (2)-Amber identification lights shall be placed on each outer corner of the top front, (J592E).

P.17.17.6. A vintage style center headlight shall be installed in the center front of the trolley finished in either brass or chrome.

P.17.17.7. (3)-Red identification lights shall be centered on the top rear section of the trolley, (J592E).

P.17.17.8. (2)- Red Identification lights shall be placed on the top outer corner of the rear of the trolley (J592E).

P.17.17.9. (2)-Clear reverse lights shall be placed in the lower section of the rear of the trolley, (J593C).

P.17.17.10. (2)-Red stoplights shall be placed in the lower section of the rear of the trolley, (J1398).

P.17.17.11. (2)-Red taillights shall be placed in the lower section of the rear of the trolley, (J585E).

P.17.17.12. (2)-Turn signal lights shall be placed in the lower section of the rear of the trolley, (J1395).

P.17.17.13. (1)-License plate light shall be placed in the lower section of the rear of the trolley above the license plate. (J587)

P.17.17.14. (4)-Amber lights shall be placed on the sides of the trolley, (2) one each side of the top front corner, (2) one at each side of the lower front corner, (J592E).

P.17.17.15. (4)-Red lights shall be placed on the sides of the trolley, (2) one each side of the lower rear corner, (2) one each side of the top rear corner, (J592E).

P.17.17.16. (2)-Amber middle turn signals shall be placed on the lower middle section on each side of the trolley.

P.18. INTERIOR LIGHTING

P.18.1. All interior lighting shall be adjustable PWM lights through multiplex system. Front and rear overhead interior lighting shall be controlled both from door open signal and operator's console. Front and rear entry ways shall be lit in accordance with FMVSS suitably mounted so that the entire stepwell and portion of the ground area immediately outside the trolley bus is illuminated. Overhead interior lighting shall provide general illumination in the passenger compartment. Careful consideration will be made when placing lighting to prevent windshield glare.

P.18.2. All interior lighting shall meet FMVSS requirements. There shall be six (6) interior white, LED, shatterproof, 8" dome style, surface mounted fixtures throughout the roof area of the vehicle. The bases shall be brass or chrome finish. Separate switches shall operate the rear and front section of the passenger area.

P.18.3. At the entry/exit there shall be an overhead courtesy light that will come on when the door is opened and remain on until the door is closed again. Each step well area shall have (2) step well lights with top covers to shield from glaring light, and one overhead light. The step well lights will automatically come on when the door is opened and remain on until the door is closed.

P.18.4. Over the driver's area there shall be a separately controlled light for the driver's convenience. There shall be a separate switch controlling the driver's light.

P.18.5. Hazard lights shall be installed on the trolley bus, (J1945, J1910).

P.18.6. (2)-Step well lights shall be installed at each entry/exit doorway.

P.18.7. (1)- flood type light shall be installed in the wheel chair door area

P.19. BODY

P.19.1. CONSTRUCTION: BODY AND UNDERSTRUCTURE

- P.19.1.1.** The basic body structure shall be an integral design. The structure shall be designed for maximum strength, reliability and durability.
- P.19.1.2.** Body and understructure shall be adequately reinforced at all joints and points where stress configuration may occur so that the vehicle will carry the required loads and properly withstand road shocks.
- P.19.1.3.** The entire trolley bus understructure, including the wheelhouses, shall be spray coated with rust inhibitor undercoating.
- P.19.1.4.** All interior and exterior metal surfaces shall be cleaned and treated to prevent rust and /or corrosion. After welding in area where primer was previously applied, all joints shall be brushed to eliminate foreign matter and then the joint shall be cleaned to provide a good base for paint adhesion. Finally the joint shall be painted with red oxide primer.
- P.19.1.5.** Aluminum panels shall be properly prepared and primed before final paint. All bolts, nuts, washers, clamps, clips, and similar parts shall be zinc or cadmium plated or phosphate coated to prevent corrosion.
- P.19.1.6.** All material used in body and chassis, including cross member, posts and panels, shall be of the required strength for the purpose intended and shall be properly treated to resist corrosion. All joints exposed to weather shall be made tight against leakage.
- P.19.1.7.** All wall sections are constructed of a combination of lower wall sections of 2" x 2" x ¼" box tube and, 1 ½" 16 gauge, box, clean coat, carbon steel tubing and 1 ½" stainless steel tubing, electrically arc welded together in a specialized framing jig. The lower half of the wall construction shall be a load bearing monocoque design to support the chassis load. Side, front and end fitting members shall be carried to the roofline and constructed to adequately carry the design loads and absorb impact and stress. This application creating a cage like structure that provides strength and durability preventing movement at all joints and stress points.
- P.19.1.8.** The rear engine area shall be a mock porch design to simulate the vintage streetcar theme.

P.19.2. CONSTRUCTION: CHASSIS

- P.19.2.1.** Understructure shall consist of structural stainless steel 3" x 6" box tube structure designed for maximum durability, reduced maintenance and weight incorporating a uni-body of the floor/chassis completely electric arc welding to create a monocoque cage like structure that is integrated with the side walls and roof.
- P.19.2.2.** Conventional bolt construction shall be with Grade 8 (traceable) hardware, and shall only be used where necessary to allow for routine disassembly (e.g. the closing cross member shall be bolted to allow for engine remove at overhaul).
- P.19.2.3.** Understructure at the trolley bus sides in the lowered floor area shall have a crash protection and must meet standards set forth in Federal Register Volume 47, No. 195, Section 2.1.2.10
- P.19.2.4.** Understructure at the front and rear overhang (defined as the distance between axle centerline and bumpers) shall be sufficiently robust to permit towing and lifting without special rigging being required. The design shall have been verified by submission of those parts of the STRUAA (Altoona Test) which address towing and recovery.
- P.19.2.5.** Out rigger supports are positioned in a grid pattern and placed strategically to provide strength and support to the overall structure preventing warping of the finished floor. The entire structure is welded from the floor/chassis to the walls and roof to provide strength, rigidity, and integrity to carry the ultimate loads and with stand road shock and vibration fatigue.
- P.19.2.6.** Understructure shall provide protected pathways for hydraulic lines, heater piping, airlines, and electrical cabling. Stainless steel trough shall be used as protective conduit for wires and cables. Joints in lines, hoses, etc. shall be accessible for repairing.
- P.19.2.7.** The floor structure is sealed and sheeted with 26 gauge galvanized sheeting providing a vapor barrier, using a composite sub flooring material that shall be waterproof and non-hygroscopic and resistant to mold growth as the base floor and attached to the framing using TEK screws. Each seam is then filled with body filler, and sanded smooth before installing the transit flooring making seams blend together.
- P.19.2.8.** 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 trolley. Jacking from a single point shall permit raising the bus sufficiently high to remove and reinstall a wheel and tire assembly. Jacking pads located on the axle or suspension near the wheels shall permit easy and safe jacking with the flat tire or dual set on a 6-inch high run up block not wider than a single tire. Jacking a changing any one tire shall be completed by a 2M

mechanic helper in less than 30 minutes from the time the bus is approached. The bus shall withstand such jacking at any one or any combination of wheel locations without permanent deformation or damage. Jacking pads shall be painted safety yellow for ease of identification.

P.19.3. CONSTRUCTION: EXTERIOR PANELS

- P.19.3.1.** Body structure shall be aesthetically pleasing without protruding fasteners. Visible exterior fasteners shall be kept to an absolute minimum, except where used to accentuate a desirable aesthetic feature.
- P.19.3.2.** Side panels shall be simple enough in shape to allow fabrication with no more tooling than a shear brake and edge roller. Ornamental items for the trolley bus shall be replaceable in case of damage.
- P.19.3.3.** The wall sections are sealed with Sika Flex 221 at all joints and seams. The entire structure is washed with Prep Sol 330 and primed with an epoxy primer, then sheeted with 20 gauge galvanealed sheeting using Sika Flex 552, then riveted with stainless steel Magna-Lok fasteners to the framing where necessary throughout each panel.

P.19.4. CONSTRUCTION HARDWARE

- P.19.4.1.** Fasteners shall be of non-corroding stainless steel material to prevent rust and corrosion. Trim pieces and fixtures installed shall be treated with ECK, an anti-electrolysis corrosion preventive material.

P.19.5. INSULATION

- P.19.5.1.** Interior of body, including roof, shall be well insulated against heat, cold and noise.
- P.19.5.2.** Roof Insulation shall be polystyrene EPS insulation.
- P.19.5.3.** Side wall insulation shall meet the same specifications as roof insulation. It shall be installed in all sidewalls, window post rear, and areas over the front and rear wheelhouses.
- P.19.5.4.** The insulation referred to above or other additional insulation shall provide effective sound attenuation for the passenger. The walls and roof are insulated with 1 1/2 inch cell bead board insulation providing R-factor of 0.24 in walls and 0.26 to 0.27 in the roof at 75 degrees F.
- P.19.5.5.** The engine compartment is properly sealed to prevent heat, noise, and fumes from entering the interior of the vehicle and insulated with a fire and heatproof sand barrier, foil faced Insultech sheeting. No interior body surface temperatures shall exceed 100 degrees Fahrenheit.

P.19.6. FLOORING

- P.19.6.1.** Floor shall be constructed of Transit grade composite sheeting.
- P.19.6.2.** Floor shall be laid in such a manner as to be free from squeaks. All edges shall be over underframe members.
- P.19.6.3.** Floor shall be reasonably level throughout and all joints between the floor and vertical surfaces shall have a cove molding.
- P.19.6.4.** Flooring material shall be securely bolted to the frame members.
- P.19.6.5.** Underframe shall be stiff enough to prevent floor from excessive flexing under normal loads. The floor shall be supported so that when a person of 190 pounds or more steps on any area, there will be no discernible flexing or movement.
- P.19.6.6.** The area at the fare box shall be adequate strength to support the fare box safely and durably.
- P.19.6.7.** The entire floor shall be thoroughly prepared for application of floor covering material.

P.19.7. ROOF

- P.19.7.1.** The roof structure is made of 1 1/2 inch 16 gauge, box, "clean coat", carbon steel tubing electrically arc welded together to the wall members to prevent drumming or vibrations.
- P.19.7.2.** The roof shall have a lantern style cupola to maintain the vintage theme of the 1800's streetcars. The top of the roof framing is sealed with Sika Flex 221, covered with .125 aluminum sheeting. All seams are welded to create a one-piece aluminum roof structure.
- P.19.7.3.** The roof shall have a lantern style cupola with the visual quality interior and exterior of a predecessor streetcar. Cupola windows are 1/8" inch safety tempered glass with a vintage etched design.
- P.19.7.4.** The front and rear have a 6-inch minimum overhang and the sides a 3 -inch minimum overhang. The roof shall have a drip rail rain gutter running the entire perimeter of the roof.
- P.19.7.5.** A rear roof hatch shall be provided to meet the requirements of FMVSS217
- P.19.7.6.** All seams, joints and overlapping panels, shall be thoroughly sealed to prevent the entry of water and dust. Where dissimilar metals meet, proper care shall be taken to prevent electrolytic corrosion.

P.19.8. STEPWELLS

P.19.8.1. The entrance and exit floor areas are to be sloped to prevent accumulation of water or ice.

P.19.9. WHEEL HOUSING

P.19.9.1. Wheelhouses shall be of sturdy construction of custom fabricated of ¼" T-100 steel and welded to the floor structure with custom aluminum tower covers on the interior with additional seating incorporated.

P.19.9.2. The wheel housing and step wells are sound deadened and sealed with a polyurethane minimum .125 thickness undercoating to eliminate sound passage to the interior of the vehicle.

P.19.9.3. The wheel housings shall prove ample clearance at front and rear tires under load and under all positions of front wheel steering.

P.19.10. FENDERS

P.19.10.1. Molded composite fenders shall be furnished at each wheel housing and shall be formed so as to effectively prevent road water/dirt from splashing up and onto driver's mirror or windows.

P.19.11. SPLASH APRON

P.19.11.1. Splash aprons, made of not less than one-quarter inch (1/4"), three ply rubberized fabric, or one quarter inch (1/4") cured masticated tire friction material, black in color, shall be provided at the rear of the wheel housings, projecting downward to a point approximately six inches (6") above ground with trolley bus loaded. Aprons shall be full width of trolley body just inside outer body framing.

P.19.12. DIP MOLDINGS

P.19.12.1. Water-deflecting roof gutters shall be provided over the side windows and doors.

P.19.13. ACCESS PANELS

P.19.13.1. Access doors shall be provided where necessary to service engine, radiator, air conditioning components, batteries, fuel fill, fluids, electrical panels, and all other components or accessories requiring service.

P.19.13.2. There shall be adequate access to the engine compartment and rear mounted air conditioning compressor. There shall be easily removable frame and access panels to allow quick access to service components.

P.19.13.3. All panels shall provide adequate space to assure easy removal of components or subcomponents.

P.19.13.4. All access panels, except for the rear engine door, shall be secured by use of locking devices with matching keys for all doors.

P.19.13.5. There shall be exterior access to the engine compartment at the rear, left, right, top and sides of the trolley bus.

P.19.13.6. All service doors shall be equipped with no less than two (2) heavy duty gas assisted struts for ease of opening and firm closure of doors.

P.19.13.7. The fuel closure door shall be large enough to allow for easy hook up of aftermarket fueling systems. The minimum dimensions of the fuel door opening shall be ten inches (10") square.

P.19.13.8. There shall be a def fluid access door, fill and gauge indicator.

P.19.13.9. Any exterior accessible electrical compartments shall be sealed to protect its contents from inclement weather.

P.19.13.10. The battery box door shall be secured with no less than two (2) exterior locking handles to allow quick access to batteries.

P.19.13.11. The front access doors for lights, towing connector, and towing eyes shall be hinged and secured with front access locking handles. Wiper motors shall be accessible and removable from front access doors.

P.19.13.12. There shall be interior access to the engine and air conditioning system. Such access shall consist of no less than three (3) removable panels in the following locations.

P.19.13.12.1.Rear bulkhead panel at the air return (w/locking fasteners)

P.19.13.12.2.Top of the rear settee (with captive fasteners)

P.19.13.12.3.Lower front section of rear settee (with captive fasteners)

P.19.14. BUMPERS

P.19.14.1. Bumper material shall be black in color and corrosion resistant. These qualities shall be sustained throughout the service life of the trolley.

P.19.14.2. Bumpers and their mounting s shall provide impact protection to the trolley bus at curb weight from two (2) miles per hour impact with a fixed, flat barrier perpendicular to the longitudinal centerline of the trolley bus. The rear bumper shall protect the trolley bus, when impacted by the striker as defined in FMVSS No. 215 loaded to four thousand (4000) pounds at four (4) miles per hour parallel to, or up to a thirty (30) degree angle to the longitudinal centerline of the trolley bus. The rear bumper to bumper extensions shall be shaped to preclude unauthorized riders standing on the bumper and shall wrap around the trolley bus to protect the engine compartment doors and radiator.

P.19.14.3. The bumper extensions shall not hinder service and shall be flared into the vehicle body with no protrusions or sharp edges. The bumper shall be independent of all power systems of the trolley us and shall not require service or maintenance in normal operation during the service life of the trolley bus.

P.19.14.4. Front and rear bumpers are one-piece, steel fabricated assemblies. The front and rear bumpers are 6 inches in height and designed to follow the contour angles of the front and rear caps. The placement of the bumpers shall be arranged to provide protection against body damage at standard SAE heights. The bumpers shall be Acid Etched, primed with polyurethane and coated with a polyurethane texture painted with a Rhino liner covering to prevent chipping.

P.19.15. TOWING EYES

P.19.15.1. Two (2) front towing eyes, concealed and located above the bumper, shall be provided.

P.19.15.2. Two (2) rear towing eyes shall be located beneath the rear bumper on the main chassis structure to allow the trolley bus to be lifted by a towing vehicle without damage to the rear bumper, body panels, or structure.

P.20. WINDOWS

P.20.1. WINDSHIELD

P.20.1.1. The windshield shall incorporate a design constructed of one-quarter inch (1/4") thick safety plate laminated glass in accordance with FMVSS 71.205, AS1 minimum rating. The operator's section of the windshield shall be sloped at sufficient angle to minimize reflections and glare.

P.20.1.2. There are three windshields to keep the authentic vintage trolley design along with side and rear windows that are arched at the top.

P.20.2. WINDSHIELD WIPERS AND WASHERS

P.20.2.1. Windshield wipers and equipment shall be Sprague Electric and shall provide an adjustable time delay feature. The Trolley bus shall be equipped with variable speed windshield wipers for each windshield section with separate controls for each. No part of the windshield mechanism shall be damaged by manual manipulation of the arm. At 60 mph, no more than ten percent (10%) of the wiped area shall be lost due to windshield wiper lift. Both wipers shall park along the edges of the windshield glass. Windshield wiper motor mechanisms shall be easily accessible for repairs or service from front access and shall be removable as complete units.

P.20.2.2. The windshield washer system shall deposit washing fluid on the windshields from nozzles attached to the wiper arm and shall evenly and completely wet the entire wiped area. The windshield washer system shall have a reservoir of one (1) gallon and be located in the front access for easy refilling. The reservoir itself shall be translucent for easy determination of fluid level. Reservoir, reservoir pumps, lines and fitting shall be corrosion resistant and protected from freezing.

P.20.3. SIDE WINDOWS

P.20.3.1. All passenger windows shall be manufactured in accordance with FMVSS 571.205. Windows shall have a vintage 3M etched pattern applied to the top arch area of the inside.

P.20.3.2. The passenger windows have a vertical slider with a center glass drop sash design with a 2-point latch system easily operable by the passengers. The windows shall have an etching design to add to the vintage appearance.

P.20.3.3. All windows shall be of the same size and shall be interchangeable. Windows shall be designed to prevent the entrance of air and water when windows are closed.

P.20.3.4. There are a sufficient number of emergency exit windows located on driver side, passenger side, and rear of the coach to meet FMVSS 217 for emergency exits. Near each window there shall be instructions on decals that sufficiently explain emergency exit procedures.

P.20.3.5. One (1) portion of the window shall be openable, or have a drop sash design, to provide adequate outside air ventilation and shall have locking latches.

P.20.3.6. Glazing color shall be consistent from window to window with the exception of the upper destination window (if used). Upper destination sign's window shall be clear in color. Other passenger windows shall have not more than a twenty-eight (28%) tint.

P.20.4. DRIVER'S WINDOW

P.20.4.1. The driver's area will have one clear T-slider arched windows for easy access to tolls. The driver's window shall be a slider window with laminated safety glass. The window shall have a ratchet or stop lock mechanism to prevent uncontrolled sliding. There shall be an interior and exterior "non-locking" handle on the front vertical bar of the operator's window.

P.21. PASSENGER DOOR

P.21.1. FRONT ENTRANCE DOOR

P.21.1.1. The front door shall be Vapor two section air operated with a minimum clear opening dimensions of thirty-four inches (34") wide. The vertical and horizontal door clearances shall comply with all ADA requirements.

P.21.1.2. Door shall be outward opening and have stainless steel hinged with joints at the door posts covered by rubber seals. Meeting edges of door shall have four inches (4") extruded overlapping type rubber safety edges with two inches (2") on each half.

P.21.1.3. Door shall be fully air operated with a Vapor door motor. An air shut-off valve shall be supplied. When the valve is in an "Off" position, front door shall be capable of being opened and closed manually.

P.21.1.4. Each door section shall be equipped with a handrail, powder coated yellow that is designed to minimize the incursion into the clear door opening. The area between the front entrance and driver's station shall have a brass hand rail to aid in boarding and the trolley.

P.21.1.5. External air dump switch shall be located on the exterior of the trolley bus located inside the passenger access door to hold the door in the open position when necessary.

P.21.2. REAR EXIT DOOR

P.21.2.1. Both front and rear doors shall be controlled by a door operating control, with the following indicator positions/aspects:

P.21.2.1.1. Front Door Open – rear door unlocked

P.21.2.1.2. Front Door Open

P.21.2.1.3. Both Doors Closed (if rear entry/exit is chosen)

P.21.2.1.4. Rear Doors Unlocked (if rear entry/exit is chosen)

P.21.2.1.5. Rear Door Unlocked – Front Door Open

P.21.2.2. A brake and accelerator interlock shall be provided that prevents movement of the trolley bus when the doors are open. The interlock equipment shall be mounted together as one (1) assembly.

P.21.2.3. A rear door (if chosen) override lever shall be provided for emergency exit. The lever shall be located in the rear door control compartment. The lever is used to release the rear door from the locked position for manual operation and also shall engage the interlock.

P.21.2.4. A master interlock override switch shall be provided. It shall be located in the electric panel near the driver and shall be in a secure position.

P.21.3. DOOR GLASS

P.21.3.1. Each section of the door shall be glazed with one-quarter-inch (1/4") nominal laminated glass. Door glass shall have the same tint as the passenger windows.

P.22. EXTERIOR MIRRORS

P.22.1. GENERAL

P.22.1.1. Trolley buses shall be equipped with two (2) mirrors, one (1) mounted on the roadside front corner post and one (1) mounted on the curbside front corner post.

P.22.1.2. Roadside mirror shall be located just above the lower edge of the driver's roadside window.

P.22.1.3. Curbside mirror is not to extend further than a twelve inch (12") radius from the corner of the trolley bus and shall be mounted on the curbside front corner post.

P.22.2. CURBSIDE AND ROADSIDE MIRRORS

P.22.2.1. Mirror shall be remotely adjustable with all metal hardware. The controls shall be located to the roadside of the driver and provide for a full range of adjustment of the mirrors. The glass shall be easily replaceable.

- P.22.2.2.** The mirror heads and arms shall be a heavy-duty retractable design to prevent damage from fixed objects and during bus washing through automatic washers. The mirror heads shall be connected to arms with adjustable aluminum or brass ball type stems with metal set screws. Mirrors shall be fully adjustable by the operator without use of tools.
- P.22.2.3.** The mirrors shall be operated by the drivers switch and shall be heated to prevent ice buildup.
- P.22.2.4.** Mirror shall not be less than six and one half feet (6 ½) above the pavement nor extend more than 12 inches (12") radius from the corner of the trolley.

P.23. INTERIOR

P.23.1. FLOOR COVERING

- P.23.1.1.** Floor shall utilize Altro Transit flooring material in a simulated wood grain or other color offered by manufacture. Up to two colors shall be selected at a pre-build conference.
- P.23.1.2.** Steps at the front entrance and rear exit shall be covered with skid resistant Altro coverings congruous with the interior floor colors and pattern. Entrance and exit step treads shall include integral molded yellow noses on stainless steel metal backing, backing to be totally enclosed in rubber.
- P.23.1.3.** Floor area under seats, including driver's area, shall be covered with mottled smooth floor covering not less than one-eighth inch (1/8") in thickness. The material is to be thoroughly cemented into position throughout the entire area. The floor covering shall no extend up on the wheel housing but shall terminate where the floor covering butts the housing.

P.23.2. MODESTY PANELS

- P.23.2.1.** All modesty panels shall be covered with matching steel painted or interior paneling color and grain shall be coordinated with the remainder of the interior.
- P.23.2.2.** All modesty panels shall be welded in place as part of the structural body with hand railings attached with through bolts to ensure sturdy attachment.
- P.23.2.3.** A modesty panel approximately thirty-four inches (34") in height shall be installed within the hand rail area of the rear of the front stepwell. This panel shall have adequate clearance from the front door, to prevent injury to passenger's hand(s) during the opening cycle.
- P.23.2.4.** A modesty panel of approximately thirty-four inches (34") in height shall be installed within the hand rail area of the rear side of the rear step well (if send entry/exit is chosen).
- P.23.2.5.** All modesty panels shall be raised three inches (3") above floor level.

P.23.3. DRIVER'S BARRIER

- P.23.3.1.** A full height barrier beginning six inches (6") above the floor shall be provided directly in back of the driver's station to separate the driver from the passenger compartment. The barrier shall extend from the left side of the trolley bus wall to the stanchion at the right rear of the driver's stanchion and then wrap around the side of the driver's seat. This panel shall in no way interfere with the safe normal operation of the trolley bus or restrict movement of the driver's seat.

P.23.4. INTERIOR TRIM

- P.23.4.1.** Interior side walls and cupola roof area shall be paneled with 1/4" oak, shall be applied to ensure a neat and finished appearance. Fasteners shall be of such type that they will not loosen due to vibration. Panels shall be supported so as to prevent buckles, drumming or flexing when the vehicle is in service.
- P.23.4.2.** All panel joints shall be sealed and covered with protective trip strips of solid oak in various widths to provide an aesthetically pleasing interior reminiscent of the predecessor streetcar. All oak shall be treated or finished with an epoxy varnish to ensure durability and protection from the elements.
- P.23.4.3.** Panel behind the rear settee shall conform to the requirements of Federal Safety Standard No. 302 Flammability of Interior Materials.
- P.23.4.4.** All trim moldings around wheel wells, sidewall, cove area, settee riser, front dash area and panel below driver's window shall be stainless steel.
- P.23.4.5.** A final interior color scheme shall be determined by the customer at the pre-production meeting.

P.23.5. STANCHIONS/GRAB RAILS

- P.23.5.1.** All stanchions and grab rails shall be one and one-quarter inch (1 ¼") diameter smoother surface anodized brass tubing, with fitting that match tubing.
- P.23.5.2.** Fitting shall be corrosion resistant and congruous with the installed stanchion rails.
- P.23.5.3.** A full length ceiling grab rail with eight (8) leather grab straps shall be provided on the trolley bus.

- P.23.5.4.** Ceiling grab rail ends shall terminate at the ceiling connection with round dome ends of brass. A vertical stanchion shall be mounted from the floor to the ceiling or ceiling grab rail at the right rear of the operator's seat. A vertical stanchion shall be mounted from the floor to the ceiling grab rail at the inside rear of the front step well and at the front and rear of the rear stepwell.
- P.23.5.5.** A hand rail shall extend from the front and rear stanchions to the body side approximately thirty-four inches (34") above the stepwell risers. This will be provided on each side of the rear stepwell.
- P.23.5.6.** A vertical stanchion running from the seat bottom to the ceiling or ceiling grab rail shall be installed in the middle of all longitudinal passenger seats.
- P.23.5.7.** Entrance grab rails shall be installed at the front stepwell area of the trolley bus. Such a grab rail shall be affixed to the wheelchair lift platform. The grab rail shall not interfere with the wheelchair maneuverability. They shall be brushed stainless steel or brass construction. In addition, grab rails shall be installed on each half of the front door which do not interfere with the lift grab rails.

P.23.6. INTERIOR MIRROR

- P.23.6.1.** Trolley bus shall be equipped with one (1) or more inside rear view mirrors. Center rear view mirror shall be seven inches (7") by sixteen inches (16"). Mirrors shall be located so as not to interfere with passengers. All mirrors shall be mounted so that they are vibration free when engine is idling and when trolley bus is moving.
- P.23.6.2.** Trolley bus shall be equipped with twelve inch (12") round diminishing mirror to be mounted at rear exit door in such a way so it will not interfere with passengers and may be viewed by the operator from a forward mirror.

P.23.7. SUN VISORS

- P.23.7.1.** Driver side window and front window shall have a New View rollup type sun visor visible through but reducing sun glare.

P.23.8. PASSENGER STOP REQUEST SIGNAL

- P.23.8.1.** A passenger "Stop Request" chime shall be installed.
- P.23.8.2.** The system shall consist of a yellow plastic coated wire rope, running horizontally from directly behind the front modesty panels to the last rear window of both sides of the trolley bus. The cable shall run horizontally along the top of the wall section and the top of the windows. There shall be hanging nylon or leather pull straps. The cable shall not sag below the window top. Cable shall be affixed with eye loops at every window post. The pull straps shall not cause interference with the opening of the windows.
- P.23.8.3.** There shall be a touch tape located on the bottom side of the flip seat areas for the ADA positions when in use the flip seats shall be stowed allowing the touch tape to be at the hand height of the ADA passenger positions.
- P.23.8.4.** A lighted sign shall notify passengers upon activation of the "Stop Request". Such a sign shall have a white lettering on blue background. The sign shall remain illuminated passengers exit the trolley bus and the front door is cycled. The sign shall be illuminated via an LED light fixture.
- P.23.8.5.** The passenger signal shall chime one one (1) time to stop continuous use by passengers. System shall reset automatically when the front doors are cycles open and closed. The sign shall be equipped WITH AN ON/OFF SWITCH LOCATED ON THE OPERATOR'S CONSOLE.

P.23.9. MISCELLANEOUS INTERIOR EQUIPMENT

- P.23.9.1.** A storage space of no less than one and one half (1 ½) cubic feet shall be supplied in the operator's area. The compartment door shall be secured by two locking handles.
- P.23.9.2.** A metal coat hook shall be furnished and installed at a convenient location for the driver. A leather or vinyl buckle strap with Velcro shall be installed to prevent coats from swaying.
- P.23.9.3.** Amerex Model 400T ABC five pound (5 lb.) dry chemical fire extinguisher and KD #610-4645 safety triangle kit shall be installed. Fire extinguisher location shall be placarded with permanent decal.

P.23.10. PASSENGER SEATS

- P.23.10.1.** The passenger seats shall be natural oak or slat with vast aluminum tram seat ends and shall meet flammability requirements of FMVSS-302. All seats shall be 34 inches in width and shall have smooth urethane coated finish of a minimum of 3-5 coats. Seating arrangement shall be forward facing, perimeter or a combination.
- P.23.10.2.** Passenger transverse seats shall be a flip up seat design and be a minimum of thirty-four inches (34") wide and eighteen inches (18") in seat depth for a double flip up seat. For a triple passenger flip up seat the seat shall be a minimum of fifty-one inches (51") wide and eighteen inches (18") deep. Flip seats shall

be identical in size and configuration. Typical seating arrangements for 34, and 37, foot trolley buses are depicted in figure 1 and 2.

P.23.10.3. There shall be no less than twenty-eight inches (28") hip to knee room between each seat.

P.23.10.4. Seat assemblies and components of identical seats shall be mechanically interchangeable.

P.23.10.5. The seats over the rear wheel housing shall be longitudinal seats facing inward, providing seating accommodation for 2 or more passengers in various multiple arrangements.

P.23.10.6. The rearmost bench seat shall provide seating accommodations of five (5) passengers.

P.23.10.7. The cast aluminum seat ends shall be scrolled and paint to match the color scheme of the trolley.

P.23.10.8. All forward facing wheelchair jump seats shall be constructed to have the same high back appearance as the fixed passenger seats. Individual side facing jump seats in the tie down area may match the other longitudinal seats in configuration.

P.23.11. WHEELCHAIR ACCESS/TIE DOWN STATIONS/RESTRAINT SYSTEM

P.23.11.1. Trolley buses shall be designed to maximize accessibility be wheelchairs and other mobility device. The front entrance shall allow for a clear turning radius of thirty-six inches (36") from the driver's station to the front door entrance modesty panel. The front wheelhouses shall provide a minimum clear opening of thirty-six inches (36") to allow mobility devices to maneuver from the entrance door back to the tie down area.

P.23.11.2. Accommodations shall be provided for two (2) wheelchair passengers to be secured in a forward or side facing position in the area immediately rear of the front wheelhouses. The length of this area shall be ninety six inches (96") minimum, and the width shall be equal the length of the transverse seats and the modesty panels. Modesty panels shall be adequately reinforced to withstand the impact of wheelchairs.

P.23.11.3. The exit signal shall be no higher than four feet (4') above the floor in this area. Maneuvering room inside the trolley bus shall accommodate easy travel for a passenger in a wheelchair from loading device through the trolley bus to the designated parking area, and back out. No portion of the wheelchair of is occupant shall protrude into the normal aisle of the trolley bus when parked in the designated parking space(s).

P.23.11.4. All dimensions for wheelchair maneuvering, parking, foot clearance, and turning area shall comply with ADA regulation.

P.23.11.5. There shall be wheelchair restraints for each tie down location in the trolley bus which comply with ADA regulations, including the accommodation of "scooter" type vehicles. A storage box for each restraint position shall be built into the flip up seat frame.

P.23.12. ACCESS RAMP

P.23.12.1. An access ramp shall be provided at the entrance door. It shall be a Lift U18 or Ricon 621S fold out ramp. The ramp shall have a useable width of thirty-one inches (31") and meet all ADA requirements. The ramp is to be operated by the driver from the seated position. In case of malfunction, the ramp shall be manually operable.

P.23.12.2. The ramp shall be shall be operable from area of sidewalks, curbs, or various other stop locations. The ramp angle meets or exceeds is six (6) to one (1).

P.23.12.3. The ramp will be manufactured of stainless steel, be rated for 660 pound capacity minimum and be driven by an all-electric drive system. The system shall allow for easy manual operation of the ramp, requiring a maximum of 20 pounds of force to lift and deploy the ramp.

P.23.12.4. All interlocks required to meet FMVSS and ADA requirements shall be provided with the wheelchair ramp.

P.23.13. DRIVER'S STATION

P.23.13.1. The design of the driver's station shall have the prime objective the provision of an environment for the driver that will aid him or her to operate the trolley bus safely and efficiently for long periods of time with minimum fatigue. The driver's station shall have the components located to provide comfort and use, safely while operating the trolley bus.

P.23.13.2. The driver's station shall accommodate drivers who are of various heights and body proportions by use of human factors design in locating proportioning the devices in the station and by the use of adjustable components such as the driver's seat and the steering column. The driver's station shall accommodate drivers within a height range of 57 to 76.5 inches.

P.23.13.3. The operator's seat shall be the USSC 9100ALX3. The seat shall be covered with heavy-duty black vinyl fabric and be perforated for ventilation. High density polyurethane foam shall be used for the seat cushion. Seat shall be equipped with two point seat belt. The seat shall be provided with double shock

vibration damping and a stepless seat rack and back recline. Air operated lumbar adjustments and an air slide release shall be mounted on the panel accessible to the driver. The seat shall provide adjustment of the ride height via a pneumatic suspension which includes a quick dump air release. A three (3) position limit/lockout lever shall be provided to allow operator to set the seat in a fixed suspension height. Seat mounting shall allow for maximum of nine inches (9") of usable for and aft travel without contacting any part of the operator compartment.

P.23.13.4. The driver's console shall be designed for the safety of the operations as well as the comfort of the driver. The forward dash console shall have a complete complement of instrumentation and controls consisting of:

- P.23.13.4.1. speedometer with an odometer
- P.23.13.4.2. voltmeter
- P.23.13.4.3. engine temperature gauge with warning lights
- P.23.13.4.4. water temperature
- P.23.13.4.5. low engine coolant level
- P.23.13.4.6. oil pressure gauge
- P.23.13.4.7. fuel level gauge
- P.23.13.4.8. alternator with Pentax charging monitor
- P.23.13.4.9. parking brake
- P.23.13.4.10. high-beam indicator
- P.23.13.4.11. directional signal indicator
- P.23.13.4.12. headlight beam switch
- P.23.13.4.13. radio cassette

P.23.13.5. To the left of the driver shall be all other vehicle accessory switches including:

- P.23.13.5.1. a master on/off switch
- P.23.13.5.2. A 12V driver's fan shall be mounted in the header area with a driver's control switch located in the switch panel.
- P.23.13.5.3. A sun Visor shall be mounted in the header area.

P.23.14. PUBLIC ADDRESS SYSTEM

- P.23.14.1.** An REI Amplifier shall be secured in a protective waterproof housing in the operator's area. Necessary noise suppression shall be made to prevent interference from the alternator, lighting or other noise sources.
- P.23.14.2.** A gooseneck microphone shall be attached to the overhead compartment, above and to the left of the driver and be capable of adjustment to the driver's left shoulder neck area.
- P.23.14.3.** An output jack shall be provided in the operator's area for future installation of a handheld microphone.
- P.23.14.4.** A foot mounted foot mounted switch shall be supplied to afford hands-free operation of the PA system.
- P.23.14.5.** The PA system shall also incorporate selected inside/outside/both operation of internal and external waterproof speaker and shall be heard from a distance of fifty feet (50') from the trolley bus.
- P.23.14.6.** A minimum of one (1) speaker every six feet (6') on each side of the trolley bus shall be provided of sufficient power and quality and shall be flush mounted to the ceiling to provide a good distribution of sound throughout the passenger compartment. Speakers shall be six inches (6") in diameter. Speakers shall be covered by removable black grille.
- P.23.14.7.** Speaker selector switch shall be conveniently mounted to allow operator to use interior speakers only, exterior speakers only, or all speakers. An on/off power switch shall be mounted on the instrument panel.
- P.23.14.8.** P.A. system shall be wired to allow future installation of "Next Stop" annunciation system interfaced with the P.A. and speaker system to allow automated messages to be broadcast over this system.
- P.23.14.9.** The trolley bus shall be equipped with a hand-held microphone in the driver's compartment area.
- P.23.14.10.** The manufacture shall supply a headphone jack and hanger bracket at the top inside of the front stepwell modesty panel for connection of a handheld microphone for special service purposes. This connection shall power all speakers identical to the operator's microphone.

P.24. HEATING, DEFROSTING, VENTILATION AND AIR CONDITIONING

P.24.1. VEHICLE HEATING

- P.24.1.1.** A heating and ventilation system shall be provided with proper correlation to provide practical maximum comfort to passengers and the operator. Heating and ventilating system shall incorporate introduction of approximately twenty percent (20%) fresh air.
- P.24.1.2.** Air for heating and ventilating shall be evenly distributed throughout the trolley bus body in such a manner as to minimize temperature variation. Provision shall be made for minor adjustment of control to maintain desired temperatures within the trolley bus without changing supply of outside air required for ventilation.
- P.24.1.3.** A manual control or modulating valve shall be provided to permit the fans to be used for power ventilation of outside air in warm weather.
- P.24.1.4.** Main heating system shall be thermostatically controlled. The heating system shall provide heated filtered air for an ambient temperature differential from 60°F to 0°F. Heating filtering elements must be of the disposable type.
- P.24.1.5.** Blowers shall be heavy duty with adequate output to provide circulation throughout the trolley bus. Blower shall also circulate fresh air throughout the trolley bus.
- P.24.1.6.** The main heater shall be mounted in rear of the trolley bus above the engine compartment. It shall have heavy-duty motors and a minimum capacity of 110,000 BTU.
- P.24.1.7.** The HVAAC system shall have a dedicated insulated ducted for the entire trolley bus. HVAAC ducts shall include closable dampers to completely eliminate air flow if desired.

P.24.2. DRIVER'S HEATER/DEFROSTER

- P.24.2.1.** A separate dash heater and blower shall be provided for the driver's comfort and for windshield defrosting. Capacity of heat shall be 52,000 BTU.
- P.24.2.2.** Defroster blower shall be automatically inoperative if the alternator is not charging.

P.24.3. HEATER WATER LINES

- P.24.3.1.** Heater water line shall not be exposed within the trolley. The hoses are a silicone grade hose ran from the rear of the trolley to the front defroster/heater through a sealed trough the inside of the trolley bus with access panels for servicing.
- P.24.3.2.** All water lines shall be heavily insulated throughout the trolley bus.

P.24.4. HEATER CORES

- P.24.4.1.** All heater core fins shall be of aluminum, and the heater core tubes shall be copper. Metal used in the tanks shall be of adequate thickness and drawn reinforcements. All radii of the tanks shall be of sufficient size to preclude fatigue failure.
- P.24.4.2.** Heater cores, motor and fan shall be readily accessible and removable through service panels

P.24.5. Heater and Blower Motors

- P.24.5.1.** All blowers required for heating and ventilating system shall be balance statically and dynamically.
- P.24.5.2.** All motors required for these blowers shall be heavy-duty type motors, with a minimum of one-quarter (1/4) horsepower.

P.24.6. HEATER THERMOSTAT

- P.24.6.1.** A thermostat controlling the heating system shall be protected or screened to prevent tampering and guarded against any possible damage from passengers.

P.24.7. AIR CONDITIONING SYSTEM

- P.24.7.1.** The trolley bus shall be equipped with a Mobile Climate Control RM35 Series designed to operate on R-134a refrigerant.
- P.24.7.2.** The air conditioning unit frame shall be constructed of structural aluminum of light 0.100 and 0.182 material thicknesses for strength, corrosion protection, and light weight. The frame shall be completely welded and painted with a high solid polyester paint. All hardware shall be 300 Series stainless steel to protect against corrosion. "Neverseerz" anti-seizing lubricant shall be applied to the treads of all stainless steel hardware during assembly to prevent thread galling.

P.24.7.3. The evaporator, heater, and condenser coils shall be constructed of seamless copper tubing having a minimum of .0195 inch wall thickness. The copper tubing shall be mechanically expanded into aluminum fins having a minimum thickness of 0.080 inches. The condenser coil shall be mounted to allow easy removal and reinstallation without major disassembly of the unit frame or removal of the unit from the trolley bus. Separate drains shall be provided for the condenser and evaporator/heater sections to allow moisture to be routed out of the unit to the street. Drain seals and/or traps shall be installed at the outlet of the evaporator/heater drain tubes to prevent entrance of dirt or fumes into the trolley bus.

P.24.7.4. The motors shall be brushless sealed 24 VDC. The condenser shall have two (2) fan motors and the evaporator/heater shall have (2) blower motors. Motors shall be selected and applied to maximum efficient operation, airflow and long life. Brush life shall be a minimum of 10,000 hours of operating time. Motors shall be capable of variable speed operation for heating and cooling.

P.24.8. TEMPERATURE AND ELECTRICAL CONTROLS

P.24.8.1. There shall be unitized control panel consisting of reliable electromechanical relays, magnetic motor circuit breakers, bi-metal control circuit breakers, adjustable return air thermostat with a range of 60°F - 90°F ambient thermostat, evaporator coil, antifreeze thermostat, and terminal board for ease of troubleshooting.

P.24.9. ELECTRICAL WIRING AND TERMINALS

P.24.9.1. All unit wiring shall conform to FMVSS requirements. All terminals shall be ring type harness with Packard pin connectors with vinyl insulation. All terminals shall be machine crimped. All terminations exposed to ambient conditions shall be coated with glycol for corrosion protection.

P.24.10. RECEIVER TANK, DRY EYE, FILTER/DEHYDRATOR

P.24.10.1. The unit shall be equipped with a refrigerant receiver tank installed vertically to ensure a steady liquid feed to the expansion valve. The receiver tank shall meet all ASTM requirements and have two (2) sight glasses for checking refrigerant level. The top sight glass shall have a floating plastic ball to indicate proper refrigerant level. A refrigerant dry eye shall be provided in the liquid line, or in the lower sight glass of the receiver tank, to indicate the presence of moisture in the refrigerant system. The unit shall have a disposable liquid line filter/dehydrator.

P.24.11. REFRIGERANT HOSES/COPPER TUBING/ FITTINGS

P.24.11.1. Suction and discharge hoses shall be provided to connect the air conditioning unit to the compressor. The hoses shall have reusable swivel fittings, Teflon liner, stainless steel interior support coil, stainless steel exterior braid and asbestos exterior sleeve for abrasion protection. Length of such hoses shall be kept to a minimum to diminish effusion of refrigerant or permeation of moisture.

P.24.11.2. All copper tubing provided shall be refrigerant grade, Series 122 seamless type meeting ASTM specifications. All solder joints shall be silver soldered. All flux and scale shall be cleaned from solder joints, prior to soldering, and all tubing exposed to ambient shall be sprayed with fungus proof varnish.

P.24.11.3. All joint Industry Council (JIC) and SAE swivel fittings of three-quarter inch (3/4") flare size and larger shall include "o" rings for added sealing protection. "O" ring material shall be compatible with refrigerant.

P.24.12. EXPANSION VALVE

P.24.12.1. The expansion valve shall be externally equalized. The expansion valve bulb shall be clamped to the suction line in the evaporator compartment and insulated from effects of surrounding air temperature. The expansion valve body shall be properly secured and mounted in the return air area for ease of access.

P.24.13. SYSTEM PERFORMANCE

P.24.13.1. The RM35 system shall control the interior trolley bus temperature to meet all White Book temperature control performance requirements as defined in Chapter 3.7, Interior Climate Control, of the Department of Transportation, Urban Mass Transportation Administration., "Baseline Advance Design Transit Coach Specifications".

P.24.14. SYSTEM PROTECTIVE CONTROLS

P.24.14.1. The air conditioning system will be equipped with the following protective control;

P.24.14.1.1. High pressure cutout switch

P.24.14.1.2. Low pressure cutout switch

P.24.14.1.3. Ambient sensing switch 45 + 5 cutout 55 +5°F cut-in

P.24.14.1.4. Evaporator coil freeze protection – The system shall be equipped with an evaporator pressure regulator or Anti-Freeze thermostat to prevent condensate freezing on the evaporator coil.

P.24.15. COMPRESSOR

P.24.15.1. The air conditioning system shall be provided with a compressor. The compressor shall be capable of cycling on/off at any operating speed. High and low refrigerant pressure cutout switches shall be mounted on the compressor. Suction and discharge service valves shall be made of brass, with steel stems.

P.25. BODY PREPARATION/PAINT AND DECALS

P.25.1. PAINTING AND STRIPING

P.25.1.1. The customer shall choose from a wide choice of colors from the manufactures provided color chart book. Matching fleet colors are also available.

P.25.1.2. Both exterior and interior paint is to be Sikkens Azko Nobellow VOC.

P.25.1.3. All paint shall be applied to a minimum thickness of six (6) mils.

P.25.1.4. The framing is washed with a metal prep wax and grease remover, and then primed with Interseal Coating.

P.25.1.5. All exterior panels are prepped with an etching wash, primed with an etching primer 670SH, a base primer low VOC primer, specially designed for metal surfaces. The primer is allowed proper drying time and sanded before applying the standard two tone Sikkens Azko Nobel Polyurethane Colors and clear coat.

P.25.1.6. A Standard Vintage pin-striping package shall be installed.

P.25.2. INTERIOR SIGNS

P.25.2.1. All interior signs shall be supplied and installed in a metal, permanent plate design mounted to the body with rivets.

P.25.2.2. "No Smoking, No Eating, No Radios, No Drinking" plates shall be placed on the driver's modesty panel above the schedule rack and the rear wall location.

P.25.2.3. Interior trolley bus number in one (1) location shall be two inch (2"), in vintage oval background with "No." symbol.

P.25.2.4. A decal explaining instructions for operating the wheelchair lift and a decal explaining the instructions for operating the kneeling system shall be installed near the driver's location.

P.25.2.5. Plastic engraved plates stating "No Standing Ahead of the White Line" shall be located on front cupola wall clearly visible to passengers in passenger area.

P.25.2.6. Decal shall be fixed on all emergency exit with instructions as required by law.

P.25.2.7. Decal stating "Do Not Push On Exit Door" shall be located on rear door (if choosing optional rear entry/exit door) on each leaf of the door affix to yellow door handles

P.25.3. EXTERIOR DECALS AND SIGNS

P.25.3.1. Exterior trolley bus number shall be affixed to all four (4) sides of trolley using the "No." symbol in front of the number. Roof Top trolley number of twenty-four (24") shall be used if required.

P.25.3.2. "Diesel Fuel" decal shall be installed outside filler door.

P.25.3.3. "Caution-Negative Ground" to be located inside battery compartment door as well all necessary instruction to operate battery disconnect switches.

P.25.3.4. "Battery Shut Off" shall be affixed to battery tray compartment door.

P.25.3.5. The International Handicapped Symbol shall be installed at one (1) location. This symbol will be the white on blue background.

P.25.3.6. Up to four (4) logos or City Name graphics shall be applied.

P.25.3.7. "Wheelchair Lift/Kneeling" decal shall be installed to the exterior near the front entrance ramp area.

P.26. SAFETY

P.26.1. VEHICLE SAFETY ITEMS

P.26.1.1. Drive shaft guards shall be installed between every pair of universal joints.

P.26.1.2. A 5-pound type B.C. fire extinguisher shall be supplied.

P.26.1.3. A triangle flare kit shall be equipped.

P.26.1.4. A body fluid clean up kit shall be provided

P.26.1.5. A transit style battery master disconnect shall be installed.

P.26.1.6. An audible back-up alarm shall be installed.

P.26.1.7. All doors and wheel chair lift shall be interlocked through the shift inhibitor, parking brake, and/or braking system.

P.26.1.8. Entrance doors shall be equipped with a sensitive edging to prevent closing when obstructed.

P.26.1.9. All appropriate warning labels shall be installed.

P.27. WARRANTY REQUIREMENTS

P.27.1. The contractor warrants and guarantees to the original Agency submitting PO, each complete bus and specific subsystem and components for 100% parts and labor as follows:

P.27.1.1. OEM standard factory warranties for chassis and engine.

P.27.1.2. Add-on components shall have component manufacture's standard warranty.

P.27.1.3. Warranty shall begin on the date that the vehicle delivery is accepted by the agency issuing the purchase order.

P.28. PRE-AWARD AUDIT

P.28.1. The vehicles are not considered delivered to the purchasing agency until the required FTA documents are completed by an ODOT staff member. A Pre-Award Audit shall be conducted to determine if the bid proposal specifications. The bidder shall submit documents, which include certification of the manufacturer's compliance with the Federal Transit Administration (FTA) Pre-Award Buy America Audit Requirements. The document submitted shall include the following information for each major component used on vehicle bid:

P.28.1.1. Name and address of each supplier.

P.28.1.2. Cost of each major component and subcomponent. In order to protect proprietary information, the document may reflect the percentage of total cost each item represents instead of the actual cost.

P.28.1.3. Country of origin of each major component and subcomponent.

P.28.1.4. Name and address of company where final assembly occurs.

P.28.1.5. Cost of final assembly

P.28.1.6. Signature of authorized representative of vehicle manufacturer.

P.29. POST- DELIVERY AUDIT

P.29.1. A Post Delivery Audit of the vehicle(s) shall be conducted at the purchaser's facility, to determine that the completed vehicle(s) meets specifications. Once this process has been satisfactorily completed, the vehicle(s) shall be considered acceptable.

P.30. ACCESSIBILITY REQUIREMENTS

P.30.1. When submitting a bid for an accessible vehicle for the disabled, the vendor shall provide a list of the vehicle related equipment illustrating the component cost and related installation charges. The purpose of this list is to reflect an accurate cost for those vehicle related items, which are required to make the vehicle accessible to the disabled.

P.31. ACCEPTANCE OF VEHICLES

P.31.1. Upon delivery at the designed location specified within this document the final acceptance will occur after the vehicles have been inspected, road tested and all FTA required post audit delivery requirements have been met.

P.31.2. All vehicles shall be insured by the bidder until the post audit delivery has been conducted at minimum.

SECTION "P"

LOW FLOOR ADA TROLLEY

RESPONSE SHEET

BASE VEHICLE COST PER UNIT

BASE VEHICLE	COST PER UNIT
	\$

OPTIONAL ITEMS

UPGRADE TO CUMMINS ISL ENGINE OR CUMMINS ISL-G ENGINE	\$
ALTERNATIVE FUEL CNG AVAILABLE WITH ISL-G ENGINE	\$
FULL ELECTRIC PROPULSION SYSTEM	\$
EMCO-WHEATION FUELING SYSTEM	\$
INVERTOR WITH 110 V OUTLETS FOR HOLIDAY LIGHTING	\$
ROOF MOUNTED TRANSIT STROBE LIGHT	\$
DVD PLAYER	\$
20" FLAT SCREEN MONITOR	\$
HEADSET MIC	\$
REI SURVEILLANCE 4 CAMERA SYSTEM	\$
SAFETY VISION 9 CAMERA SYSTEM	\$
SEON 7 CAMERA SURVEILLANCE CAMERA SYSTEM	\$
APOLLO/ROAD RUNNER 7 CAMERA SURVEILLANCE CAMERA SYSTEM	\$
FAUX WOOD PLANK TRANSIT FLOORING (VARIOUS COLOR AVAILABLE)	\$
FAUX WOOD PLANK TRANSIT FLOORING (VARIOUS COLOR AVAILABLE)	\$
OPEN AIR SECTIONS WITH GUARD RAILS AND RAIN CURTAINS	\$
WINDOW INSERTS USED WITH OPEN AIR OPTIONS	\$
MAHOGANY TRIM PACKAGE EXTERIOR	\$
MAHOGANY OR OAK TRIM OVER TOP WINDOWS ONLY	\$
2 ND EXIT/ENTRY DOOR	\$
SPORTSWORKS DL2 BIKE RACK	\$
SPORTSWORKS DL3 BIKE RACK	\$
AFEX FIRE SUPPRESSION SYSTEM	\$
INTERIOR WALL WITH SWING OUT DOOR DIVIDING OPEN AIR SECTION	\$
MAHOGANY SEAT SLATS	\$
SPIRAL BRASS UPGRADE	\$
FREEDMAN TRANSIT SEATING – CITIPRO MODEL	\$
TRAM SEAT CUSHION BOTTOMS	\$
GENFARE ODYSSEY FARE COLLECTION	\$
GENFARE FAST FARE COLLECTION	\$
DIAMOND D SV FARE COLLECTION	\$
TRANSIGN LED DESTINATION SIGNS	\$
LUMINATOR LED DESTINATION SIGNS	\$
TRAPEZE AVL/APC/GPS SYSTEM	\$
TSO MOBILE AVL/APC/GPS SYSTEM	\$

FIGURE 1

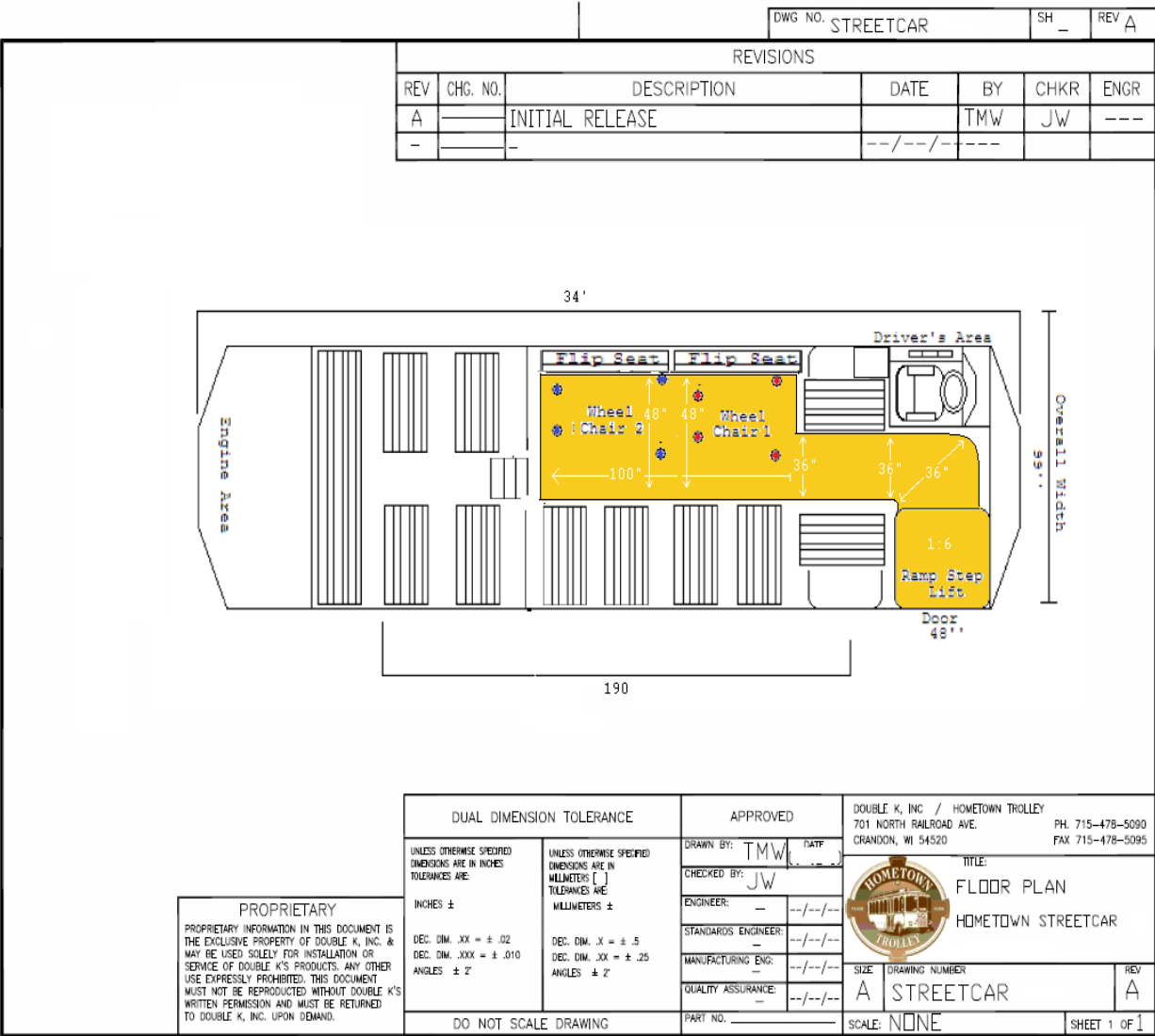
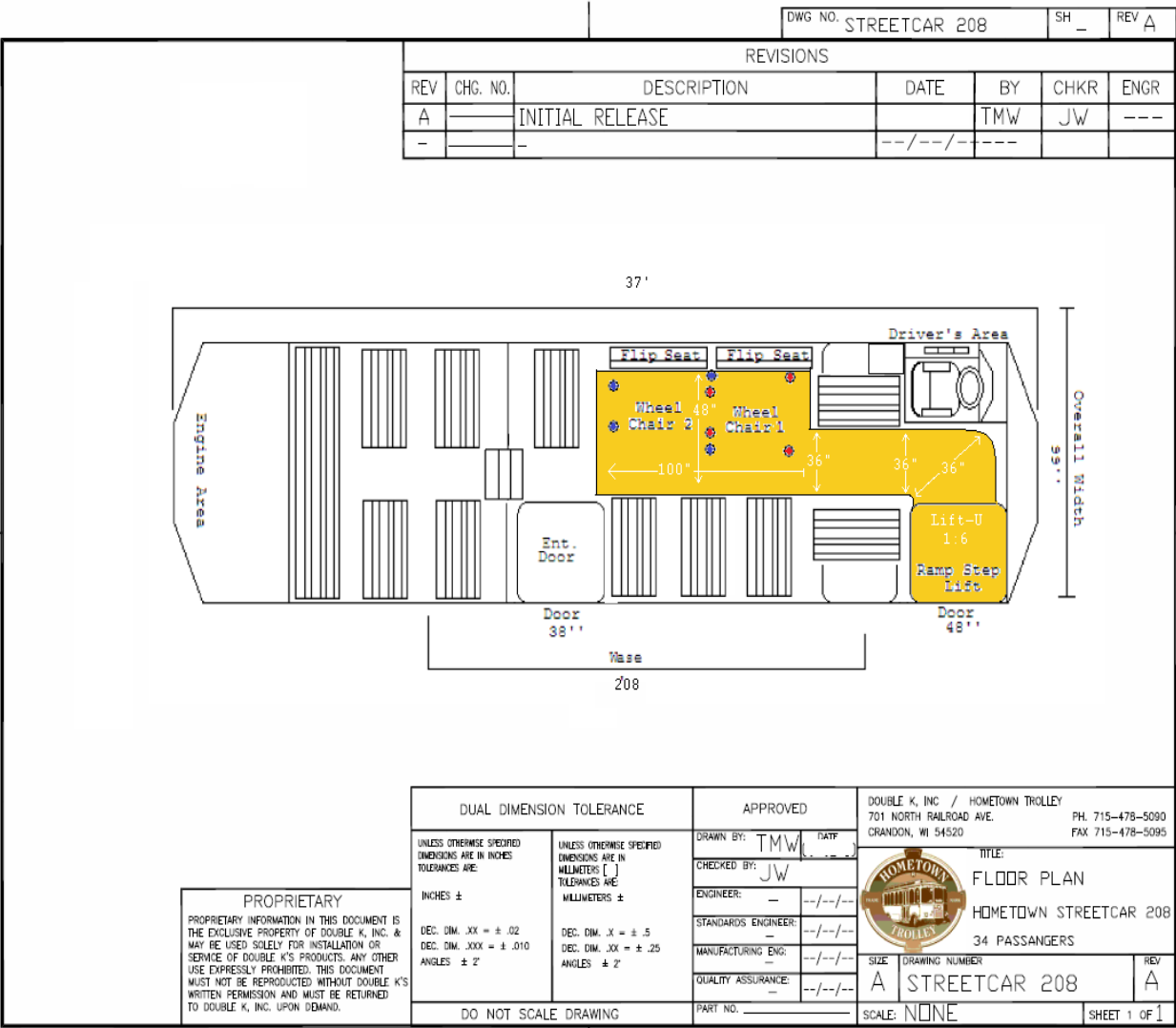


FIGURE 2



Q. SOLICITATION SPECIFICATIONS FOR REAR LIFT FULL-SIZE CONVERSION VAN

Q.1. DELIVERY

- Q.1.1.** Vehicle must be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Pre-delivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following:
- Q.1.1.1.** The vehicle must have a full tank of fuel when delivered.
 - Q.1.1.2.** Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
 - Q.1.1.3.** All parts added, as part of the modification process shall be new.
 - Q.1.1.4.** Headlights properly aligned
 - Q.1.1.5.** Engine Tuned
 - Q.1.1.6.** All accessories properly adjusted
 - Q.1.1.7.** Electrical, braking and suspension systems inspected
 - Q.1.1.8.** Both batteries Charged
 - Q.1.1.9.** Front-end aligned, all wheels balanced, including spare
 - Q.1.1.10.** All lubricants checked, and greased if needed
 - Q.1.1.11.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
 - Q.1.1.12.** Warranty papers and owner's guide
 - Q.1.1.13.** Exterior and interior cleaned and washed.
 - Q.1.1.14.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery.
 - Q.1.1.15.** Under no circumstances are tow vehicles to be attached to any buses.
 - Q.1.1.16.** Each vehicle must be delivered to the agency submitting the P.O.

Q.1.2. CERTIFICATE OF ORIGINS

- Q.1.2.1.** Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order **five** business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery **is not acceptable**.

Q.1.3. NOTIFICATION

- Q.1.4.** Vendor shall notify buyer of vehicle delivery **ten** business days prior. NOTE: If these specifications contradict any listed in the Federal Regulations, they are superseded by those of the Federal Regulations.

Q.2. NO PROTOTYPES

- Q.2.1.** Vehicle must be a current production Model type van that has been in Production for a minimum of one year.

Q.3. BODY STRUCTURE

- Q.3.1.** Standard van body shall meet all stated specification. The vehicle shall be reinforced such that the structural of the basic van is not degraded.
- Q.3.2.** Absolutely No cutting, Welding, or drilling will be allowed on high strength chassis structure such as Structural high strength Boron Steel.
- Q.3.3.** Vehicles shall meet all applicable requirements of the Americans with Disabilities Act (ADA As set forth in CFR 37 and 38, issued September 6, 1991, with respect to the body.

Q.4. OEM CHASSIS FRAME AND BODY

- Q.4.1.** Ford Transit T350-HD Extended Long Wheelbase Wagon with Dual Rear Wheels or Approved Equal. With Deluxe Interior and Exterior trim (XLT Package)

Q.5. DOORS

- Q.5.1.** Vehicle must have a Bus Style Entry Doorway with Dark Deep tinted privacy glass on Bus Doorway.

- Q.5.2.** A Bus Style Entry Doorway shall be included rear of the Curbside B Pillar.
- Q.5.3.** The Bus Style Entry Doorway shall be A & M Brand or Approved Equal.
- Q.5.4.** The Minimum Clear Entry Width Shall be 32"
- Q.5.5.** The steps shall be a uniform 9" deep and 9" tall and the first step shall be approximately 9" from the ground.
- Q.5.6.** The Left and right Vertical Sides of the Doorway shall be cut and fit to match the Contour of the Chassis body, protruding outward at the bottom only as necessary for the stepwell. No Metal Edge should extend outward from the Contour of the Chassis Body higher than the Chassis Body Side molding.
- Q.5.7.** No cutting of Chassis Reinforcing Structural Steel, such as Boron Steel will be allowed.
- Q.5.8.** Stainless Steel Assist Handrails on the Interior Left and Right of the Doorway Structure shall be Included.
- Q.5.9.** An L.E.D. Light that automatically illuminates when the Doorway is opened shall be Included.

Q.6. WHEELCHAIR LIFT DOORS

- Q.6.1.** Wheel chair lift doors must be at rear of the vehicle
- Q.6.2.** OEM chassis van doors shall be retained.
- Q.6.3.** Shall include a Chassis OEM Magnetic Door Holder.
- Q.6.4.** Doors shall be easily operable from the inside with easily accessible door locks provided.
- Q.6.5.** Inside door handles shall be provided on inside of each hinged swing-out door for adequate closing of doors when inside.

Q.7. DOOR LOCKS

- Q.7.1.** All doors shall be equipped with a lock.

Q.8. DRIVER'S DOOR AND CO-PILOT'S DOOR

- Q.8.1.** Must have Power windows and Power door locks

Q.9. RUNNING BOARDS

- Q.9.1.** Vehicle must have Extra Heavy-duty Running Boards for Driver door and Co-Pilot's door.
- Q.9.2.** The steps shall be constructed of galvanized one inch square 11 gauge steel tubing or angle iron and have cross center braces and be tested at 800 lbs.
- Q.9.3.** The steps surface shall be made of expanded galvanized steel to allow debris and water run-off.
- Q.9.4.** The steps shall be properly braced and secured to the van and be capable of supporting a minimum of 800 lbs.

Q.10. HANDRAIL

- Q.10.1.** Handrails must be stainless Steel that will not rattle or Flex and mounting bolts shall be bolted into stainless steel.
- Q.10.2.** Handrails (left and right) of the front passenger door shall be provided. Cross-sectional diameter of handrail shall be between 1 ¼" and 1½".
- Q.10.3.** Entrance handrails shall not be padded.
- Q.10.4.** Must have at minimum a wall thickness of 18 gauge steel.
- Q.10.5.** Wood mounting is not allowed.

Q.11. STEPWELL

- Q.11.1.** Stepwell must be made of Galvanized, Primed or Powder Coated steel.
- Q.11.2.** Must have two steps covered with the same slip resistant floor covering as specified within this document.
- Q.11.3.** maximum 12" minimum 8" from ground to first step,
- Q.11.4.** 9" riser, Tread depth minimum 8½".
- Q.11.5.** All steps to get up to floor level must be in step well area.

Q.12. INTERIOR

- Q.12.1.** An OEM (XLT) Chassis Interior Trim System shall be provided.
- Q.12.2.** Interior wall paneling and door trim shall be OEM
- Q.12.3.** The headliner shall be OEM.

- Q.12.4.** The Drivers Side Ejection Mitigation Air Bag Shall be Retained.
- Q.12.5.** All interior panels, materials, and treatments shall meet all FMVSS 302 requirements.
- Q.12.6.** Vendor shall provide a list of available colors at their quoted price and may also include a list of colors available at additional cost.

Q.13. STORAGE COMPARTMENT

- Q.13.1.** An overhead storage compartment shall be installed over the driver and front passenger interior. The Overhead Storage Compartment shall be Chassis OEM, if available.

Q.14. FLOOR ASSEMBLY

- Q.14.1.** The subflooring shall be a minimum of 3/4" thick Plywood securely fastened to the understructure.
- Q.14.2.** The floor shall be sanded smooth to ensure a proper bonding of the vinyl flooring.
- Q.14.3.** The floor covering shall be wall-to-wall hard fire-resistant slip-resistant, transit quality flooring securely bonded to the plywood floor with waterproof adhesive.
- Q.14.4.** Acceptable Flooring Brands are Altro, or other Approved Equal.
- Q.14.5.** Flooring Color shall be determined by the agency.

Q.15. SLIP-RESISTANT FLOOR COVERING

- Q.15.1.** Floor covering shall be slip resistant vinyl flooring, constructed with aluminum oxide, silicon carbide and optional PVC chip blended throughout a high quality vinyl wear surface.
- Q.15.2.** Top coating is not acceptable.
- Q.15.3.** Backing to be polyester/cellulose material with fiberglass fiber reinforced center scrim for additional durability.
- Q.15.4.** Bacteriostats will be incorporated providing all exposed surfaces with excellent anti-bacterial properties.
- Q.15.5.** Must be Altro Chroma with a minimum thickness of 2.2 millimeters or equivalent
- Q.15.6.** Color to be selected from current Altro color range by each agency.
- Q.15.7.** The whole floor will be a uniform thickness throughout the vehicle, eliminating the need for ribbed surfaces, while exceeding the ADA minimum slip resistance standard rating of .06 static coefficient of friction under dry or wet conditions.
- Q.15.8.** Seams must be heat welded to provide a permanent waterproof seal against water penetration leading to premature sub-floor failure or curling leading to possible tripping hazards.
- Q.15.9.** Landing area and step edgings are to be Altro yellow safety vinyl edging.
- Q.15.10.** Edging is to be heat welded to the main floor and step tread to provide for a long lasting seam.
- Q.15.11.** The floor must be installed according to manufacturer's directions using proper tools, accessories and adhesives.
- Q.15.12.** Step tread and riser are to be a one continuous piece construction eliminating seam at the back of the step. Tread to be supported at the upward bend at the back of the step and up the riser by coving material.
- Q.15.13.** NOTE: If the flooring is not installed according to the flooring manufacture (heat welded and adhesives) specifications the Van will not be accepted.

Q.16. DRIVER CONTROLS

- Q.16.1.** Instrument panel, dash controls and features to be included;
 - Q.16.1.1.** Dash shall be color coordinated with interior trim color.
 - Q.16.1.2.** Glove box with light and lock to be provided, if available from chassis Mfr.
 - Q.16.1.3.** All controls and switches shall be within easy reach of the driver.
 - Q.16.1.4.** Overhead switches or controls must be in easy reach of driver.
 - Q.16.1.5.** Lights in lieu of gauges are not acceptable except where noted.
 - Q.16.1.6.** Power door locks with remote entry and Two Keys and Two Fobs are required
 - Q.16.1.7.** Power windows are required
 - Q.16.1.8.** Power / Heated mirrors With Turn Signal Flashers are required
 - Q.16.1.9.** A tilting telescopic steering wheel shall be included
 - Q.16.1.10.** Chassis OEM Cruise Control is required

Q.16.1.11. Instrument panel and dash shall be equipped with the following OEM instruments, gauges, and controls:

Q.16.1.11.1. Tachometer , Speedometer with odometer and trip odometer

Q.16.1.11.2. Oil pressure gauge

Q.16.1.11.3. Engine coolant temperature

Q.16.1.11.4. Fuel gauge

Q.16.1.11.5. Upper beam head lamp indicator (light)

Q.16.1.11.6. Dual-note horn

Q.16.1.11.7. Directional signals (light)

Q.16.1.11.8. Parking brake on (light)

Q.16.1.11.9. Headlight switch

Q.16.1.11.10. Inside hood release

Q.16.1.11.11. Controls for heater, defroster, and air conditioner

Q.16.1.11.12. 12 Volt Power outlet

Q.16.1.11.13. OEM chassis mfr's am/fm push button radio

Q.16.1.11.14. Digital clock

Q.16.1.11.15. Windshield wiper w/two speed, intermittent, and washer

Q.16.1.11.16. Emergency flashers

Q.17. BUMPERS

Q.17.1. Bumpers Front and rear must be OEM Mfrs standard.

Q.18. AIR CONDITIONING AND HEATING

Q.18.1. Vehicle shall have the following;

Q.18.1.1. OEM chassis front and rear heating and A/C system required.

Q.18.1.2. Front/Rear heater and front defroster shall be OEM chassis with the maximum BTU rating available from chassis mfr.

Q.18.1.3. Front/Rear, high capacity A/C system required.

Q.18.1.4. Dash unit shall be separately controlled from auxiliary system.

Q.19. SAFETY EQUIPMENT

Q.19.1. All miscellaneous equipment must be secured to the vehicle and easily accessible.

Q.19.1.1. First aid kit: (24M – National Standard School Bus Metal

Q.19.1.1.1. Must be Certified Safety Mfg. Model S203-045 or equivalent.

Q.19.1.2. Fire extinguisher – Multi-purpose Stored Pressure Dry Chemical Extinguisher.

Q.19.1.2.1. Must be a 5 lb. type 3A:40B: C Pro Line, Kiddie Model # FXBND9 or equivalent.

Q.19.1.2.2. Must have a gauge to indicate state of charge and mounted to vehicle using a bracket and having a heavy duty vinyl cover.

Q.20. TRIANGLE WARNING DEVICES (3), WITH STORAGE CONTAINER

Q.20.1. must meet FMVSSP # 125

Q.21. BLOOD BORNE PATHOGENS INFECTION CONTROL KIT

Q.21.1. Must be Certified Safety Mfg. Model #FK200-931, or equivalent.

Q.21.2. Seat belt cutter

Q.22. MIRRORS

Q.22.1. Vehicle exterior mirrors;

Q.22.2. OEM chassis power /heated dual exterior rearview mirrors shall be included

- Q.22.2.1.** Black matt or stainless finish
- Q.22.2.2.** For Safety an Integrated Turn signal is Required
- Q.22.2.3.** A Convex Lower Mirror shall be Included.

Q.22.3. Vehicle interior mirrors;

- Q.22.3.1.** Vehicle must have OEM windshield mounted mirror
- Q.22.3.2.** OEM chassis driver's and Co-pilot sun visor, rear view mirror, and airbag required.

Q.23. SEATS

Q.23.1. Driver's Seat and Co-pilot Seat:

- Q.23.1.1.** Driver's and co-pilot seats shall be (OEM XLT) deluxe high back, fully padded, Cloth contoured bucket types of heavy-duty construction with an armrest.
- Q.23.1.2.** The driver's seat shall be easily adjusted forward and backward without the use of tools.
- Q.23.1.3.** OEM three point restraint system is required. Upholstery shall be color- keyed to the passenger seats.
- Q.23.1.4.** NOTE: Bidder must supply seating diagram reflecting all listed dimensions for approval.

Q.24. PASSENGER SEATS

- Q.24.1.** Seating shall be provided for seven (7) ambulatory passengers and one wheelchair securement station. (See options for additional wheelchair securement station and fold down seats and floor plans).
- Q.24.2.** All seats shall be cloth. Chassis (OEM XLT)
- Q.24.3.** Fixed or Folding seats may be Chassis OEM, Freedman, or approved equal and shall be a minimum of 16" wide and 16" deep.
- Q.24.4.** The seat back cushion shall measure a minimum of 17", shall provide lumbar support and utilize channeling to aid lateral stability.
- Q.24.5.** When any aftermarket seat is used. Seating shall be Freedman series GO-ES or approved equal, and be compliant with FMVSS 208.
- Q.24.6.** Bolting seats to plywood floor without bolting into structural steel under floor is NOT ALLOWED.

Q.25. PASSENGER RESTRAINT SYSTEM

- Q.25.1.** All restraints and retractors must meet all FMVSS 208 regulations.
- Q.25.2.** Wheelchair occupant restraint systems shall be compliant with FMVSS 49.38.
- Q.25.3.** Successful Pull Test results from an A2LA Accredited Laboratory, including Pictures shall be included with all RFP Responses.

Q.26. COLOR OF SEATS

- Q.26.1.** Bid must include all colors available
- Q.26.2.** Successful vendor shall coordinate with the agency issuing this purchase order in the selection of material and color of the seats.

Q.27. PRIORITY SEATING SIGNS

- Q.27.1.** Each vehicle shall contain a sign which indicates that the seats in the front of the vehicle are priority seats for people with disabilities.
- Q.27.2.** Each wheelchair station location shall be designated as such.
- Q.27.3.** The signs shall be in compliance with CFR 38, subpart 38.27 and the appendix to it.

Q.28. LIGHTING

Q.28.1. VEHICLE INTERIOR LIGHTINGS

- Q.28.1.1.** The interior of the vehicle shall be illuminated by OEM interior lighting.
- Q.28.1.2.** The lighting fixtures shall be controlled by the chassis OEM lighting switch.
- Q.28.1.3.** The instrument panel must be illuminated to allow the driver to see all the controls at night.
- Q.28.1.4.** Chassis OEM instrument panel switch shall control the intensity of the lights.
- Q.28.1.5.** All door lights and the side passenger door shall illuminate automatically when doors are opened.

Q.28.1.6. L.E.D. Lighting shall be required to illuminate on the lift.

Q.28.2. VEHICLE EXTERIOR LIGHTING

Q.28.2.1. Exterior lighting shall meet all State and Federal Regulations.

Q.28.2.2. A Third High Mounted Center Brake Lamp shall be Included.

Q.29. ELECTRICAL WIRING

Q.29.1. Vehicle wiring shall be ran inside the body and be located in a protected area.

Q.29.2. Any wiring that is exposed to the elements shall be non-metallic loomed and securely clipped every 18" for maximum protection.

Q.29.3. Clips shall be rubber or plastic coated to prevent their cutting thru the wiring insulation.

Q.29.4. Protective grommets shall be installed at all points where wiring penetrates metal and other materials.

Q.29.5. Circuit breakers and electrical panels shall be in easily accessible location.

Q.29.6. No lock wire connectors will be allowed.

Q.29.7. Grounding off components shall be thru polarized shielded terminals wired to main structural ground points.

Q.29.8. All accessories and electrical equipment except head and parking lights, emergency flashers, dome light(s), and wheelchair lift shall be wired through the vehicle ignition switch so as to be operative only with the switch in "on" or accessory" position.

Q.29.9. Power wire to Wheelchair lift shall include an In-line circuit breaker with manual reset provided by the Wheelchair Lift Manufacturer.

Q.30. WINDOWS

Q.30.1. Windshield and front most doors: Chassis OEM standard with standard tint and remainder of windows must have;

Q.30.1.1. Dark OEM deep privacy tint.

Q.30.1.2. An Electric Defogger shall be included on the rear windows

Q.30.1.3. OEM chassis safety glass and capable of venting

Q.30.1.4. FMVSS: All windows (including windshield) and tinting shall meet all applicable FMVSS requirements.

Q.30.2. NOTE: All windows and emergency exits must meet the performance and operational requirements as outlined in the Federal Motor Vehicle Safety Standards and Procedures.

Q.31. SAFETY BACK-UP EQUIPMENT

Q.31.1. An Audible Back-up Warning Device shall be included. The following shall be equipped If Chassis OEM, is available;

Q.31.1.1. A Rear View Camera with Dashboard Monitor that activates when the Transmission is placed in Reverse.

Q.31.1.2. A Back-Up Sensor System with Audible Alert Warnings.

Q.32. WHEELCHAIR LIFT AND EQUIPMENT

Q.32.1. An electric powered hydraulic wheelchair lift shall be installed inside the vehicle at the rear of the vehicle.

Q.32.2. Bus must meet FMVSS 403-404 lift installation requirements.

Q.32.3. Wheelchair lift shall meet the following MINIMUM requirements.

Q.32.4. Lift to be a Braun wheel chair Lift NL919FIB-2 with Handrail Safety Belt (Millennium-2 Series) or equivalent.

Q.32.5. 800 pound load capacity lifts assembly.

Q.32.6. An electric hydraulic pump, powered by vehicle's electrical system.

B.1.1. Platform dimensions 34" wide by 51" long.

Q.32.7. Platform to be constructed of 11 gauge expanded metal.

Q.32.8. Platform shall be stored in an upright position within the vehicle.

Q.32.9. Powered operation for (1) unfolding and folding the platforms and (2) raising and lowering the platform.

Q.32.10. Emergency platforms release to permit the platform to be unfolded manually and lowered by gravity.

- Q.32.11.** To prevent the wheelchair from rolling off, a barrier 1 ½" at minimum shall be provided on the outer edges of the platform and have an outboard roll stop that engages and locks before the platform leaves the ground to form a safety barrier when platform is raised or lowered
- Q.32.12.** A free floating bridge plate will be replaced between the lift platform and the vehicle. This bridge plate will be hinged in a manner to permit upward movement should a person's foot become entangled.
- Q.32.13.** Lift shall be securely bolted to the floor and floor reinforced as necessary to support the load.
- Q.32.14.** To permit the lift platform to be raised without electrical power, a hand pump that allows the operator to raise the platform shall be installed.
- Q.32.15.** An interior light shall be provided to illuminate the lift area;
- Q.32.16.** All moving parts likely to cause personal injury shall be shielded.
- Q.32.17.** Working parts, such as cables, pulleys, and shafts, which can be expected to wear, and upon which the lift depends for support of the load, shall have a safety factor of at least six, based on the ultimate strength of the material. Nonworking parts, such as platform, frame, and attachment hardware, which would not be expected to wear, shall have a safety factor of at least three, based on the ultimate strength of the material.
- Q.32.18.** Lift shall be installed as specified by the manufacturer and shall be thoroughly tested prior to delivery.
- Q.32.19.** Repair manual, parts list and instructions for adjusting hydraulic valves and electrical equipment shall be provided.
- Q.32.20.** Lift controls shall be interlocked with the vehicle brakes, transmission, or door, or shall provide other appropriate mechanisms or systems to ensure that the vehicle cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks or systems are engaged.
- Q.32.21.** The left control cord must be secured in a manner not to interfere with the door being closed.
- Q.32.22. USE BY STANDEES**
- Q.32.22.1.** Lift shall accommodate persons using walkers, crutches, canes or braces or who otherwise have difficulty using steps. The platform may be marked to indicate a preferred standing position.
- Q.32.23. LIFT HANDRAILS**
- Q.32.23.1.** Platform on lift shall be equipped with handrails on two sides, which move in tandem with the lift, and which shall be graspable and provide support to standees throughout the entire lift operation.
- Q.32.23.2.** Handrails shall have a usable component at least 8" long with the lowest portion a minimum 30" above the platform and the highest portion a maximum 38" above the platform.
- Q.32.23.3.** Capability of withstanding a force of 100 pounds concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure required.
- Q.32.23.4.** Cross-sectional diameter of handrail shall be between 1 ¼" and 1½", and shall have eased edges with corner radii of not less than 1/8".
- Q.32.23.5.** Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.
- Q.32.24. WHEELCHAIR SECUREMENT**
- Q.32.24.1.** Wheelchair parking space shall have clear floor area of 30" wide by 52" long and be equipped with a four-point wheelchair securement tie-down.
- Q.32.24.2.** Occupant restraint system must be Q'Straint Q-8306-SC or equivalent. Shall have a Retractable lap/shoulder belt combo with a Retractable height adjuster that are anchored to floor and wall that meet SAE J2249 and ADA requirements.
- Q.32.24.3.** Slide N Click anchors must be bolted to structural steel.
- Q.32.24.4.** Bolting to plywood floor without bolting into structural steel under floor IS NOT ALLOWED.
- Q.32.24.5.** Wheel Chair Securement system must be Q'Straint QRT MAX Automatic Retractor System Q-8306-SC with Slide N Click anchorage system and J-Hooks, or equivalent.
- Q.32.24.6.** There must be 52" at minimum and 54" maximum measured from center to center between front and rear Slide N Click anchor points. And be fully assembled and ready to use.
- Q.32.24.7.** A metal Storage bin shall be provided to store belts when not in use
- Q.32.24.8.** Must include eight (8) Q'Straint Q5-7580 Webbing Loops or equivalent for Securing Scooters. Wheelchair location must be in the rear of bus, one beside the other.
- Q.32.25. WHEELCHAIR STATIONS**

- Q.32.25.1.** At a minimum, one wheelchair station shall be provided in each vehicle. (See options for additional wheelchair securement station and fold down seats and floor plans)
- Q.32.25.2.** Wheelchair stations are the spaces inside the vehicle for transporting people in wheelchairs and are to be provided on all vehicles.
- Q.32.25.3.** Each wheelchair station shall consist of usable floor area in which a passenger in a wheelchair may be positioned and where the wheelchair occupant restraint systems and wheelchair securement devices are located.
- Q.32.25.4.** Wheelchair stations will secure wheelchairs in a forward facing position only.
- Q.32.25.5.** NOTE: Each wheelchair securement location shall have sign designating it as such. Lettering size and type on these signs shall comply with the Americans with disabilities Act Regulations.

Q.33. WHEELCHAIR ACCESSIBILITY SYMBOL

- Q.33.1.** The vehicle will display the international wheelchair accessibility symbol of a person in a wheelchair that is outlined in white on blue background.

Q.34. VEHICLE COLORS

- Q.34.1.** Vendor to supply list of colors and prices available.

Q.35. VEHICLE FLOOR PLAN

- Q.35.1.** A proposed floor plan including all pertinent interior dimensions such as overall length, width, distance between seats, etc.
- Q.35.2.** Shall be submitted with the bid proposal.

Q.36. CHASSIS SPECIFICATIONS

- Q.36.1.** Bidder must list chassis specs must be listed the spaces provided below:

SPECIFICATIONS	MINIMUM/MAXIMUM IN INCHES	SUPPLIER'S RESPONSE
OVERALL VEHICLE LENGTH	235" MINIMUM	
OVERALL VEHICLE LENGTH	367" MINIMUM	
WIDTH EXTERIOR	80" MINIMUM	
WIDTH INTERIOR	70" MINIMUM	
HEIGHT EXTERIOR	100" MINIMUM	
HEIGHT EXTERIOR	120" MAXIMUM	
HEIGHT INTERIOR	73" MINIMUM	
WHEELBASE	146" MINIMUM	
WHEELBASE	150" MAXIMUM	
GVWR, AXLE, SPRING, AND TIRE	9,250 LB GVWR MINIMUM	

- Q.36.2.** NOTE: It is the bidder's responsibility to calculate the actual loaded weight, spring and axle ratings so that the vehicle is engineered for safety.

Q.37. WHEELS AND TIRES

- Q.37.1.** Wheel rim shall be mfr's standard for GVWR.
- Q.37.2.** Tires – Seven (7, inc. full spare) steel belted, all season radial, to meet GVWR.
- Q.37.3.** All tires shall be the same make or brand, shall be mounted on rims, and shall be balanced.
- Q.37.4.** Hubcaps – Set of 2 required for front wheels.

Q.38. ENGINE: GASOLINE

- Q.38.1.** The engine shall be an electronically fuel injected six cylinder gasoline powered engine with the minimum displacement of 3.5 liters.
- Q.38.2.** The engine shall be designed to have a useful life of at least 100,000 miles.
- Q.38.3.** The engine shall be equipped with the largest external oil cooler available from the OEM MFR of the base van.
- Q.38.4.** NOTE: The engine shall have a CNG/LPG gaseous engine prep package.

Q.39. RADIATOR

- Q.39.1.** Heavy-duty radiator with capacity to prevent engine overheating while operating in stop and go transit operation in ambient temperatures as high as 110 degrees F and provide protection to -30 degrees F.

Q.40. TRANSMISSION

- Q.40.1.** Vehicle transmission shall be heaviest duty transmission available from OEM.

Q.40.2. OEM auxiliary transmission oil-to-air cooling.

Q.40.3. Dipstick and add oil filler tube shall be easily identifiable.

Q.40.4. Automatic 6-speed with overdrive.

Q.41. DRIVE SHAFT

Q.41.1. The driveshaft shall be rated and capable of transmitting the torque multiplication of the engine/transmission to the drive wheels.

Q.41.2. The chassis OEM shall balance the drive-shaft.

Q.41.3. To prevent the driveshaft from hitting the ground a driveshaft guard shall be provided. A Chassis OEM guard is preferred.

Q.42. BRAKES

Q.42.1. Two (2) braking systems are required for the vehicle. Service brakes shall be dual hydraulic, disc front and disc rear.

Q.42.2. The parking brake system shall be operated by a cable to the rear wheels, or Drive Shaft Drum Brake.

Q.42.3. The braking system shall be adequate for the GVWR of the vehicle.

Q.43. GEAR RATIO

Q.43.1. OEM Standard gear ratio

Q.44. FUEL CAPACITY

Q.44.1. Fuel capacity must be largest available from chassis manufacture.

Q.45. SUSPENSION SYSTEM

Q.45.1. Suspension system shall be heavy duty and load rated for GVWR of the vehicle.

Q.45.2. Shock absorbers shall be extra heavy duty gas and load rated, capable of controlling the ride when empty, as well as when loaded to maximum GVWR.

Q.45.3. Independent MacPherson-strut

Q.45.4. Leaf with Rear stabilizer bar required if available from OEM

Q.45.5. A Chassis OEM Electronic Anti-Rollover System shall be included.

Q.46. STEERING

Q.46.1. Must have power-assisted steering

Q.47. AIR CLEANER

Q.47.1. Must have a heavy duty, dry type air cleaner

Q.48. OIL FILTER

Q.48.1. Must have a heavy duty, throw away type oil filter.

Q.49. ALTERNATOR

Q.49.1. Vehicle shall have OEM 220-amp Alternator.

Q.50. BATTERIES

Q.50.1. Two (2) heavy duty, maintenance free, OEM Batteries

Q.51. STABILIZER BAR

Q.51.1. Heavy Duty Front and rear

Q.52. HORN

Q.52.1. Must have a dual, electric horn.

Q.53. SIGNAL

Q.53.1. Directional and self-canceling with hazard warning flashers.

Q.54. WINDSHIELD WIPERS

Q.54.1. Minimum two speeds with intermittent feature and washer.

Q.55. KEYS

Q.55.1. Vehicle must include two (2) sets of keys and fobs.

Q.56. RADIO

Q.56.1. Must have an AM & FM CD radio

Q.56.2. Radio must be of same manufacture as chassis. Radio must be mounted in the Chassis OEM Location in dash.

Q.57. PAINTING, DECALS AND MONOGRAMS

Q.57.1. All signs required by State and federal law shall be affixed to each vehicle exterior and interior.

Q.57.2. It is up to the bus dealer/manufacture to add such signs and decals upon delivery of vehicle.

Q.57.3. No decals, name plates, or painted identification of the bus dealer/manufacture are to be added to the vehicle.

Q.58. WARRANTY REQUIREMENTS

Q.58.1. The contractor warrants and guarantees to the original Agency submitting PO, each complete bus and specific subsystem and components for 100% parts and labor as follows:

Q.58.1.1. OEM standard factory warranties for chassis and engine.

Q.58.1.2. Add-on components shall have component manufacture's standard warranty.

Q.58.1.3. Warranty shall begin on the date that the vehicle delivery is accepted by the agency issuing the purchase order.

Q.59. GENERAL

Q.59.1. All equipment cataloged as standard for the basic vehicle, unless superseded by these specifications, must be furnished and included in the purchase price of each vehicle. Complete printed specifications, published literature, and photos, or illustrations of the basic units that the bidder proposes to furnish with this bid must accompany each bid.

Q.60. QUALITY OF MATERIALS

Q.60.1. All materials and equipment used shall be built and/or attached in accordance with all applicable safety codes and design standards including but not limited to;

Q.60.1.1. Society of Automotive Engineers (Electrical components and wiring, hydraulic components, fasteners)

Q.60.1.2. American National Standards Institute (Chain drive and wire rope components)

Q.60.1.3. American Welding Society (Welding code and recommended practices)

Q.60.1.4. FMVSS

Q.60.1.5. All parts shall be new.

Q.60.1.6. All necessary servicing and adjustments shall be made on the equipment prior to delivery of the vehicle.

Q.60.1.7. All exposed metal surfaces shall be painted or shall be corrosion-resistant.

Q.60.1.8. All Wheelchair Lift components wiring located on the underside of the vehicle shall be fully loomed.

Q.61. PUBLICATIONS AND PRINTED MATERIALS

Q.61.1. Each vehicle shall have a complete set of operation, quality assurance, and warranty publications. The information shall be organized in a three ring binder format with each sections clearly identified.

Q.61.2. As built wiring diagram and as built parts manuals for body and all auxiliary equipment.

Q.61.3. Maintenance and inspection schedule incorporating the required maintenance and inspection of the basic vehicle and its sub-systems.

Q.61.4. Operator's manual: A complete operations manual and troubleshooting guide with a detailed manufacturer's parts list that covers the conversion features on the vehicle as listed in this specification. The manual will provide complete, comprehensive instructions for the wheelchair accessories, wheelchair list deployment, air conditioning system, tie downs, heater, deployment of seats, wiring diagram and related equipment.

Q.61.5. Warranty papers for chassis, body, and additional equipment.

Q.61.6. Warranty Information: Each vehicle must have a published listing of contractor warranty repair locations, including address, telephone number, and contact names for the State of Oklahoma.

Q.62. PRE-AWARD AUDIT

Q.62.1. The vehicles are not considered delivered to the purchasing agency until the required FTA documents are completed by an ODOT staff member. A Pre-Award Audit shall be conducted to determine if the bid proposal specifications. The bidder shall submit documents, which include certification of the manufacturer's compliance with the Federal Transit Administration (FTA) Pre-Award Buy America Audit Requirements. The document submitted shall include the following information for each major component used on vehicle bid:

Q.62.1.1. Name and address of each supplier.

Q.62.1.2. Cost of each major component and subcomponent. In order to protect proprietary information, the document may reflect the percentage of total cost each item represents instead of the actual cost.

Q.62.1.3. Country of origin of each major component and subcomponent.

Q.62.1.4. Name and address of company where final assembly occurs.

Q.62.1.5. Cost of final assembly

Q.62.1.6. Signature of authorized representative of vehicle manufacturer.

Q.63. POST- DELIVERY AUDIT

Q.63.1. A Post Delivery Audit of the vehicle(s) shall be conducted at the purchaser's facility, to determine that the completed vehicle(s) meets specifications. Once this process has been satisfactorily completed, the vehicle(s) shall be considered acceptable.

Q.64. ACCESSIBILITY REQUIREMENTS

Q.64.1. When submitting a bid for an accessible vehicle for the disabled, the vendor shall provide a list of the vehicle related equipment illustrating the component cost and related installation charges. The purpose of this list is to reflect an accurate cost for those vehicle related items, which are required to make the vehicle accessible to the disabled.

Q.65. ACCEPTANCE OF VEHICLES

Q.65.1. Upon delivery at the designed location specified within this document the final acceptance will occur after the vehicles have been inspected, road tested and all FTA required post audit delivery requirements have been meet.

Q.65.2. All vehicles shall be insured by the bidder until the post audit delivery has been conducted at minimum.

Q.66. SPECIFICATIONS FOR OPTIONAL ITEMS

Q.66.1. TWO-WAY RADIO SYSTEM - UHF

Q.66.1.1. ICOM F6021 UHF two-way Radio System with a PCTEL MUF4505 UHF antenna and coax or approved equal.

Q.66.1.2. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

Q.66.1.3. Radio must be mounted in an easy accessible location for the driver.

Q.66.1.4. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

Q.66.2. TWO-WAY RADIO SYSTEM - VHF

Q.66.2.1. ICOM F5021 VHF two-way Radio System with a PCTEL MHB5800 VHF antenna and coax or approved equal.

Q.66.2.2. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

Q.66.2.3. Radio must be mounted in an easy accessible location for the driver.

Q.66.2.4. Radio must be programmed with the correct Frequencies and the antenna tuned for the agency issuing this purchase.

Q.66.3. TWO-WAY RADIO SYSTEM - 800 MHZ

Q.66.3.1. **Kenwood NX-900K 800 mhz two-way Radio System with a PCTEL MUF8003 antenna and coax or approved equal.**

Q.66.3.2. Antenna shall be mounted on an L bracket on fender opposite of OEM AM/FM radio antenna.

Q.66.3.3. Radio must be mounted in an easy accessible location for the driver.

- Q.66.3.4.** Radio must be programmed with the correct Frequencies and the antenna tuned for agency issuing this purchase.
- Q.66.4. BODY STRIPE**
 - Q.66.4.1.** 4" Body Strip, painted or vinyl.
- Q.66.5. OUTSIDE PASSENGER DOOR SWITCH**
 - Q.66.5.1.** Outside keyed electric passenger door switch outside. Switch must be water proof.
- Q.66.6. BUS CAMERA SYSTEM**
 - Q.66.6.1.** REI Bus-Watch R4001 with 500GB Hard drive and four cameras or approved equal. Successful vendor shall coordinate with the agency issuing this purchase for location of Camera's.
- Q.66.7. INTEGRATED CHILD SEAT**
 - Q.66.7.1.** Integrated Child Restraint Seat must be a Freedman Seating ICS-10 or equivalent
 - Q.66.7.2.** Must have an integrated 4-point safety harness for children 22-78 lbs with under seat retractor seat belts for adults
- Q.66.8. VINYL SEATS DELETE**
 - Q.66.8.1.** This will be a price deduction from the durable transit style cloth fabrics.
 - Q.66.8.2.** Vinyl deduction is for passenger seats only
 - Q.66.8.3.** Pilot and co-pilot seats shall be XLT OEM cloth fabric
- Q.66.9. DIESEL ENGINE**
 - Q.66.9.1.** 3.2L Turbo Diesel I5 with Manual Regen Initiation with or without Active Regen inhibitor.
- Q.66.10. WHEELCHAIR LIFT**
 - Q.66.10.1.** 1000 lb. capacity Wheelchair lift
- Q.66.11. ADDITIONAL WHEELCHAIR POSITION**
 - Q.66.11.1.** Include additional wheelchair position including securement system and occupant restraints.
- Q.66.12. 2 PASS. CLOTH BENCH**
 - Q.66.12.1.** 2 passenger cloth bench seat with 3 point occupant restraints
- Q.66.13. 1 PASS. CLOTH BENCH**
 - Q.66.13.1.** 1 passenger cloth bench seat with 3 point occupant restraints
- Q.66.14. 2 PASS. FOLDING CLOTH BENCH SEAT**
 - Q.66.14.1.** 2 passenger forward facing folding cloth bench seat with 3 point occupant restraints
- Q.66.15. 1 PASS. FOLDING CLOTH BENCH SEAT**
 - Q.66.15.1.** 1 passenger forward facing folding cloth bench seat with 3 point occupant restraints
- Q.66.16. OEM EXTERIOR COLOR OTHER THAN WHITE**
- Q.66.17. LIMITED SLIP AXLE**
- Q.66.18. 10 WAY POWER DRIVERS SEAT**
- Q.66.19. CNG CONVERSION FORD CHASSIS**
 - Q.66.19.1.** OEM engine shall be converted to operate on dedicated CNG. A World NGV or approved equal shall be provided. System shall be CARB and EPA certified, OBDII compliant, and fully integrated into the OEM powertrain control system. No additional control module will be accepted. Dual fuel systems will not be accepted. System must comply with the following;
 - Q.66.19.2.** Closed-loop fuel control
 - Q.66.19.3.** Sequential fuel injection (SFI)
 - Q.66.19.4.** Optimized ignition timing
 - Q.66.19.5.** Must maintain original fault codes (DTCs)
 - Q.66.19.6.** Diagnostics accessed through DLC using original scan tool or any generic OBD-II scanner

Q.66.19.7. CNG system shall be covered by 3 year/50,000 mile warranty and cannot void the OEM powertrain warranty.

Q.66.19.8. The minimum CNG tank capacity on the conversion vans should be at least 19 Gasoline Gallon Equivalent.

Q.66.19.9. Must provide a detailed floor plan of the placement of the CNG tanks and any seats that have to be deleted.

Q.66.19.10. System must be installed by a Qualified Vehicle Modifier (QVM), and installation must meet or exceed OEM requirements. This system shall also be installed by the system manufacture.

Q.66.20.2 ADDITIONAL KEYS WITH REMOTE FOBS

Q.66.21. DELETE BUS STYLE DOORWAY

Q.66.21.1. Supply the van with OEM sliding side doorway in lieu of bus style doorway. Include a 40" long, 9" wide galvanized expanded steel step. All other specifications must be met.

Q.66.22. SUPPLY 20' T350 MODEL X2X WAGON WITH SLIDING DOOR OR APPROVED EQUAL

Q.66.22.1. Insert credit to be given for using this chassis with Single rear wheels 9,250 GVWR, OEM SLIDING SIDE DOORWAY and standard 3.7L engine in lieu of base chassis 22' with bus style doorway and Dual rear wheels. Include a 40" long, 9" wide galvanized expanded steel step. All other specifications must be met including seating capacity.

Q.66.23. SUPPLY 20' T350 MODEL X2X WAGON WITH BUS STYLE DOORS OR APPROVED EQUAL

Q.66.23.1. Insert credit to be given for using this chassis with Single rear wheels 9,250 GVWR, with BUS STYLE DOORWAY and standard 3.7L engine in lieu of base chassis 22' with Dual rear wheels. All other specifications must be met including seating capacity.

Q.66.24. MEMO/PAMPHLET RACK

Q.66.24.1. The memo/Pamphlet rack will be bolted to inside side wall of bus. (See Figure 2)

Q.66.25. TDSS FOLD AWAY SEAT

Q.66.25.1. Seat will be bolted to structural steel. (See Figure 3)

Q.66.26. METAL BOX

Q.66.26.1. Metal box should be bolted and placed between the passenger and driver's seat. (See Figure 4)

Q.66.27. SEAT BELT EXTENSIONS

Q.66.27.1. Extra Seat belt Extensions

SECTION “Q” FOR REAR LIFT FULL-SIZE CONVERSION VAN RESPONSE SHEET

BASE VEHICLE COST PER UNIT

BASE VEHICLE	COST PER UNIT
TRANSIT BUS (GAS ENGINE)	\$

CHASSIS SPECIFICATIONS

Specify Overall Vehicle Length (outside of front bumper to outside of Rear bumper): _____

OPTIONAL ITEMS

OPTIONAL ITEMS	COST PER ITEM
TWO-WAY RADIO (UHF)	\$
TWO-WAY RADIO (VHF)	\$
TWO-WAY RADIO (800 MHZ)	\$
BODY STRIPE	\$
OUTSIDE PASSENGER DOOR SWITCH	\$
BUS CAMERA SYSTEM	\$
INTEGRATED CHILD SEATS	\$
VINYL SEATS	\$
DIESEL ENGINE	\$
WHEELCHAIR LIFT 1000 LB	\$
ADDITIONAL WHEELCHAIR POSITION	\$
2 PASSENGER CLOTH BENCH SEAT	\$
1 PASSENGER CLOTH BENCH SEAT	\$
2 PASSENGER FORWARD FACING FOLDING CLOTH BENCH SEAT	\$
1 PASSENGER FORWARD FACING FOLDING CLOTH BENCH SEAT	\$
OEM EXTERIOR COLOR OTHER THAN WHITE	\$
LIMITED SLIP AXLE	\$
10 WAY POWER DRIVERS SEAT	\$
CNG CONVERSION	\$
2 ADDITIONAL KEYS WITH REMOTE FOBS	\$
DELETE BUS STYLE DOORWAY	\$
SUPPLY 20' T350 WITH SLIDING DOOR	\$
SUPPLY 20 T350 WITH BUS STYLE DOOR	\$
BUS BODY OPTION (GLAVAL COMMUTE)	\$
MEMO/PAMPHLET RACK	\$
FREEDMAN SEATING TDSS (OR EQUIVALENT) FOLD AWAY SEAT	\$
METAL BOX	\$
EXTRA SEAT BELT EXTENSIONS	\$

A LIST OF OPTIONAL EQUIPMENT AND/OR ACCESSORIES SHALL BE PROVIDED. THE LIST MUST CONTAIN:

- Item
- Description and functionality detail
- Cost of item installed in final delivery of vehicle
- Any changes to listed specifications as outlined above to accommodate options

PROPOSAL EXCEPTIONS

Supplier must list any exceptions here to be used as a part of the Proposal evaluation and analysis. Please list the roman numerical on the standard specs or the number for the options when listing any Proposal exceptions.

FIGURE 1

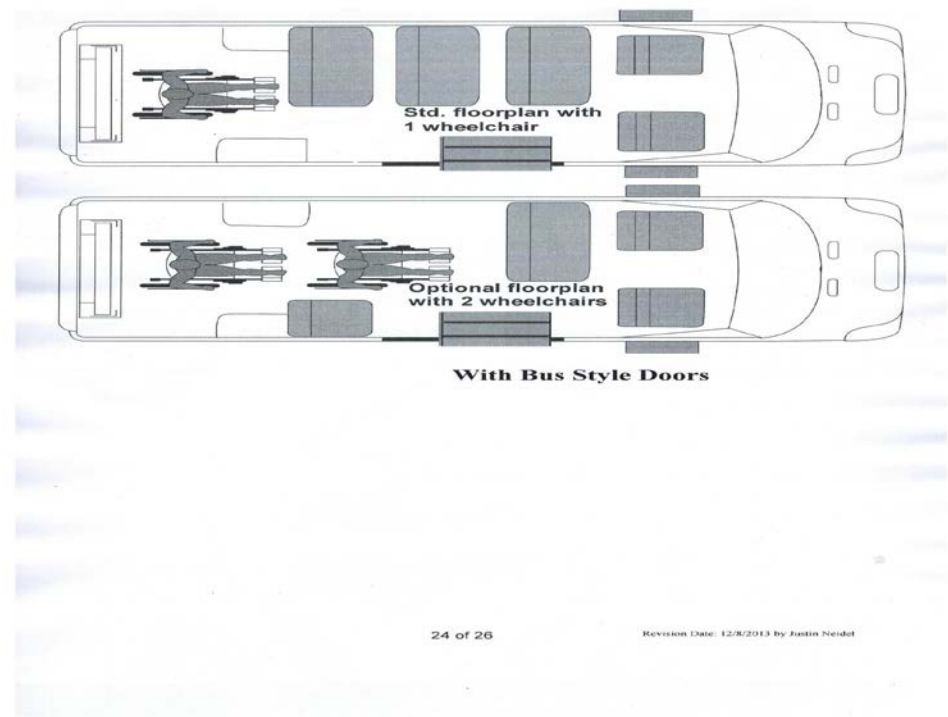


FIGURE 2

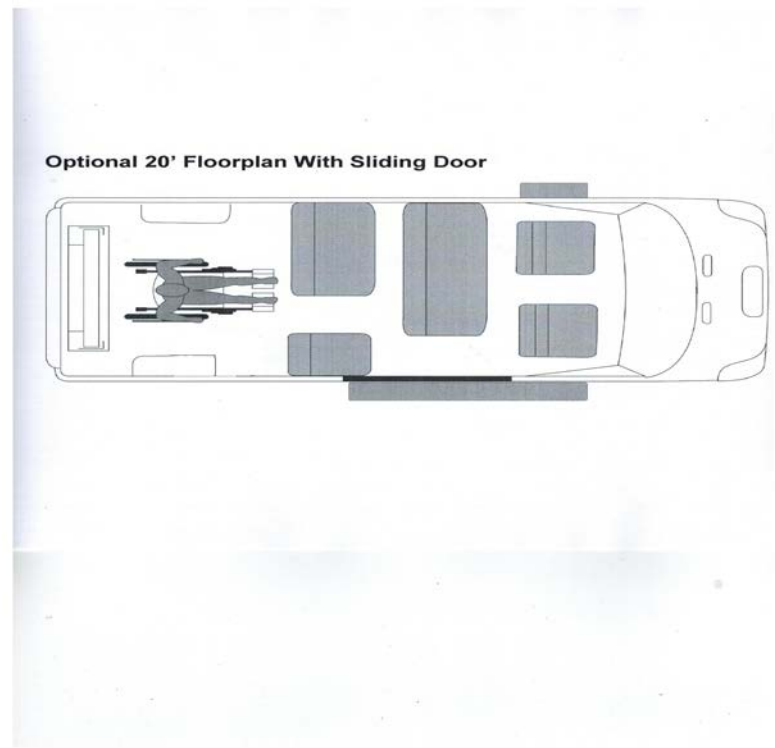


FIGURE 3



FIGURE 4



FIGURE 5

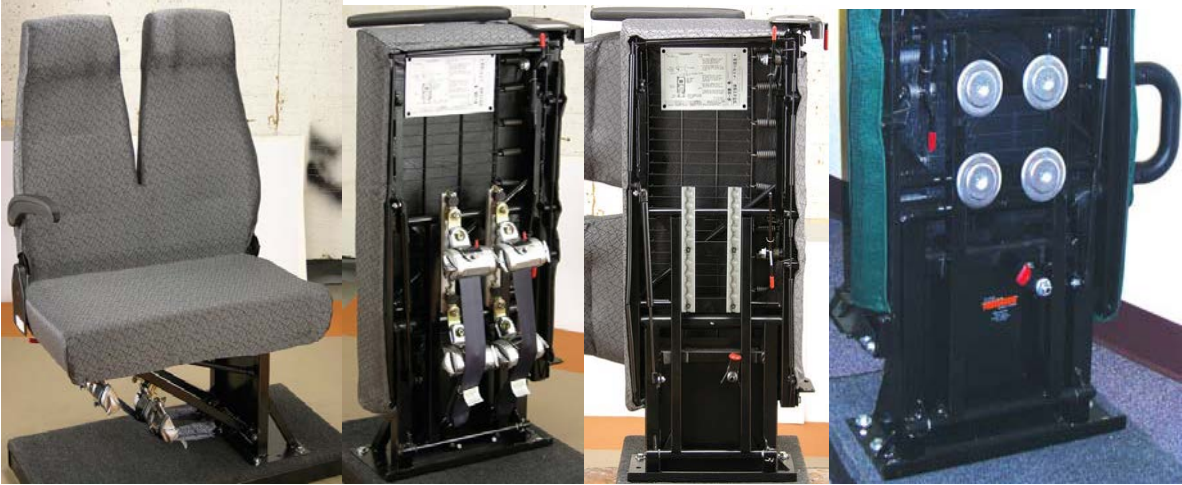


FIGURE 6



R. SOLICITATION SPECIFICATIONS FOR HEAVY-DUTY TRANSIT LOW-FLOOR CNG BUS 30, 35 & 40 FOOT

R.1. DELIVERY

- R.1.1.** Vehicle must be delivered at a maximum of 120 calendar days from the date a Purchase order is issued. Predelivery servicing and adjustments: prior to acceptance by the purchaser, the vendor shall service and adjust each vehicle for operation. This process shall include but not be limited to the following: **R.1.1.1.** The vehicle must have a full tank of fuel when delivered.
- R.1.1.2.** Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance thereof by use of tools and items that are normal and available as commercial standard items. The body and structure shall be designed for ease of maintenance and repair.
- R.1.1.3.** All parts added, as part of the modification process shall be new.
- R.1.1.4.** Headlights properly aligned
- R.1.1.5.** Engine Tuned
- R.1.1.6.** All accessories properly adjusted
- R.1.1.7.** Electrical, braking and suspension systems inspected
- R.1.1.8.** Both batteries Charged
- R.1.1.9.** Front-end aligned, all wheels balanced, including spare
- R.1.1.10.** All lubricants checked, and greased if needed
- R.1.1.11.** Cooling system serviced with permanent type anti-freeze and summer coolant for minus 20 degrees F (-28.888C).
- R.1.1.12.** Warranty papers and owner's guide
- R.1.1.13.** Exterior and interior cleaned and washed.
- R.1.1.14.** Odometer cannot exceed 3,000 miles at the time of delivery of completed buses to the purchasing agency. There will be a charge of one dollar (\$1.00) per mile for each vehicle with an odometer reading in excess of 3,000 miles payable to the purchasing agency at the time of delivery. **R.1.1.15.** Under no circumstances are tow vehicles to be attached to any buses.
- R.1.1.16.** Each vehicle must be delivered to the agency submitting the P.O.

R.2. CERTIFICATE OF ORIGINS

- R.2.1.** Copies of the all Certificate of Origins and signed invoices must be emailed to the organization named on the purchase order five business days before delivery is made and originals must be delivered with the vehicle: receipt of these after delivery is not acceptable.

R.3. NOTIFICATION

- R.3.1.** Vendor shall notify buyer of vehicle delivery ten business days prior. If these specifications contradict any listed in the Federal Regulations, they are superseded by those of the Federal Regulations.

R.4. OPTIONAL EQUIPMENT

- R.4.1.** All items listed shall be priced and included as part of the bid. Individual agencies that use this bid shall be able to select alternative equipment from this listing without incurring cost for additional engineering hours for any changes in optional equipment.

R.5. OVERALL REQUIREMENTS

- R.5.1.** 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. Components used in the vehicle shall be of heavy-duty design and proven in transit service.
- R.5.2.** The buses shall afford features essential for safe, efficient and comfortable operation by the operator. This implies the utmost in road and traffic visibility under all driving conditions and adequate means for safe passenger movement. The bus must be maneuvered easily in normal and heavy traffic.
- R.5.3.** All Proposers must conform to these specifications and the product they furnish shall be of first-class quality, and workmanship, and shall be of the best obtainable in the various trades. The design of the body, chassis, and equipment, which the manufacturer proposes to furnish, shall be such as to produce a vehicle of substantial and durable construction in all respects.

- R.5.4.** All systems, sub-systems, and components shall be individually and permanently labeled with Manufacturer, Part Number, and Serial Number. Label is to be located, in each instance, for easiest access for reading while installed for use in the bus. List of all systems, subsystems, and components shall accompany each bus either on paper or diskette. This shall include an OEM to vendor cross-reference listing.
- R.5.5.** The manufacturer shall use FC-300 and FC-195 hoses for all flexible lines except A/C and discharge from the air compressor to the wet tank.
- R.5.6.** The manufacturer shall be responsible for providing all parts or details which make each bus complete and ready for service, even though such part(s) or details(s) are not mentioned in these specifications.
- R.5.7.** All buses shall be in compliance with the Americans with Disabilities Act (ADA). These buses shall be new, unused, current model specifically designed for intra-city service and substantially manufactured in the United States (in accordance with "Buy America" requirements). These units must meet all Federal requirements applicable to this type of vehicle.
- R.5.8.** Buses provided under this contract shall be 30 foot, 35 foot, and 40 foot in length, 102 inches wide, with a low floor standard transit design.

R.6. WORKER AND PROTECTIVE MEASURES

- R.6.1.** All bolts or rods passing through wood shall be sealed with zinc chromate or other approved sealing compound. Where wood and wood are placed together, all outer edges of wood, as well as the edges of holes, cutouts and notches shall be coated with a linseed oil and titanium dioxide sealer or zinc chromate or other appropriate sealing compound.
- R.6.2.** All exterior light fixtures shall be fitted to the contour of the bus body and adequately sealed to prevent entrance of water.
- R.6.3.** All rubber seals on ventilator doors and compartment cabinet doors shall be placed in 'U' shaped channels to firmly hold the rubber in place. Equally, self-adhering closed cell neoprene seals may be used, without 'U' channels.
- R.6.4.** All burrs and sharp edges shall be dressed so as to prevent injury to passengers and employees, or damage to their clothing.
- R.6.5.** All buses shall be subjected to water tests simulating the severe rain conditions experienced in the Oklahoma environment. Windows, escape hatches, doors, etc. are subject to an approved water test to be conducted at the manufacturer's facility by the manufacturer and shall be observed by the Resident Inspector(s).
- R.6.6.** Water testing may be verified by further testing at the agency's Maintenance Facility prior to the acceptance of each vehicle if test observation or verification of leak repair is missed on or not observed by the Resident Inspector on any bus built. Any bus that fails to pass the water test shall be corrected by the Contractor. The retest/corrective repair cycle shall repeat until the leak(s) have been eliminated to the agency's satisfaction.

R.7. WATER TEST DESCRIPTION

- R.7.1.** The roof, roof hatches, front cap, rear cap, sidewalls, passenger windows, operator's windows, destination sign windows, windshields, wheel wells and all doors of all buses shall be water tested prior to the delivery of each unit as follows:
- R.7.1.1.** The water test shall consist of a series of nozzles which are strategically located around the perimeter of the vehicle so as to spray water over the entire surface of the vehicle.
- R.7.1.2.** The nozzles shall eject a volume of water no less than 2.6 gallons per minute per nozzle under a pressure of no less than 22 lbs. per minute measured at the nozzle tip.
- R.7.1.3.** The Contractor shall be required to water test each vehicle under the conditions described above for no less than 15 minutes to ensure there are no water leaks in the bus.
- R.7.1.4.** Bus road testing shall be conducted immediately after the water test.
- R.7.2.** Contractor shall take the necessary steps of corrective action to repair any leaks found as a result of the described test and shall repeat the 15 minute water test to ensure that corrective steps have been successful. This process shall be repeated until no leaks are found. Documentation of each bus shall be kept by the manufacturer as to the location of the leak, what caused the leak to occur and shall describe the repair action taken to prevent the leak from reoccurring.
- R.7.3.** If the Contractor's bus manufacturing process water test differs from the water test process and criteria described above, then any deviations shall be approved by the Procuring Agency.

R.8. TOTAL BUS OPERATION

- R.8.1.** 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 twenty-five (25) miles during the road tests. The plan shall be submitted to the agency for approval.

R.8.2. All zerk grease testing fittings shall be accessible from a pit location with a standard straight nose grease gun.

R.8.3. All vehicles will be road-tested and dyno-tested.

R.9. WEIGHT

R.9.1. 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.

R.9.2. Buses at a capacity load shall not exceed the tire factor limits, brake test criteria or structural design criteria.

R.10. CAPACITY

R.10.1. The vehicle shall be designed to carry the gross vehicle weight, which shall not exceed the bus GVWR.

R.11. Service Life

R.11.1. The minimum useful design life of the bus in transit service shall be at least 12 years or 500,000 miles. It shall be capable of operating at least 40,000 miles per year, including the 12th year.

R.12. MAINTENANCE AND INSPECTION

R.12.1. 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).

R.12.2. Test ports shall be provided for commonly checked functions on the bus, such as air intake, exhaust, hydraulic, pneumatic, charge-air and engine cooling systems, engine, transmission, etc.

R.12.3. All Engine and Transmission components will have the fluid sampling valves (or equivalents) installed that are easy to access: device and location selection to be made at pre-production meeting.

R.12.4. The manufacturer shall give prime consideration to the routine problems of maintaining the vehicle. All bus 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 bus structure and/or equipment such as seats and flooring under seats in order to gain access to these areas. Each bus shall be designed to facilitate the disassembly, reassembly, servicing or maintenance, using tools and equipment that are normally available as standard commercial items.

R.12.5. Requirements for the use of unique specialized tools will be minimized. The body and structure of the bus shall be designed for ease of maintenance and repair. Individual panels or other equipment which 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.

R.12.6. 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.

R.12.7. 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 bus.

R.13. INTERCHANGEABILITY

R.13.1. 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 separate 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.

R.13.2. 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. Contractor shall identify and secure approval for any changes in components or unit construction provided within a Contract.

R.13.3. In the event that the Contractor is unable to comply with the interchangeability requirement, the Contractor must notify the Agency and obtain the Agency's prior written approval, including any changing in pricing.

R.13.4. Agency shall review proposed product changes on a case-by-case basis and shall have the right to require extended warranties to ensure that product changes perform as least as well as the originally supplied products.

R.14. TRAINING

R.14.1. Along with the purchase of new buses, it is the Procuring Agency's requirements to have the manufacturer provide an appropriate program of instruction targeted to the operator, servicing, and maintenance personnel. This will be accomplished through a combination of Agency on-site and Contractor and/or supplier site training.

R.14.2. All training instructors shall be competent to teach the course area they are instructing. Further, all instructors shall speak English and have a complete understanding of the English language. If the instructor or vendor presenter lacks the skill or knowledge to provide instruction, or cannot communicate with the students, the Procuring Agency reserves the right to request that the instructor be replaced and the area of training be repeated. **R.14.3.** All Training will be priced as an option and separately from the base bus price.

R.15. OPERATOR ORIENTATION

R.15.1. The Contractor shall provide an 8-hour course of instruction for Procuring Agency for Operations personnel. Class size is not to exceed 10 employees per session. The program shall include, but not be limited to the following:

R.15.1.1. Operator Compartment, Controls and Switches, Warning Indicators and Gauges, Seat Adjustment, Door Control, Walk Around Inspection, Compartment-by-Compartment Explanation, Mirror Adjustments, Climate Control System, Wheelchair Ramp, Safety Equipment, And Emergency Procedures Wheelchairs Securement.

R.16. MAINTENANCE ORIENTATION

R.16.1. The Contractor shall provide an 8-hour course of instruction for Procuring Agency Maintenance personnel on Vehicle Servicing. Class size is not to exceed 10 employees per session. At minimum, the course shall cover the following areas:

R.16.1.1. Chassis, Suspension, Steering, Axles, Brakes Air, Body, Doors, Electrical, Engine, Fuel, Transmission, HVAC, FIRE SUPPRESSION, TOWING/JACKING

R.17. TECHNICAL TRAINING

R.17.1. The Contractor shall provide a structured program of technical training which will consist of specific and identifiably separate curriculum for each subject area. Each subject area training session shall be between eight (8) and forty (40) classroom/hands-on hours based on subject area, with class size being no more than (10) participants. The training will be delivered at the Procuring Agency's location on a schedule coordinated by the Procuring Agency's training department and the Contractor.

R.17.2. The following subject areas will be offered:

R.17.2.1. Body and Chassis, Suspension and Steering, Electrical and Electronics, Air and Brake System, HVAC/Climate Controls, Engine, Transmission, Wheelchair Ramp System, Destination Signs, Doors, Axles and Tires, Fuel System, and Fire Suppression

R.17.3. The technical training shall be delivered on a schedule coordinated between the Procuring Agency's training department and the Contractor. The subject area of sessions to be provided will be negotiated between the Procuring Agency's training personnel and the Contractor, with the base requirement being 96 hours.

R.18. OEM

R.18.1. The Contractor shall provide two (2) class slots at the manufacturer's suppliers training facility for technical instruction course on the operation, diagnostics, troubleshooting, repair, and servicing of the below listed areas:

R.18.1.1. Engine

R.18.1.2. Transmission

R.19. OPERATING ENVIRONMENT

R.19.1. The bus shall achieve normal operation in ambient temperature ranges of 10°F to 115°F, 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 feet.

R.20. NOISE

R.20.1. INTERIOR NOISE

R.20.1.1. 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 65 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.

R.20.1.2. The bus-generated noise level experienced by a passenger at any seat location in the bus shall not exceed 80 dBA. The operator area shall not experience a noise level of more than 75.5 dBA.

R.20.2. EXTERIOR NOISE

R.20.2.1. Airborne noise generated by the bus and measured from either side shall not exceed 80 dBA under full power acceleration when operated 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 83 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.

R.20.2.2. All noise readings shall be taken fifty (50) feet from, and perpendicular to, the centerline of the bus with all accessories operating. The Contractor shall comply with the exterior noise requirements defined in local laws and ordinances identified by the Agency and SAE J366.

R.21. FIRE SAFETY

R.21.1. 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.

R.21.2. 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.

R.22. RESPECT FOR THE ENVIRONMENT

R.22.1. In the design and manufacture of the bus, the Contractor shall make every effort to reduce the amount of potentially hazardous waste. In accordance with Section 6002 of the Resource Conservation and Recovery Act, the Contractor shall use, whenever possible and allowed by the specifications, recycled materials in the manufacture of the bus.

R.23. BUS DIMENSIONS

R.23.1. PHYSICAL SIZE

R.23.1.1. 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 shall have the following overall dimensions.

R.23.2. BUS LENGTH

R.23.2.1. 30 Foot Bus (30 feet ± 6 inches)

R.23.2.2. 35 Foot Bus (35 feet ± 6 inches)

R.23.2.3. 40 Foot Bus (40 feet ± 6 inches)

R.23.3. BUS WIDTH

R.23.3.1. Body width shall be 102 inches (+0, -1 inch)

R.23.4. Bus Height

R.23.4.1. Maximum overall height shall be 140 inches, including all rigid, roof-mounted items.

R.23.5. STEP HEIGHT

R.23.5.1. The step height shall not exceed 16.5 inches at either doorway without kneeling and shall not exceed 15.5 inches at the step. A maximum of two steps is allowed to accommodate a raised aisle floor in the rear of the bus.

R.23.6. UNDERBODY CLEARANCE

R.23.6.1. The bus shall maintain the minimum clearance dimensions as defined in SAE Standard J689, regardless of load up to the gross vehicle weight rating.

R.23.7. RAMP CLEARANCES

R.23.7.1. 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.

- R.23.7.2.** 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.
- R.23.7.3.** 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.

R.23.8. TABLE 2

Breakover Angle

Angle	30-ft Bus
Approach	8.6 degrees (min.)
Front breakover	8 degrees (min.)
Departure	8.1 degrees (min.)

R.23.9. GROUND CLEARANCE

- R.23.9.1.** Ground clearance shall be no less than 9 inches, (8 inches at jacking pad) except within the axle zone and wheel area.
- R.23.9.2.** Axle zone clearance, which is the projected area between tires and wheels on the same axial centerline, shall be no less than 5.4 inches.
- R.23.9.3.** Wheel area clearance shall be no less than 8 inches for parts fixed to the bus body and 6 inches for parts that move vertically with the axles.

R.23.10. FLOOR HEIGHT

- R.23.10.1.** Height of the step above the street shall be no more than 16 inches measured at the centerline of the front and rear doorway.
- R.23.10.2.** The floor may be inclined along the longitudinal axis of the bus, and the incline shall not exceed 3.5 degrees off the horizontal except locally at the doors where 2 degree slope toward the door is allowed.
- R.23.10.3.** All floor measurements shall be with the bus at the design running height and on a level surface and with the standard installed tires.
- R.23.10.4.** A maximum of two steps is allowed to accommodate a raised aisle floor in the rear of the bus.

R.23.11. INTERIOR HEADROOM

- R.23.11.1.** Headroom above the aisle and at the centerline of the aisle seats shall be no less than 78 inches in the forward half of the bus tapering to no less than 74 inches forward of the rear settee.
- R.23.11.2.** At the centerline of the window seats, headroom shall be no lower than 65 inches, except for parcel racks and reading lights, if specified.
- R.23.11.3.** Headroom at the back of the rear bench seat may be reduced to a minimum of 56 inches, but it shall increase to the ceiling height at the front of the seat cushion.
- R.23.11.4.** 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.

R.23.12. AISLE WIDTH

- R.23.12.1.** The minimum clear aisle width between pairs of transverse seats with all attached hardware shall be at least 22 inches.
- R.23.12.2.** The aisle width between the front wheelhouses shall be at least 35.5 inches, and the entire area between the front wheelhouses shall be available for passengers and mobility aid devices.

R.24. VEHICLE PERFORMANCE

R.24.1. POWER REQUIREMENTS

- R.24.1.1.** The propulsion system shall be sized to provide sufficient power to enable the bus to meet the defined acceleration, top speed, and gradability requirements, and operate all propulsion-driven accessories using actual road test results and computerized vehicle performance data.

R.24.2. TOP SPEED

R.24.2.1. 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.

R.24.2.2. Values are assumed to be sustained. Manufacturer shall supply Agency with data if there is a variance between peak performance and sustained vehicle performance.

R.24.3. GRADEABILITY

R.24.3.1. Gradeability requirements shall be met on grades with a dry commercial asphalt or concrete pavement at GVWR with all accessories operating.

R.24.4. DEFAULT

R.24.4.1. The propulsion system and drivetrain shall enable the bus to achieve and maintain a speed of 40 mph on a 2½ percent ascending grade and 15 mph on a 10 percent ascending grade continuous.

R.24.4.2. Values are assumed to be sustained. Manufacturer shall supply Agency with data if there is a variance between peak performance and sustained vehicle performance.

R.24.5. ACCELERATION

R.24.5.1. The acceleration shall meet the requirements below and shall be sufficiently gradual and smooth to prevent throwing standing passengers off-balance. Acceleration measurement shall commence when the accelerator is depressed.

R.24.6. TABLE 3

R.24.6.1.

Maximum Start Acceleration Times on a Level Surface

SPEED (MPH)	MAXIMUM TIME (SECONDS)
10	5
20	10
30	18
40	30
50	60
TOP SPEED	

OPERATING RANGE

R.24.7.1. The operating range of the bus shall be designed to meet the operating profile as stated in the "Design Operating Profile" section.

R.24.8. CNG

R.24.8.1. The operating range of the bus when run on the Altoona Test cycle shall be at least 350 miles with full fuel capacity.

R.25. POWER PLANT

R.25.1. ENGINE - CNG

R.25.1.1. The bus shall be powered by a Cummins 2013 ISLG 280 HP cng engine capable of providing the performance to satisfy the operating conditions in geographical areas throughout the state of Oklahoma. The engine shall have a minimum design life of 12.5 years or 500,000 miles, whichever comes first, and it shall be designed to require no more than one (1) major overhaul to achieve this lifetime. The engine and the transmission shall be compatible with each other in that the electronic controls of the engine shall interface with the transmission and vice versa, if controls are used. Engine shall meet all current Federal EPA requirements. A copy of the engine certification shall be supplied with the proposal.

R.25.1.2. The engine shall comply with applicable local, state, and/or federal emissions and useful life requirements. Technical Specifications, when operating on fuel equal to CARB Specifications for Compressed Natural Gas #2292.5. The four predominate characteristics must be met are Methane, Ethane, Butane and Propane. Components of the fuel management and/or control system shall have a design life of not less than 150,000 miles without replacement or major service. The lifetime estimate is based on the design operating profile.

R.25.1.3. The engine shall be equipped with an electronically controlled management system, compatible with either 12- or 24-volt power distribution. The engine control system shall be capable of transmitting and receiving electronic inputs and data from other drivetrain components and broadcasting that data to other vehicle systems. Communication between electronic drivetrain components and other vehicle systems shall be made using the communications networks. The engine's electronic management system shall monitor operating conditions and provide instantaneous adjustments to optimize both engine and bus performance. The system shall be programmable to allow optimization of programmable features.

R.25.1.4. The engine starting system shall be protected by an interlock that prevents its engagement when the engine is running. Special equipment or procedures may be employed to start the bus when exposed to temperatures less than 30°F for a minimum of four hours without the engine in operation. All cold weather starting aids, engine heating devices and procedures shall be of the type recommended by the engine manufacturer and approved by the Agency. The integration of all systems on the vehicle relative to engine idle speed shall be the responsibility of the vehicle manufacturer to meet the requirements of the transit property. A Hot flow CTM 15110—A00 engine block heater will be located in the rear engine compartment.

R.25.2. AUTOMATIC ENGINE PROTECTION/SHUTDOWN OVERRIDE FEATURE

R.25.2.1. The engine control system shall protect the engine against progressive damage. The system shall monitor conditions critical for safe operation and automatically de-rate power and/or speed and initiate engine shutdown as needed. The on-board diagnostic system shall trigger an audible alarm and warning light to signal the operator when the engine control unit detects a malfunction and the engine protection system is activated.

R.25.2.2. Automatic shutdown shall occur when parameters established for the functions below are exceeded:

R.25.2.2.1. Coolant Level

R.25.2.2.2. Coolant Temperature

R.25.2.2.3. Oil Pressure

R.25.2.2.4. Oil Temperature

R.25.2.2.5. 20 minutes of Idling

R.25.2.2.6. Exhaust Temperature

R.25.2.2.7. Fire Suppression

R.25.2.3. The automatic shutdown for the Fire Suppression feature shall occur when the Fire Suppression system is discharged.

R.25.2.4. A control shall be available to the operator, to allow temporary override (30-45 seconds) of the engine protection/shutdown system if engine power is required to move the bus in emergency conditions. Override action shall be recorded. This data shall be retrievable by the Agency.

R.25.2.5. The fast idle device shall be activated and controlled automatically by the engine control system. This device will operate only when the transmission is in neutral.

R.25.2.6. The integration of all systems on the vehicle relative to engine idle speed shall be the responsibility of the vehicle manufacturer and shall meet the requirements of the transit property.

R.25.2.7. The engine starting system shall be protected by an interlock that prevents its engagement when the engine is running.

R.25.2.8. Engine throttle operation shall be inhibited, through interlocks, whenever:

R.25.2.8.1. Front or rear door open

R.25.2.8.2. The vehicle is kneeled

R.25.2.8.3. Wheelchair ramp is in operation

R.25.2.8.4. Rear door emergency release

R.25.2.8.5. Fast Idle Operation

R.25.2.9. Failure of the engine throttle control shall not result in an unsafe condition. Loss of air or electrical throttle control shall inhibit throttle.

R.25.2.10. A rear mounted engine speed control (hand throttle) will be provided.

R.25.2.11. The engine shall have on-board diagnostic capabilities, able to monitor vital functions, store out-of-parameter conditions in memory, and communicate faults and vital conditions to service personnel. Diagnostic reader device connector ports, suitably protected against dirt and moisture, shall be provided

in operator's area and near or inside engine compartment. The on-board diagnostic system shall inform the operator via visual and/or audible alarms when out-of-parameter conditions exist for vital engine functions. All removable caps shall be tethered including the caps for the diagnostic connector ports in the operator's area and in the engine compartment.

R.25.3. PROPULSION SYSTEM SERVICE

R.25.3.1. The propulsion system shall be arranged so that accessibility for all routine maintenance is assured. No special tools, other than dollies and hoists, shall be required to remove the propulsion system or any subsystems. However, the Agency shall recognize that properly rated test equipment and safe electrical work practices are essential when servicing all voltage components. The exhaust system, air cleaner, air compressor, starter (if used), alternator, radiator, all engine accessories, and any other component requiring service or replacement shall be easily removable.

R.25.4. STANDARD REQUIREMENTS FOR A FAST IDLE DEVICE

R.25.4.1. The fast idle device shall be activated and controlled automatically by the control system.

R.25.5. COOLING SYSTEMS

R.25.5.1. The cooling systems shall be of sufficient size to maintain all engine and transmission fluids and engine intake air at safe, continuous operating temperatures during the most severe operations possible and in accordance with engine and transmission manufacturers' cooling system requirements. The cooling system fan controls should sense the temperatures of the operating fluids and the intake air, and if either is above safe operating conditions the cooling fan should be engaged. The fan control system shall be designed with a fail-safe mode of "fan on." The cooling system shall meet the requirements stated in the operating environment.

R.25.5.2. The engine shall be cooled by a water-based, pressure type, cooling system that does not permit boiling or coolant loss during the operations described above. Engine thermostats shall be easily accessible for replacement. Shutoff ball valves shall allow filter replacement without coolant loss. Ball valves shall permit complete shutoff of lines for the heating and defroster units, and water booster pumps. The water boost pump shall be a long life brushless design. All low points in the water-based cooling system shall be equipped with a standard with a 1/4" MPT brass hex plug. Air vent valves shall be fitted at high points in the cooling system unless it can be demonstrated that the system is self-purging.

R.25.5.3. A Modine E-Fan electric fan system or approved equal will be provided. Electric fans shall be brushless, variable speed, reversible and have a corrosion resistant metal shroud with finger guards that meet SAE spec J1308_200808. The fans should provide electronic feedback control and have diagnostics capability through the standard SAE J1939 diagnostics port. The cooling system shall consist of multiple electric DC brushless pusher type variable speed fans with electronic feedback controls. Electric fan motor speeds shall have a minimum operating range of 0-5500 rpm with capability of manual or automatic reverse operation in order to assist in debris removal. The cooling system shall be equipped with a master controller with the following capabilities; automatically reduce fan speed when the vehicle stops to minimize noise.

R.25.5.4. As an option, an EMP electric fan system will be made available and priced separately.

R.25.5.5. A means of determining satisfactory engine coolant level shall be provided. 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 inches above the ground. Radiator and charge air cooler fan(s) shall be electrically driven and capable of a manual reverse operations for periodic self-cleaning of the radiator and charge air cooler.

R.25.6. CHARGE AIR COOLING

R.25.6.1. 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.

R.25.7. TRANSMISSION COOLING

R.25.7.1. 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 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.

R.25.8. TRANSMISSION – CONVENTIONAL POWERTRAIN

- R.25.8.1.** The transmission shall be an Allison B400R 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.
- R.25.8.2.** The electronic controls shall be capable of transmitting and receiving electronic inputs and data from other drivetrain components and broadcasting that data to other vehicle systems. 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-volt power distribution, provide consistent shift quality and compensate for changing conditions such as variations in vehicle weight and engine power.
- R.25.8.3.** A nominal brake pedal application of 6 to 10 psi shall be required by the operator to engage forward or reverse range from the neutral position to prevent sudden acceleration of the bus from a parked position.
- R.25.8.4.** 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 operator when the electronic control unit detects a malfunction.
- R.25.8.5.** As an option, an electronic transmission fluid level monitoring and protection system will be made available and priced separately.
- R.25.8.6.** Models with remote mounted transmission vents shall have vents mounted to prevent plugging and/or the entry of foreign materials

R.25.9. RETARDER

- R.25.9.1.** The transmission shall be equipped with an integral hydraulic retarder designed to extend brake lining service life. The application of the retarder shall cause a smooth blending of both retarder and service brake functions without exceeding jerk requirements as defined in Section 5.2.2.1.5. Brake lights shall illuminate when the retarder is activated.
- R.25.9.2.** The retarder shall become partially engaged (approximately 1/4 to 1/3 of its total application, with a resulting deceleration of no greater than 0.03 g) when the throttle is completely released (e.g., zero throttle). Maximum retarder shall be achieved when brake pedal is depressed prior to engagement of service brakes with a maximum resulting deceleration of approximately 0.13 g. The resulting decelerations specified include the effects of engine braking, wind resistance and rolling resistance.
- R.25.9.3.** The thermostatically controlled cooling fan shall be activated when the retarder is engaged and the coolant temperature exceeds the maximum limit established by the engine and transmission manufacturers.

R.25.10. STANDARD REQUIREMENT FOR RETARDER ACTIVATION

- R.25.10.1.** The retarder shall be adjustable within the limits of the powertrain and activated when the brake pedal is depressed. The Agency will work with the OEM/drive system manufacturer to determine retarder performance settings. A retarder disable switch shall be accessible to the seated operator. Disabling retarder shall be recorded for Agency data collection.

R.25.11. MOUNTING

- R.25.11.1.** All powerplant mounting shall be mechanically isolated to minimize transfer of vibration to the body structure and provide a minimum clearance of 0.75 inches. Mounts shall control the movement of the powerplant so as not to affect performance of belt-driven accessories or cause strain in piping and wiring connections to the powerplant.

R.25.12. ENGINE / TRANSMISSION OIL FILL / FILTERS

- R.25.12.1.** 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. The engine and transmission shall be equipped with sufficient heavy-duty fuel and oil filters for efficient operation and to protect the engine and transmission between scheduled filter changes. All filters shall be easily accessible and the filter bases shall be plumbed to ensure correct reinstallation.

R.25.13. ENGINE COMPARTMENT GAUGES

R.25.13.1. Engine oil pressure, transmission and coolant temperature gauges are required in engine compartment.

R.25.14. ENGINE AIR CLEANER

R.25.14.1. 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 air filter.

R.25.15. HYDRAULIC SYSTEMS

R.25.15.1. Hydraulic system service tasks shall be minimized and scheduled no more frequently than those of other major bus systems. All elements of the hydraulic system shall be easily accessible for service or unit replacement. 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.

R.25.15.2. The hydraulic system shall operate within the allowable temperature range as specified by the lubricant manufacturer.

R.25.16. FLUID LINES

R.25.16.1. 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.

R.25.16.2. 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.

R.25.16.3. All hoses, pipes, lines and fittings shall be specified and installed per the manufacturer's recommendations.

R.25.17. FITTINGS AND CLAMPS

R.25.17.1. 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.

R.25.17.2. 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.

R.25.18. CHARGE AIR PIPING

R.25.18.1. 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.

R.25.18.2. Charge air piping shall be constructed of stainless steel, aluminized steel or anodized aluminum, except between the air filter and turbocharger inlet, where piping may be constructed of fiberglass. 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 360-degree seal.

R.25.19. RADIATOR

R.25.19.1. Radiator piping shall be stainless steel or brass tubing, and if practicable, hoses shall be eliminated. Necessary hoses shall be impervious to all bus fluids. All hoses shall be secured with stainless steel clamps that provide a complete 360-degree seal. The clamps shall maintain a constant tension at all times, expanding and contracting with the hose in response to temperature changes and aging of the hose material.

R.25.20. OIL AND HYDRAULIC LINES

R.25.20.1. 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.

R.26. FUEL

R.26.1. FUEL LINES

R.26.1.1. This section was written to be in compliance with NFPA-52 for U.S. buses and CAN/CGA-B149.4-M91 for Canadian buses. 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. Piping 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.

R.26.1.2. Fuel lines shall be securely mounted, braced, and supported every 24 inches, or as designed by the bus manufacturer to minimize vibration and shall be protected against damage, corrosion, or breakage due to strain or wear.

R.26.1.3. Manifolds connecting fuel containers shall be designed and fabricated to minimize vibration and shall be installed in a protected location(s) to prevent line or manifold damage from unsecured objects or road debris.

R.26.1.4. Fuel hose and hose connections, where permitted, shall be less than 48 inches in length, made from materials resistant to corrosion and action of natural gas, and protected from fretting and high heat.

R.26.1.5. High pressure CNG lines shall be pressure tested to a minimum of 125% of system working pressure prior to fueling. CNG or Nitrogen shall be used to pressure test the lines/assembly. The bus manufacturer shall have a documented procedure of testing the high pressure line assembly.

R.26.1.6. The fuel lines forward of the engine bulkhead shall be per 5.2.2.2.4

R.27. FUEL SYSTEM DESIGN AND CONSTRUCTION

R.27.1. CNG fuel containers/cylinders must be designed, constructed manufactured and tested in accordance with at least one of the following:

R.27.1.1. CNG Cylinder Visual Inspection

R.27.1.1.1. A general visual inspection of all cylinders shall occur during routine maintenance or as specified in the agency safety plan. The purpose of this general inspection is to look for signs of gross external damage or abuse to the cylinders. This cursory inspection can be performed by a skill level of 3M or less. A detailed visual inspection of all cylinders shall occur every 3 years (NGV2) or every 3 years or 36,000 miles (FMVSS 304). This detailed visual inspection shall be performed by an experienced third party or a trained in-house individual following criteria established by CGA pamphlet C-6.4 (Methods for External Visual Inspection of Natural Gas Vehicle Fuel Containers and their Installations). If a question arises the respective coach manufacturer and cylinder manufacturer should be consulted.

R.27.1.2. Operating Range

R.27.1.2.1. Fuel system shall be capable of being filled (for 350 mile range) from 500 psi to a settled pressure of 3600 psi in a maximum of five minutes.

R.27.1.3. Labeling

R.27.1.3.1. The capacity, date of manufacture, manufacturer name, location of manufacture, and certification of compliance to Federal Motor Carrier Safety Regulation shall be permanently marked on the fuel tank(s). The markings shall be readily visible and shall not be covered with an undercoating material.

R.27.1.4. Fuel Filler

R.27.1.4.1. The fuel filler shall be located 7 to 38 feet (on a 30 foot bus) behind the centerline of the front door on the curbside of the bus. The filler cap shall be retained to prevent loss and shall be recessed into the body.

R.27.1.5. Installation

R.27.1.5.1. 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 3-3. 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.

R.27.1.6. Valves

R.27.1.6.1. 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.

R.27.1.7. Pressure Relief Devices

R.27.1.7.1. PRD's 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 NGV21998, 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.

R.27.1.8. CNG Fueling System

R.27.1.8.1. The CNG fueling port receptacle shall be an ANSI/AGA NGV1 certified receptacle. The coach shall be capable of being fueled by a nozzle (insert procuring agencies standard fueling nozzle). 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 which disables the engine starting system when the access door is open, to prevent drive-away. The interlock shall be of the type such that if the sensor fails the coach will not start.

R.27.1.8.2. Bus shall be equipped with (1) fast fill, and (1) slow fill.

R.27.1.8.3. Fueling port receptacle shall be located on the curbside of the vehicle between the rear axle and the rear of the bus.

R.27.1.9. CNG De-Fueling System

R.27.1.9.1. The CNG de-fueling port shall be an ANSI/AGA NGV1 certified receptacle. The CNG de-fueling port shall be located on the curbside of the coach, in a location that is compatible with standard de-fueling station operations. The de-fueling system shall incorporate the following characteristics:

R.27.1.9.1.1. Dust Cap permanently “tethered” to the de-fueling port

R.27.1.9.1.2. Device(s) to prevent inadvertent defueling. Specifications to be provided by procuring agency

R.27.1.9.1.3. Location/method of attaching CNG fuel system to earth ground

R.27.1.9.1.4. Components compatible with procuring Agency's de-fueling operation

R.28. EMISSIONS AND EXHAUST

R.28.1. EXHAUST EMISSIONS

R.28.1.1. The engine and related systems shall meet all applicable emission and engine design guidelines and standards.

R.28.2. EXHAUST SYSTEM

R.28.2.1. Exhaust gases and waste heat shall be discharged from the roadside rear corner of the roof. The exhaust pipe shall be of sufficient height to prevent exhaust gases and waste heat from discoloring or causing heat deformation to the bus. 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. An exhaust after-treatment system will be provided to ensure compliance to all applicable EPA regulations in effect.

R.28.3. DIESEL EXHAUST FLUID (DEF) INJECTION

R.28.3.1. If required by the engine manufacturer to meet NOx level requirements specified by EPA, a DEF injection system will be provided. The DEF system will minimally include a tank, an injector, a pump, an ECM and a selective catalytic converter. The tanks shall be designed to store DEF in the operating environment described in the “Operating Environment” section. The DEF fluid lines shall be designed to prevent the DEF from freezing. The DEF injection system shall not be damaged from a cold soak at 10°F.

R.28.4. PARTICULATE AFTER-TREATMENT

R.28.4.1. 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.

R.28.5. FIRE SUPPRESSION SYSTEM

R.28.5.1. An Amerex V25 automatic fire suppression system will be provided to ensure adequate coverage in the engine compartment and main electrical box areas should a fire event happens. The system shall incorporate a telltale, dash mounted operator warning light, audible indicator and switch, automatically shutting off all fans and climate control systems in the event of discharge.

R.28.5.2. The system installed shall be certified by the vehicle manufacturer that it is suitable for use in the proposed vehicle in case the unit fails to function during an on board vehicle event or fire. Each vehicle shall be delivered with a certificate identifying the vehicle identification number (VIN) for which it applies. The system shall be U.L., U.C.L., and F.M. listed and meet all D.O.T. and F.M.V.S.S. and be certified by the vehicle and equipment manufacturer.

R.28.5.3. As an option, a delete for the Fire Suppression for the cng bus will be included.

R.29. STRUCTURE

R.29.1. DESIGN

R.29.1.1. The structure of the bus shall be designed to withstand the transit service conditions typical of an urban 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. The design operating profile specified by the Agency shall be considered for this purpose.

R.29.2. ALTOONA TESTING

R.29.2.1. 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 any and all such failures will not occur shall be submitted to the Agency.

R.29.3. ALTOONA TEST REPORT PROVIDED TO AGENCY PRIOR TO START OF BUS PRODUCTION

R.29.3.1. Prior to the start of any bus manufacturing or assembly processes, the structure of the proposed bus model shall have undergone appropriate structural testing and/or analysis, including the complete regimen of FTA required Altoona tests. Prior to assembly of the first bus, the OEM shall provide the Agency with a completed report of Altoona testing for the proposed bus model along with a plan of corrective action to address deficiencies, breakdowns and other issues identified during Altoona testing. The bus model tested shall match the bus model proposed for procurement, including structure, axles and drive-train. Base model and partial Altoona test reports are acceptable when the combination of these tests adequately represents the proposed bus model.

R.30. STRUCTURAL VALIDATION BASELINE

R.30.1. STRUCTURAL ANALYSIS

R.30.1.1. The structure of the bus shall have undergone appropriate structural testing and/or analysis. At minimum, appropriate structural testing and analysis shall include Altoona testing or Finite Element Analysis (FEA).

R.30.2. DISTORTION

R.30.2.1. 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 inch curb or in a 6 inch deep hole.

R.30.3. RESONANCE AND VIBRATION

R.30.3.1. All structure, body and panel-bending mode frequencies, including vertical, lateral and torsional modes, shall be sufficiently removed from all primary excitation frequencies to minimize audible, visible or sensible resonant vibrations during normal service.

R.30.4. ENGINE COMPARTMENT BULKHEADS

R.30.4.1. 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. 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.

R.30.4.2. 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.

R.30.5. CRASHWORTHINESS

R.30.5.1. The bus body and roof structure shall withstand a static load equal to 150 percent of the curb weight evenly distributed on the roof with no more than a 6 inch reduction in any interior dimension. Windows shall remain in place and shall not open under such a load. These requirements must be met without the roof-mounted equipment installed.

R.30.5.2. The bus shall withstand a 25 mph impact by a 4000-pound automobile at any side, excluding doorways, along either side of the bus with no more than 3 inches of permanent structural deformation at seated passenger hip height. This impact shall not result in sharp edges or protrusions in the bus interior.

R.30.5.3. Exterior panels below 35 inches from ground level shall withstand a static load of 2000 lbs. applied perpendicular to the bus by a pad no larger than 5 sq. inches. This load shall not result in deformation that prevents installation of new exterior panels to restore the original appearance of the bus. The transit bus, at GVWR and under static conditions, shall not exhibit deformation or deflection that impairs operation of doors, windows, or other mechanical elements. Static conditions include the vehicle at rest with any one wheel or dual set of wheels on a 6 inch curb or in a 6 inch deep hole.

R.30.5.4. The sidewall structure shall be capable of withstanding impacts of 200 foot pounds of energy from a steel faced spherical missile no less than 9 inches in diameter and of a 500 pound load applied anywhere along their length by a rigid plate 1 foot in length with no visible damage to the supporting structure. A damaged portion of the supporting structure shall be replaceable without requiring removal or replacement of the entire structure.

R.30.5.5. The bus chassis shall be stainless steel with an integrated side impact barrier to provide additional safety to the passengers in the low floor area.

R.30.6. CORROSION

R.30.6.1. 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 Agency's use of proper cleaning and neutralizing agents.

R.30.6.2. 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.

R.30.7. CORROSION-RESISTANCE REQUIREMENTS FOR EXPOSED AND INTERIOR SURFACES OF TUBING BELOW LOWER WINDOW LEVEL

R.30.7.1. All exposed surfaces and the interior surfaces of tubing and other enclosed members below lower window line shall be corrosion resistant through application of a corrosion protection system.

R.30.8. TOWING

R.30.8.1. Each towing device shall withstand, without permanent deformation, tension loads up to 1.2 times the curb weight of the bus within 20 degrees of the longitudinal axis of the bus. If applicable, the rear towing device(s) shall not provide a toehold for unauthorized riders. The method of attaching the towing device shall not require the removal, or disconnection, of front suspension or steering components. Removal of the bike rack is permitted for attachment of towing devices.

R.30.8.2. A plug connector permanently mounted at the front of the bus shall provide for bus tail lamp, marker, stop and turn signal lamp operation as controlled from the towing vehicle. The connector shall include a springloaded dust- and water-resistant cap. Shop air connectors shall be provided at the front and rear of the bus and shall be capable of supplying all pneumatic systems of the bus with externally sourced compressed air. The location of these shop air connectors shall facilitate towing operations.

R.30.9. LIFTED (SUPPORTED) FRONT AXLE AND FLAT TOWING CAPABILITY

R.30.9.1. The front towing devices shall allow attachment of adapters for a rigid tow bar and shall permit the lifting of the bus until the front wheels are clear off the ground in order to position the bus on the towing equipment by the front wheels. These devices shall also permit common flat towing.

R.30.9.2. Two rear recovery devices/tie downs shall permit lifting and towing of the bus for a short distance, such as in cases of an emergency, to allow access to provisions for front towing of bus. The method of attaching the tow bar or adapter shall require the specific approval of the Agency. 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 hook with a 1 inch throat.

R.30.10. JACKING

R.30.10.1. It shall be possible to safely jack up the bus, at curb weight, with a common 10-ton floor jack with or without special adapter, when a tire or dual set is completely flat and the bus is on a level, hard surface, without crawling under any portion of the bus. Jacking from a single point shall permit raising the bus sufficiently high to remove and reinstall a wheel and tire assembly. Jacking pads located on the axle or suspension near the wheels shall permit easy and safe jacking with the flat tire or dual set on a 6 inch high run-up block not wider than a single tire. The bus shall withstand such jacking at any one or any combination of wheel locations without permanent deformation or damage.

R.30.11. HOISTING

R.30.11.1. 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.

R.31. FLOOR

R.31.1. DESIGN

R.31.1.1. 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 1/4 inch 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.

R.31.2. STRENGTH

R.31.2.1. 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 bus. 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.

R.31.2.2. The floor deck shall be reinforced as needed to support passenger loads. At GVWR, the floor shall have an elastic deflection of no more than 0.60 inches from the normal plane. The floor shall withstand the application of 2.5 times gross load weight without permanent detrimental deformation. The floor, with coverings applied, shall withstand a static load of at least 150 lbs. applied through the flat end of a 1/2 inch diameter rod, with 1/32 inch radius, without permanent visible deformation.

R.31.3. CONSTRUCTION

R.31.3.1. 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. The floor covering material shall be Altro flooring or equivalent.

R.31.4. PRESSURE-PRESERVED PLYWOOD PANEL

R.31.4.1. Plywood shall be certified at the time of manufacturing by an industry-approved third-party inspection agency 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. Plywood shall be pressure-treated with a preservative chemical and process such as alkaline copper quaternary (ACQ) 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 15 percent.

R.32. PLATFORMS

R.32.1. OPERATOR'S AREA

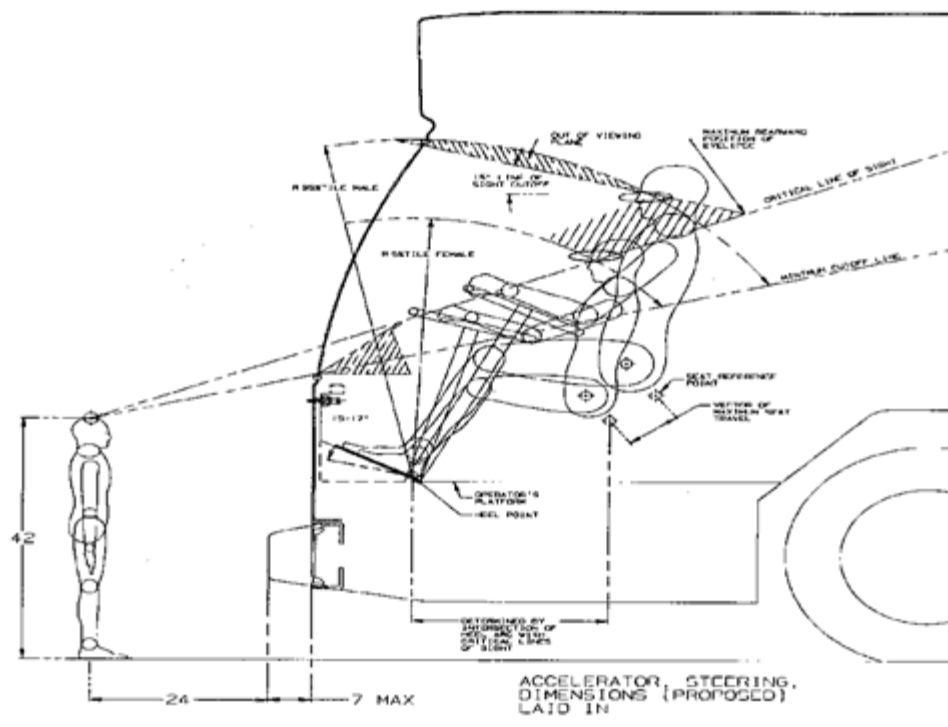
R.32.1.1. The covering of platform surfaces and risers, except where otherwise indicated, shall be the same material as specified for floor covering. Trim shall be provided along top edges of platforms unless integral nosing is provided.

R.32.2. OPERATOR'S PLATFORM

R.32.2.1. The operator's platform shall be of a height such that, in a seated position, the operator can see an object located at an elevation of 42 inches above the road surface, 24 inches from the leading edge of the bumper. Notwithstanding this requirement, the platform height shall not position the operator such that the operator's vertical upward view is less than 15 degrees. A warning decal or sign shall be provided to alert the operator to the change in floor level. Figure 1 illustrates a means by which the platform height can be determined, using the critical line of sight.

R.32.2.2. FIGURE 3

R.32.2.2.1. Determining Platform Height



R.32.3. FAREBOX

R.32.3.1. Farebox placement should minimize impact to passenger access and minimize interference with the operator's line of sight. Farebox to be a Diamond XV shall be provided unless the Agency submitting the PO requests for a different brand.

R.32.4. REAR STEP AREA TO REAR AREA

R.32.4.1. If the vehicle is of a bi-level floor design, 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 inches 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.

R.33. WHEEL HOUSING

R.33.1. DESIGN AND CONSTRUCTION

R.33.1.1. 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 stainless steel.

- R.33.1.2.** 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 shall be adequately reinforced where seat pedestals are installed. Wheel housings shall have sufficient sound insulation to minimize tire and road noise and meet all noise requirements of this specification.
- R.33.1.3.** 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, or its use as a luggage rack.
- R.33.1.4.** 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 inches above floor shall be equipped with scuff-resistant coating or stainless steel trim.
- R.33.1.5.** Wheel housings, as installed and trimmed, shall withstand impacts of a 2 inch steel ball with at least 200 ft.-lbs. of energy without penetration.
- R.33.1.6.** 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 inches higher than the wheel well housing.

R.34. CHASSIS

R.34.1. SUSPENSION

R.34.2. GENERAL REQUIREMENTS

- R.34.2.1.** The front, 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.

R.34.3. ALIGNMENT

- R.34.3.1.** All axles should be properly aligned so the vehicle tracks accurately within the size and geometry of the vehicle.

R.34.4. SPRINGS AND SHOCK ABSORBERS

R.34.4.1. Suspension Travel

- R.34.4.1.1.** The suspension system shall permit a minimum wheel travel of 2.75 inch jounce-upward travel of a wheel when the bus hits a bump (higher than street surface), and 2.75 inch rebound-downward travel when the bus comes off a bump and the wheels fall relative to the body. Urethane bumpers shall be provided at the limit of jounce travel. Rebound travel may be limited by urethane 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 1/2 inch at any point from the height required. The safe operation of a bus cannot be impacted by ride height up to 1 inch from design normal ride height.

R.34.5. DAMPING

- R.34.5.1.** 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 bus motion to three cycles or less after hitting road perturbations. The shock absorber bushing shall be made of urethane material that will last the life of the shock absorber. The damper shall incorporate a secondary hydraulic rebound stop.

R.34.6. LUBRICATION

R.34.6.1. Standard Grease Fittings

- R.34.6.1.1.** 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.

R.34.7. KNEELING

- R.34.7.1.** A kneeling system shall lower the entrance(s) of the bus a minimum of 2.0 inches during loading or unloading operations regardless of load up to GVWR, measured at the longitudinal centerline of the entrance door(s) by the operator. The kneeling control shall provide the following functions: R.34.7.1.1. Downward control must be held to allow downward kneeling movement.

- R.34.7.1.2. Release of the control during downward movement must completely stop the lowering motion and hold the height of the bus at that position.
- R.34.7.1.3. Upward control actuation must allow the bus to return to normal floor height without the operator having to hold the control.
- R.34.7.2.** 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 inches 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.
- R.34.7.3.** An indicator visible to the operator shall be illuminated until the bus is raised to a height adequate for safe street travel. An audible warning alarm will sound simultaneously with the operation of the kneeler to alert passengers and bystanders. A warning light mounted near the curbside of the front door, a minimum 2.5 inches 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.

R.35. WHEELS AND TIRES

There shall be seven (7) wheels and tires supplied which will include one (1) spare wheel and tire.

R.35.1. WHEELS

- R.35.1.1.** All wheels shall be interchangeable and shall be removable without a puller. 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.

R.35.2. PAINTED STEEL

- R.35.2.1.** Wheels and rims shall be hub-piloted steel with white powder coat (maximum 3.5 mil) and shall resist rim flange wear.

R.35.3. TIRES

- R.35.3.1.** Tires shall be suitable for the conditions of transit service and sustained operation at the maximum speed capability of the bus. Tires should be Michelin or equivalent. Load on any tire at GVWR shall not exceed the tire Supplier's rating. 30' buses will have 275/70/22.5 Michelin tires.

R.36. STEERING

- R.36.1.** 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.

R.37. STEERING AXLE

R.37.1. SOLID BEAM AXLE AND GREASE-TYPE FRONT BEARINGS AND SEALS

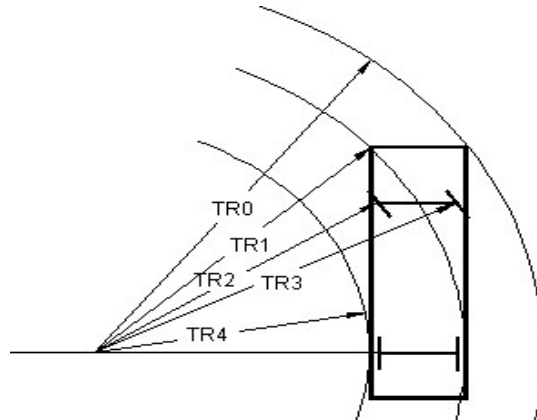
- R.37.1.1.** The front axle shall be a Meritor solid beam, non-driving with a load rating sufficient for the bus loaded to GVWR and shall be equipped with oil type front wheel bearings and seals. All friction points on the front axle shall be equipped with replaceable bushings or inserts and lubrication fittings easily accessible from a pit or hoist.
- R.37.1.2.** 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.
- R.37.1.3.** The steering geometry of the outside (frontlock) wheel shall be within 2 degrees of true Ackerman up to 50 percent lock measured at the inside (backlock) wheel. The steering geometry shall be within 3 degrees of true Ackerman for the remaining 100 percent lock measured at the inside (backlock) wheel.

R.38. STEERING WHEEL

R.38.1. TURNING EFFORT

- R.38.1.1.** 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.
- R.38.1.2.** Under these conditions, the torque required to turn the steering wheel 10 degrees 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.

- R.38.1.3.** 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.
- R.38.1.4.** Caster angle shall be selected to provide a tendency for the return of the front wheels to the straight position with minimal assistance from the operator.



R.38.2. STEERING WHEEL, GENERAL

- R.38.2.1.** The steering wheel diameter shall be approximately 18-20 inches; the rim diameter shall be 7/8 inch to 1-1/4 inches and shaped for firm grip with comfort for long periods of time.
- R.38.2.2.** 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.

R.38.3. STEERING COLUMN TILT

- R.38.3.1.** The steering column shall have full tilt capability with an adjustment range of no less than 40 degrees from the vertical and easily adjustable by the operator.

R.38.4. STEERING WHEEL TELESCOPIC ADJUSTMENT

- R.38.4.1.** The steering wheel shall have full telescoping capability and have a minimum telescopic range of 1.8 inches and a minimum low-end adjustment of 28 inches, measured from the top of the steering wheel rim in the horizontal position to the cab floor at the heel point.

R.38.5. DRIVE AXLE

- R.38.5.1.** The bus shall be driven by a heavy-duty Meritor single reduction 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.
- R.38.5.2.** The drive shaft shall be guarded to prevent hitting any critical systems, including brake lines, bus floor or the ground, in the event of a tube or universal joint failure.

R.39. BRAKES

R.39.1. SERVICE BRAKE

- R.39.1.1.** Brakes shall be self-adjusting. Brake wear indicators (visible brake sensors) shall be provided on exposed push rods.

R.39.2. ACTUATION

R.39.2.1. Air-Actuated Brakes

- R.39.2.1.1.** 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 70 lbs. at a point 7 inches above the heel point of the pedal to achieve maximum braking. The heel point is the location of the operator's heel when his or her foot is rested flat on the pedal and the heel is touching the floor or heel pad of the pedal. The ECU for the ABS system shall be protected, yet in an accessible location to allow for ease of service.

R.39.2.1.2. The total braking effort shall be distributed between all wheels in such a ratio as to ensure equal friction material wear rate at all wheel locations. Manufacturer shall demonstrate compliance by providing a copy of a thermo dynamic brake balance test upon request.

R.39.2.2. Automatic Traction Control - Microprocessor controlled automatic traction control (ATC) shall be provided.

R.39.3. FRICTION MATERIAL

R.39.3.1. The brake linings shall be made of non-asbestos material. In order to aid maintenance personnel in determining extent of wear, a provision such as a scribe line or chamfer indicating the thickness at which replacement becomes necessary shall be provided on each brake lining. The complete brake lining wear indicator shall be clearly visible from the hoist or pit without removing backing plates.

R.39.4. HUBS

R.39.4.1. 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. Vehicle to be equipped with Engler Hubometer.

R.39.5. DRUM BRAKES

R.39.5.1. The service brakes shall be two (2) shoe, internal-expanding, air operated S-cam type brakes at each wheel. The brakes must be capable of stopping the vehicle in accordance with the performance requirements of State and Federal regulations in effect at the time of manufacture. Parking brake shall be spring applied, air released chamber mounted on the rear axle assembly. All brake linings shall be of non-asbestos material three-quarters (3/4) inch thick. Brake shoe return springs shall be the heaviest available.

R.39.5.2. Spring brake chambers shall be provided, and shall comply with requirements of State and Federal regulations FMVSS 121 in effect at time of manufacturer on the front and rear of these buses. At a minimum the front chamber shall be size 24 and the rear shall be size 36. The emergency air tank shall be piped to a service valve at the left front corner of the bus to fill the tank for towing the vehicle.

R.39.5.3. Brake shoe effective area shall total a minimum of 932 square inches. Brake shoes shall be operated by cams which in return are operated by automatic slack adjusters. Slack adjusters shall be equipped with grease fittings and be capable of automatic adjustments throughout the life of the lining and drum assembly. Brake lines shall be installed so that the possibility of damage is minimized.

R.39.5.4. Lines and hoses shall be clamped and supported in a manner which minimizes long, unsupported hose lengths and precludes rubbing against any part of the bus.

R.39.5.5. The parking and emergency brakes shall be with a 40 PSI setting, controlled by a manual valve located convenient to the operator for safe, convenient access. Valve operation shall be "pull to set brakes" and "push to release" type brake system.

R.39.5.6. This brake shall have stopping ability that is equal to or better than required by Federal and State regulations. It shall automatically apply if air system pressure falls below half the normal value or such other value as is recommended by the manufacturer. This parking/emergency brake shall be of spring brake design. The manufacturer will provide in their proposal a statement of brake efficiency at empty and loaded capacity.

R.39.5.7. NOTE: As an option, a brake stroke and wear monitoring system shall be made available and priced separately.

R.39.6. PARKING/EMERGENCY BRAKE

R.39.6.1. Air Brakes - 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.

R.40. INTERLOCKS

R.40.1. PASSENGER DOOR INTERLOCKS

R.40.1.1. To prevent opening mid and rear passenger doors while the bus is in motion, a speed sensor shall be integrated with the door controls to prevent the mid/rear doors from being enabled or opened unless the bus speed is less than 2 mph.

R.40.1.2. 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 operator's door control is moved to a mid/rear door enable or open position, or a mid or rear door panel is opened more than 3 inches 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.

R.40.1.3. All door systems employing brake and accelerator interlocks shall be supplied with supporting failure mode effects analysis documentation (FEMA), 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 and unsecured condition, unless the door master switch has been actuated to intentionally release the interlocks.

R.40.1.4. 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 whenever front doors are open, selection to be made by Procuring Agency at pre-production meeting.

R.41. PNEUMATIC SYSTEM

R.41.1. GENERAL

R.41.1.1. 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.

R.41.1.2. 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.

R.41.2. AIR COMPRESSOR

R.41.2.1. An engine-driven air compressor shall be sized to charge the air system from 40 psi to the governor cutoff pressure in less than four (4) minutes while not exceeding the fast idle speed setting of the engine.

R.41.3. AIR LINES AND FITTINGS

R.41.3.1. 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 200oF. 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:

R.41.3.1.1. *Green* Indicates primary brakes and supply

R.41.3.1.2. *Red* Indicates secondary brakes

R.41.3.1.3. *Brown* Indicates parking brake

R.41.3.1.4. *Yellow* Indicates compressor governor signal

R.41.3.1.5. *Black* Indicates accessories

R.41.3.2. 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 inch intervals or less.

R.41.3.3. The compressor discharge line between powerplant 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.

R.41.3.4. 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.

R.41.4. AIR RESERVOIRS

R.41.4.1. All air reservoirs shall meet the requirements of FMVSS Standard 121 and SAE Standard J10. 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.

R.41.5. AIR SYSTEM DRYER

R.41.5.1. 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 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.

R.42. ELECTRICAL, ELECTRONIC AND DATA COMMUNICATION SYSTEMS

R.42.1. OVERVIEW

R.42.1.1. 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).

R.42.1.2. Electronic devices are individual systems and components that process and store data, integrate electronic information or perform other specific functions.

R.42.1.3. 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.

R.42.1.4. Information level systems that require vehicle information for their operations or provide information shall adhere to J1939 data standard.

R.42.1.5. Data communications systems are divided into three levels to reflect the use of multiple data networks:

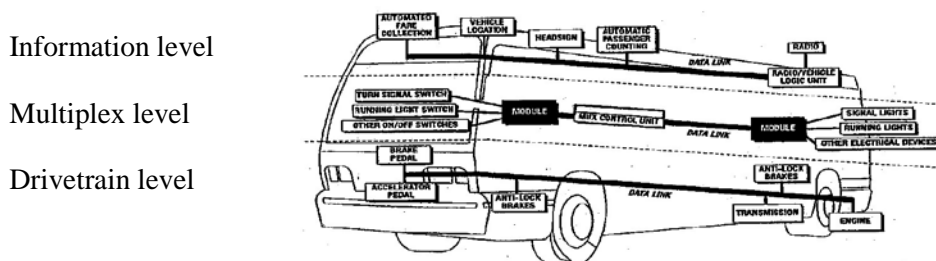
R.42.1.5.1. Drivetrain level: Components related to the drivetrain including the propulsion system components (engine, transmission and hybrid units), and anti-lock braking system (ABS), which may include traction control.

R.42.1.5.2. Information level: Components whose primary function is the collection, control or display of data that is not necessary to the safe drivability of the vehicle (i.e., the vehicle will continue to operate when those functions are inoperable). These components typically consist of those required for automatic vehicle location (AVL) systems, destination signs, fare boxes, passenger counters, radio systems, automated voice and signage systems, video surveillance and similar components.

R.42.1.5.3. Multiplex level: Electrical or electronic devices controlled through input/output signals such as discrete, analog and serial data information (i.e., on/off switch inputs, relay or relay control outputs). Multiplexing is used to control components not typically found on the drivetrain or information levels, such as lights; wheelchair lifts; doors; heating, ventilation and air conditioning (HVAC) systems; and gateway devices.

R.42.1.6. FIGURE 5

R.42.1.6.1. Data Communications Systems Levels



R.42.2. MODULAR DESIGN

R.42.2.1. 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.

R.42.2.2. Powerplant 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.

R.42.3. ENVIRONMENTAL AND MOUNTING REQUIREMENTS

- R.42.3.1.** 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 SAE J1455.
- R.42.3.2.** 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 SAE J1113 and UNECE Council Directive 95/54 (R-10).
- R.42.3.3.** The Agency shall follow recommendations from bus manufacturers and subsystem Suppliers regarding methods to prevent damage from voltage spikes generated from welding, jump starts, shorts, etc.
- R.42.3.4.** 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.
- R.42.3.5.** 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.
- R.42.3.6.** All electrical/electronic hardware and its mounting shall comply with the shock and vibration requirements of SAE J1455.
- R.42.3.7.** Electrical cables and wiring shall be adequate for all anticipated loads. The main wiring harness shall, to the maximum extent practical, be installed inside the bus body passenger compartment and, where that is not practical, shall be secured in frame rail raceways. The Contractor shall route and secure all wiring so that it does not rub anywhere. Routing of step well light wiring shall be such as to avoid rubbing door posts, etc. When wires or looms pass through metal, the wires shall be protected by a rubber grommet.
- R.42.3.8.** Each electrical panel, i.e. front and exit door panels, battery compartment, and front electrical panel shall provide an explanation of the respective electrical circuits and components contained within and shall be furnished in a silk-screened or water/oil proof diagram on the inside of the door panel.
- R.42.3.9.** All engine compartment wiring and light wiring shall be insulated from the heat and be resistant to oil and grease. Electrical equipment, junction boxes and connectors shall not be placed where they are subjected to excessive heat, oil, grease, or road spray. All multiple terminal connectors shall be military (cannon plug) type, fully sealed and protected with a potting compound to prevent outside dirt and corrosives from entering the wiring, connectors, or plugs.
- R.42.3.10.** All main power supply terminals shall be covered with electric post rubber cover.
- R.42.3.11.** All electrical end plugs shall be covered. The wiring harnesses shall incorporate ten percent (10%) spare wires. 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. All cables and harnesses shall be secured to prevent chafing or shorting against each other or any part of the vehicle.
- R.42.3.12.** Clamps shall be rubber or PVC clad aircraft type. Grommets or other protective material shall be installed at points where wiring penetrates metal structures.
- R.42.3.13.** All wiring shall start and end at a junction block or component.
- R.42.3.14.** All inline and bulkhead connectors are to be of the weather pack sealed type.
- R.42.3.15.** Multi-pin connectors shall be protected internally from corrosion with silicone dielectric grease (Dow Corning #4). All circuits except the engine emergency shut-off and speedometer circuits must be protected by reset circuit breakers that clearly indicate their position when tripped. Each breaker must be labeled. Circuit breakers must have plastic dust caps.
- R.42.3.16.** Provide constant power for powering systems, such as but not limited to the fire suppression, radio, farebox, and DC-DC converter that require constant power when battery cutoff switch is off.
- R.42.3.17.** The windshield wiper and headlamps electric circuit shall be protected by modified auto-reset circuit breakers sized to the requirement of the load.
- R.42.3.18.** Rubber Covers shall be provided for all the Electric Posts.
- R.42.3.19.** All junction boxes located in the engine compartment shall be designed to allow thorough steam cleaning of the engine compartment area without intrusion of water.
- R.42.3.20.** Major junction panels shall be readily accessible for maintenance, not located behind or alongside seat or other fixed/semi-fixed obstructions. Access panels and junction box covers shall have seals which will preclude entry of rain, wash water, road debris, etc. All wiring and junction panel terminals shall be numbered and color coded for easy identification. A diagram showing the coding as the bus was built shall be furnished.

R.42.3.21. The Contractor shall supply at least two spare circuits in the main harness between the front and rear of the bus. The main harness from the engine compartment shall be equipped with multiple circuit cannon type connectors.

R.42.4. HARDWARE MOUNTING

R.42.4.1. 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.

R.42.4.2. 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.

R.42.4.3. 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.

R.42.4.4. All electrical/electronic hardware and its mounting shall comply with the shock and vibration requirements of SAE J1455.

R.43. GENERAL ELECTRICAL REQUIREMENTS

R.43.1. BATTERIES

R.43.1.1. Low-Voltage Batteries (24V) DEK 8D

R.43.1.2. Four (4) Group 31 twelve volt (12V) lead acid filled thermal battery units, with top studs connectors with minimum 950 cold cranking amps at zero degrees Fahrenheit with a reserve capacity of 425 minutes or greater will be required.

R.43.2. BATTERY CABLES

R.43.2.1. The battery terminal ends and cables 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, be flexible and 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 SGT, SGX or GXL and SAE Recommended Practice J541. A wiring diagram will be water proof and mounted to the battery access door.

R.43.3. MASTER BATTERY SWITCH

R.43.3.1. A single master switch shall be provided near the battery compartment for the disconnecting of all battery positives (12V and 24V), except for safety devices such as the fire suppression system and other systems as specified. 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 off or are in normal service. The access door shall be labeled "Battery Emergency Shut-Off Switch."

R.43.3.2. Turning the master switch off with the powerplant operating 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.

R.43.4. JUMP-START CONNECTOR

R.43.4.1. A jump-start connector, red for 24V and blue for 12V, shall be provided at a location determined at the pre-production meeting and shall be equipped with dust cap and adequately protected from moisture, dirt and debris.

R.43.5. BATTERY COMPARTMENT

R.43.5.1. The battery compartment must be well-ventilated to prevent hydrogen buildup while protecting the compartment from road spray, water intrusion and de-icing chemicals. Batteries shall be mounted in a stainless steel slide out tray on rollers, with less than 50 lbs. of effort. The battery tray shall have drain holes. The batteries shall not be located in the engine compartment.

R.43.5.2. The vehicle shall be equipped with a 12VDC and 24VDC quick disconnect switch (es). The battery compartment door shall conveniently accommodate operation of the 12VDC and 24VDC quick disconnect switch (es).

R.43.6. ALTERNATOR / REGULATOR

R.43.6.1. A EMP P450 alternator or equivalent shall supply the entire nighttime operating electrical load of the coach while providing at least 20 percent (20%) of its current output for battery charging when the battery is fully discharged.

R.43.7. CIRCUIT PROTECTION

R.43.7.1. 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 breakers or 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 Agency mechanic with visible indication of open circuits.

R.43.7.2. The Agency 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. 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.

R.43.8. GROUNDS

R.43.8.1. 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 four ground ring/spade terminal connections shall be made per ground stud. Electronic equipment requiring an isolated ground to the battery (i.e., electronic ground) shall not be grounded through the chassis.

R.43.9. LOW VOLTAGE/LOW CURRENT WIRING AND TERMINALS

R.43.9.1. All power and ground wiring shall conform to specification requirements of SAE Recommended Practice J1127, J1128 and J1292. Double insulation shall be maintained as close to the junction box, electrical compartment or terminals as possible. The requirement for double insulation shall be met by wrapping the harness with plastic electrical tape or by sheathing all wires and harnesses with non-conductive, rigid or flexible conduit.

R.43.9.2. 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 present in the harness. Kinking, grounding at multiple points, stretching, and exceeding minimum bend radius shall be prevented.

R.43.9.3. 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.

R.43.9.4. 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.

R.43.9.5. 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.

R.43.9.6. 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 watertight 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 either use different inserts or different insert orientations to prevent incorrect connections.

R.43.9.7. 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 inch, 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.

R.43.9.8. Ultra-sonic and T-splices may be used with 7 AWG or smaller wire. When a T-splice is used, it shall meet these additional requirements:

R.43.9.8.1. It shall include a mechanical clamp in addition to solder on the splice.

R.43.9.8.2. The wire shall support no mechanical load in the area of the splice.

R.43.9.8.3. The wire shall be supported to prevent flexing.

R.43.9.9. All splicing shall be staggered in the harness so that no two splices are positioned in the same location within the harness.

R.43.9.10. 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.

R.43.9.11. The instrument panel and wiring shall be easily accessible for service from the operator'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.

R.43.10. ELECTRICAL COMPONENTS

R.43.10.1. 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.

R.43.10.2. 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 and wiper motors). All electric motors shall be easily accessible for servicing.

R.43.11. ELECTRICAL COMPARTMENTS

R.43.11.1. 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.

R.43.11.2. The front compartment shall be completely serviceable from the operator'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.

R.43.12. GENERAL ELECTRONIC REQUIREMENTS

R.43.12.1. 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.

R.43.12.2. 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 50V 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.

R.43.13. WIRING AND TERMINALS

R.43.13.1. Kinking, grounding at multiple points, stretching and reducing the bend radius below the manufacturer's recommended minimum shall not be permitted.

R.43.14. DISCRETE INPUTS/OUTPUTS (I/O)

R.43.14.1. 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.

R.43.15. SHIELDING

R.43.15.1. 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.

R.43.15.2. A shield grounded at both end forms a ground loop, which can cause intermittent control or faults.

R.43.15.3. 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.

R.43.16. COMMUNICATIONS

R.43.16.1. 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.

R.43.16.2. Communications networks that use power line carriers (e.g., data modulated on a 24V-power line) shall meet the most stringent applicable wiring and terminal specifications.

R.43.17. RADIO FREQUENCY (RF)

R.43.17.1. 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 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.

R.43.18. AUDIO

R.43.18.1. 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.

R.43.19. MULTIPLEXING - GENERAL

R.43.19.1. The Dynex multiplexing system shall 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.

R.43.19.2. Versatility and future expansion shall be provided for by expandable system architecture. The multiplex system shall be capable of accepting new inputs and outputs through the addition of new modules and/or the utilization of existing spare inputs and outputs.

R.43.19.3. All like components in the multiplex system shall be modular and interchangeable with 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.

R.43.19.4. Ten percent (10%) of the total number of inputs and outputs, or at least one each for each voltage type utilized (0V, 12V, 24V) at each module location shall be designated as spares.

R.43.20. DATA COMMUNICATIONS - GENERAL

R.43.20.1. 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 Agency with the following minimum information:

R.43.20.1.1. 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).

R.43.20.1.2. Data definition requirements that ensure access to diagnostic information and performance characteristics.

R.43.20.1.3. The capability and procedures for uploading new application or configuration data.

R.43.20.1.4. Access to revision levels of data, application software and firmware.

R.43.20.1.5. The capability and procedures for uploading new firmware or application software.

R.43.20.1.6. Evidence that applicable data shall be broadcast to the network in an efficient manner such that the overall network integrity is not compromised.

R.43.20.2. Any electronic vehicle components used on a network shall be conformance tested to the corresponding network standard.

R.43.21. DRIVETRAIN LEVEL

R.43.21.1. 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 and/or J1708/J1587 with forward and backward compatibilities or other open protocols.

R.43.22. DIAGNOSTICS, FAULT DETECTION AND DATA ACCESS

R.43.22.1. Drivetrain performance, maintenance and diagnostic data, and other electronic messages shall be formatted and transmitted on the communications networks.

R.43.22.2. 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.

R.43.23. PROGRAMMABILITY (SOFTWARE)

R.43.23.1. The drivetrain level components shall be programmable by the Agency with limitations as specified by the sub-system Supplier.

R.44. MULTIPLEX LEVEL

R.44.1. DATA ACCESS

R.44.1.1. 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 Agency.

R.44.2. DIAGNOSTICS AND FAULT DETECTION

R.44.2.1. 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 onboard visual/audible indicators.

R.44.2.2. 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 handheld 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.

R.44.3. PROGRAMMABILITY (SOFTWARE)

R.44.3.1. 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:

R.44.3.1.1. password protection

R.44.3.1.2. limited distribution of the configuration software

R.44.3.1.3. limited access to the programming tools required to change the software

R.44.3.1.4. hardware protection that prevents undesired changes to the software

R.44.3.2. 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:

R.44.3.2.1. hardware component identification where labels are included on all multiplex hardware to identify components

R.44.3.2.2. hardware series identification where all multiplex hardware displays the current hardware serial number and firmware revision employed by the module

R.44.3.2.3. software revision identification where all copies of the software in service displays the most recent revision number

R.44.3.2.4. a method of determining which version of the software is currently in use in the multiplex system

R.44.4. ELECTRONIC NOISE CONTROL

R.44.4.1. Electrical and electronic sub-systems 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.

R.44.4.2. Electrical and electronic sub-systems on the buses 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, A/C or D/C power lines and RFI/EMI emissions from other vehicles.

R.45. OPERATOR PROVISIONS, CONTROLS AND INSTRUMENTATION

R.45.1. OPERATOR'S AREA CONTROLS

R.45.1.1. General

- R.45.1.1.1. In general when designing the operator's area, it is recommended that SAE J833, "Human Physical Dimensions," be used.
- R.45.1.1.2. 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."
- R.45.1.1.3. Glare, The operator's work area shall be designed to minimize glare to the extent possible. Objects within and adjacent to this area shall be matte black or dark gray in color wherever possible to reduce the reflection of light onto the windshield. The use of polished metal and light-colored surfaces within and adjacent to the operator's area shall be avoided.

R.46. VISORS/SUN SHADES

R.46.1. FRONT AND SIDE SUN SHADE/VISOR

- R.46.1.1. An adjustable roller type sunscreen shall be provided over the operator's windshield and/or the operator's side window. The sunscreen shall be capable of being lowered to the midpoint of the operator's window. When deployed, the screen shall be secure, stable and shall not rattle, sway or intrude into the operator's field of view due to the motion of the bus or as a result of air movement. Once lowered, the screen shall remain in the lowered position until returned to the stowed position by the operator. Sunscreen shall be shaped to minimize light leakage between the visor and windshield pillars to the extent possible.
- R.46.1.2. Visors shall store out of the way and shall not obstruct airflow from the climate control system or interfere with other equipment, such as the radio handset or the destination control. Deployment of the visors shall not restrict vision of the rearview mirrors. Visor adjustments shall be made easily by hand with positive locking and releasing devices and shall not be subject to damage by over-tightening. Sun visor construction and materials shall be strong enough to resist breakage during adjustments.

R.46.2. OPERATOR'S CONTROLS

- R.46.2.1. 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.
- R.46.2.2. 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.
- R.46.2.3. 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.
- R.46.2.4. Fuel gauge on dash panel in view of operator.

R.46.3. NORMAL BUS OPERATION INSTRUMENTATION AND CONTROLS

- R.46.3.1. 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.
- R.46.3.2. 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.
- R.46.3.3. 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.

R.46.3.4. 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.

R.46.3.5. Consideration shall be provided for future additions of spare indicators as the capability of onboard diagnostic systems improves. Blank spaces shall contain LEDs.

R.47. Transit Bus Instruments and Alarms

Device	Description	Location	Function	Visual/ Audible
Master run switch	Rotary, fourposition 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	
Device	Description	Location	Function	Visual/ Audible
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

HVAC	Switch or switches to control HVAC	Upper Sawthooth	Permits selection of passenger ventilation: off, cool, heat, low fan, high fan or full auto with on/off only	
Operator's ventilation	Rotary, threeposition detent	Side console or Dash left wing	Permits supplemental ventilation: fan off, low or high	
Defroster fan	Rotary, threeposition 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 ¹ switch	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 ¹ switch	Front door remote or Dash right wing	Permits ramp and kneel activation from front door area, ¹ key required	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	Right Side of Steering Wheel	Permits kneeling activation and raise and normal at front door remote location	Amber or red dash indicator. Ext alarm and Amber light
Device	Description	Location	Function	Visual/Audible
Driver's Seat Alarm	Pressure switch	Seat Wiring	Activate an audible alarm If the door is open the bus in gear and or park brake not set.	Red Light Blinking
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 operator to override activation of rear door passenger tape switches	
Engine shutdown override	Momentary switch with operation protection	Side console	Permits operator 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 operator to override and manually discharge fire suppression system	Red light
Mobile data terminal	Mobile data terminal bus operator interface panel	Above right dash wing	Facilitates operator interaction with communication system and master log-on	LCD display with visual status and text messages
Device	Description	Location	Function	Visual/Audible
Destination sign interface	Destination sign interface panel	In approved location	Facilitates operator 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 operator to manually activate public address microphone	
Low profile microphone	Low-profile discrete Mounting	Steering column	Permits operator to make announcements with both hands on the wheel and focusing on road conditions	
High beam	Detented push button	In approved location	Permits operator to toggle between low and high beam	Blue light

Parking brake	Pneumatic PPV	Side console or Dash left wing	Permits operator to apply and release parking brake	Red light
Park brake release	Pneumatic PPV	Vertical side of the side console or dash center	Permits operator 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 operator override to disable door and brake/throttle interlock	Red light
Warning interlocks deactivated	Red indicator light	Dash panel center	Illuminates to warn drive that interlocks have been deactivated.	Red light
Retarder disable	Multi-pole switch detented	Within reach of Operator or approved location	Permits operator override to disable brake retardation/regeneration	Red light
Alarm acknowledge	Push button momentary	Approved location	Permits operator to acknowledge alarm condition	
Rear door passenger sensor disable	Multi-pole toggle, detented	In sign compartment or Operator's barrier compartment	Permits operator to override rear door passenger sensing system	
Device	Description	Location	Function	Visual/ Audible
Indicator / alarm test button	Momentary switch or programming ¹	Dash center panel	Permits operator to activate test of sentry, indicators and audible alarms	All visuals and audibles
Auxiliary power	110-volt 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
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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	Bus operator display	Property specific or dash center	Indication of fire detection activation by zone/location	Buzzer and red light
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 operator'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 operator's sight	Detects hot engine condition and initiates time delay shutdown	Red light
Device	Description	Location	Function	Visual/Audible
Low engine oil pressure indicator	Engine oil pressure indicator may be supplied as audible alert and visual and/or text message	Within operator'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 timedelayed 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	
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

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

R.47.1. OPERATOR FOOT CONTROLS

R.47.1.1. Accelerator and brake pedals shall be designed for ankle motion. Foot surfaces of the pedals shall be faced with wear-resistant, nonskid, replaceable material.

R.47.2. PEDAL ANGLE

R.47.2.1. 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 degrees at the point of initiation of contact and extend downward to an angle of 10 to 18 degrees at full throttle.

R.47.2.2. 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.

R.47.3. PEDAL DIMENSIONS AND POSITION

R.47.3.1. The floor-mounted accelerator pedal shall be 10 to 12 inches long and 3 to 4 inches wide. Clearance around the pedal must allow for no interference precluding operation.

R.48. OPERATOR FOOT SWITCHES

R.48.1. FLOOR-MOUNTED FOOT CONTROL PLATFORM

R.48.1.1. The angle of the turn signal platform shall be determined from a horizontal plane, regardless of the slope of the cab floor. The turn signal platform shall be angled at a minimum of 10 degrees and a maximum of 37 degrees. It shall be located no closer to the seat front than the heel point of the accelerator pedal.

R.48.2. TURN SIGNAL CONTROLS

R.48.2.1. Turn signal controls shall be floor-mounted, foot-controlled, water-resistant, heavy-duty, momentary contact switches.

R.48.3. Foot Switch Control

R.48.3.1. The control switches for the turn signals shall be mounted on an inclined, floor-mounted stainless steel enclosure or metal plate mounted to an incline integrated into the operator's platform, 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. The inclined mounting surface shall be skid-resistant. All other signals, including high beam and public address system shall be in approved location.

R.48.3.2. The foot switches shall be UL-listed, heavy-duty type, of a rugged, corrosion-resistant metal construction. The foot switches for the directionals shall be momentary type, while those for the PA system and the high beam shall be latching type. The spacing of the switches shall be such that inadvertent simultaneous deflection of switches is prevented.

R.49. OPERATOR'S AMENITIES

R.49.1. COAT HOOK

R.49.1.1. A hook and tie-back loop shall be provided to secure the operator's coat. It shall be mounted above and to the left rear of the operator's head level behind the operator's seat.

R.50. WINDSHIELD WIPERS AND WASHERS

R.50.1. WINDSHIELD WIPERS

R.50.1.1. 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. Electric wipers will be used.

R.50.2. INTERMITTENT WIPER WITH VARIABLE CONTROL

R.50.2.1. A variable-speed feature shall be provided to allow adjustment of wiper speed for each side of the windshield between approximately five (5) and twenty-five (25) cycles per minute.

R.50.3. NON-SYNCHRONIZED WIPERS

R.50.3.1. For non-synchronized wipers, separate controls for each side shall be supplied.

R.50.4. WINDSHIELD WASHERS

R.50.4.1. The windshield washer system, when used with the wipers, shall deposit washing fluid evenly and completely wet the entire wiped area.

R.50.4.2. The windshield washer system shall have a minimum 3-gallon reservoir, located for easy refilling from outside of the bus. Reservoir pumps, lines and fittings shall be corrosion-resistant and must include a means to determine fluid level.

R.51. OPERATOR'S SEAT

R.51.1. DIMENSIONS

R.51.1.1. The Operator'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.

R.51.1.2. The seat like a Recaro Ergo Metro with a two point seat belt

R.51.1.3. An operator's seat alarm will be installed to indicate if the vehicle is in gear and or the park brake not set an audible alarm will sound.

R.51.1.4. OPERATOR'S SEAT

R.51.1.4.1. Head rest

R.51.1.4.2. Seat back

R.51.1.4.3. Arm rest

R.51.1.4.4. Seat belt

R.51.1.4.5. Seat base

R.51.1.4.6. Seat back lumbar support seat

R.51.2. SEAT PAN CUSHION LENGTH

R.51.2.1. 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 inches at its minimum length and no more than 20.5 inches at its maximum length.

R.51.3. SEAT PAN CUSHION HEIGHT DIMENSIONS

R.51.3.1. Measurement shall be from the cab floor to the top of the level seat at its center midpoint. The seat shall adjust in height from a minimum of 14 inches, with a minimum 6 inches vertical range of adjustment.

R.51.4. SEAT PAN CUSHION SLOPE

R.51.4.1. Measurement is the slope of the plane created by connecting the two high points of the seat, one at the rear of the seat at its intersection with the seat back and the other at the front of the seat just before it waterfalls downward at the edge. The slope can be measured using an inclinometer and shall be stated in degrees of incline relative to the horizontal plane (0 degrees). The seat pan shall adjust in its slope from no less than plus 12 degrees (rearward "bucket seat" incline), to no less than minus 5 degrees (forward slope).

R.51.5. SEAT BASE FORE/AFT ADJUSTMENT

R.51.5.1. Measurement is the horizontal distance from the heel point to the front edge of the seat. The minimum and maximum distances shall be measured from the front edge of the seat when it is adjusted to its minimum seat pan depth (approximately 15 inches). On all low-floor buses, the seat-base shall travel horizontally a minimum of 9 inches. It shall adjust no closer to the heel point than 6 inches.

R.51.6. SEAT PAN CUSHION WIDTH

R.51.6.1. Measurement is the horizontal distance across the seat cushion. The seat pan cushion shall be 17 to 21 inches across at the front edge of the seat cushion and 20 to 23 inches across at the side bolsters.

R.51.7. SEAT SUSPENSION

R.51.7.1. The operator'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. **R.51.7.2.** Rubber snubbers shall be provided to prevent metal-to-metal contact.

R.51.8. SEAT BACK WIDTH

R.51.8.1. 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 inches. Seat back will include dual recliner gears on both sides of the seat.

R.51.9. SEAT BACK LUMBAR SUPPORT

R.51.9.1. 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 inches.

R.51.10. SEAT BACK ANGLE ADJUSTMENT

R.51.10.1. The seat back angle shall be measured relative to a level seat pan, where 90 degrees is the upright position and 90 degrees-plus represents the amount of recline.

R.51.10.2. The seat back shall adjust in angle from a minimum of no more than 90 degrees (upright) to at least 105 degrees (reclined), with infinite adjustment in between.

R.51.11. SEAT BELT

R.51.11.1. The belt assembly should be an auto-locking retractor (ALR) lap seat belt only. All seat belts should be stored in automatic retractors. The belts shall be mounted to the seat frame so that the operator may adjust the seat without resetting the seat belt.

R.51.11.2. The seat and seat belt assemblies as installed in the bus shall withstand static horizontal forces as required in FMVSS 207 and 210. Seatbelt webbing shall be black in color.

R.51.12. SEAT CONTROL LOCATIONS

R.51.12.1. While seated, the operator shall be able to make seat adjustments by hand without complexity, excessive effort or being pinched. Adjustment mechanisms shall hold the adjustments and shall not be subject to inadvertent changes.

R.51.13. SEAT STRUCTURE AND MATERIALS

R.51.13.1. Cushions

R.51.13.1.1. Cushions shall be fully padded with at least 3 inches of materials in the seating areas at the bottom and back.

R.51.13.2. Cushion Materials

R.51.13.2.1. All materials used on the seat assembly, passenger and operator's seat shall meet the flammability requirements of the FMVSS #302. Proof of Compliance must be submitted with proposals.

R.51.14. PEDESTAL

R.51.14.1. Exposed portions of frame and hardware shall be stainless steel or chrome plated.

R.52. MIRRORS

R.52.1. EXTERIOR MIRRORS

R.52.1.1. Exterior mirrors like Lucerix (Metagal) 8" x 15" 2-piece flat and convex. Mirrors or B&R 10" x 11" 2-piece flat and convex, heated and remote w/ stainless steel and cast aluminum arms shall be remote controlled motorized with black powder coated stainless steel arms that return to original position when moved. Left mirror shall be mounted near the front or upper edge of the operator's window. Right mirror shall be viewed through the upper right corner of windshield and mounted so as to provide maximum practical clearance to the ground. Mirrors must fold out of way of automatic washer. Metal mirror parts to be chrome plated or stainless steel. Exterior mirrors must utilize a "quick disconnect" for electrical wiring or approved equal.

R.52.2. INTERIOR MIRRORS

R.52.2.1. Mirrors shall be provided for the operator to observe passengers throughout the bus without leaving the seat and without shoulder movement. The operator shall be able to observe passengers in the front/entrance and rear/exit areas, anywhere in the aisle, and in the rear seats.

R.52.2.2. A (min) 8½" x 16" rear view mirror shall be provided on the front sign header.

R.52.2.3. A 6" diameter adjustable convex mirror over and forward of the front door shall be provided. An adjustable convex mirror shall be provided over/above and to the rear of the rear exit door. (Convex mirrors described above are to be used in conjunction with each other.) The glass in this mirror shall be replaceable.

R.53. WINDOWS

R.53.1. WINDSHIELD

R.53.1.1. 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 ft. high no more than 2 ft. 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 90degree 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.

R.53.1.2. The 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.

R.53.2. GLAZING

R.53.2.1. The windshield glazing material shall have a 1/4 inch nominal thickness laminated safety glass conforming to the requirements of ANSI Z26.1 Test Grouping 1A and the Recommended Practices defined in SAE J673.

R.53.3. OPERATOR'S SIDE WINDOW

R.53.3.1. The operator's side window shall be the sliding type, requiring only the rear half of sash to latch upon closing, and shall open sufficiently to permit the seated operator to easily adjust the street-side outside rearview mirror. 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 tint.

R.53.3.2. The operator's view, perpendicular through operator's side window glazing, should extend a minimum of 33 inches (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 inches (560 mm) above the operator's floor to ensure visibility of an undermounted convex mirror.

R.53.3.3. Operator's window construction shall maximize ability for full opening of the window.

- R.53.3.4.** The operator's side window glazing material shall have a 1/4 inch nominal thickness laminated safety glass conforming with the requirements of ANSI Z26.1-1996 Test Grouping 2 and the Recommended Practices defined in SAE J673.
- R.53.3.5.** The design shall prevent sections from freezing closed in the winter. Light transmittance shall be 75 percent on the glass area below 53 inches from the operator platform floor. On the top fixed over bottom slider configuration, the top fixed area above 53 inches may have a maximum 5 percent light transmittance.

R.53.4. PASSENGER SIDE WINDOWS

- R.53.4.1.** The side windows shall be full sliders. With the exception of the upper portion of first right-hand and /or left hand window where the side destination sign shall be located, all other shall be tinted 7/32" 28% gray tinted safety glass and frame windows will have black (dark) polyester powder coat aluminum frames inside and out. Windows to be bonded/transom. Windows shall be flat panel, transit application with approved laminated safety glass (ANSI 25.1). Glazing in the sash shall be easily replaced without removing the sash from the bus. Side window sliders shall be equipped with metal latches. All windows shall be of glass shall be mounted in removable rubber retaining strips/seals.
- R.53.4.2.** A positive lock type emergency latch meeting the FMVSS-217 shall be furnished on each window frame. Each window shall have a permanent decal describing emergency window operation procedures.
- R.53.4.3.** Side windows shall be designed to prevent the entrance of air and water when windows are closed. The window seal rubber must be installed so that passengers cannot remove it and rubber shall be of such quality to resist adhering to other sash sill.

R.54. HEATING, VENTILATING AND AIR CONDITIONING

R.54.1. CAPACITY AND PERFORMANCE

- R.54.1.1.** The Heating, Ventilation and Air Conditioning (HVAC) climate control system shall be rear-mounted Thermo King T-14(616) Screw Compressor, Brushless Evaporator & Condenser Motors with R134a Freon capable of maintaining the interior of the bus at the temperature and humidity levels defined in the following paragraphs. Accessibility and serviceability of components preferably shall be provided without requiring maintenance personnel to climb up on the roof of the bus.

- R.54.1.2.** The following climatic factors shall be used as design guidelines and shall be considered as operational requirements.

R.54.1.2.1. Temperature and Solar Load

R.54.1.2.1.1. AMBIENT AIR TEMPERATURE, EXTERNAL EQUIPMENT

MINIMUM	-20°F
MAXIMUM	120°F

R.54.1.2.2. HUMIDITY

MINIMUM	5%
MAXIMUM	100%

R.54.1.2.3. PRECIPITATION

MAXIMUM RAINFALL RATE	6 IN/HOUR
MAXIMUM SNOWFALL RATE	5 IN/HOUR
MAXIMUM SNOW ACCUMULATION	18 IN

- R.54.1.3.** 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 maintain an average passenger compartment temperature within a range between 65° and 80°F, while controlling the relative humidity to a value of 50 percent or less. The system shall maintain these conditions while subjected to any outside ambient temperatures within a range of 10° to 95°F and at any ambient relative humidity levels between 5 and 50 percent. Reheat system water control valve to be pulsing type to provide even heat distribution.

- R.54.1.4.** When the bus is operated in outside ambient temperatures of 95° to 115°F, the interior temperature of the bus shall be permitted to rise one degree for each degree of exterior temperature in excess of 95°F. When bus is operated in outside ambient temperatures in the range of -10°F to +10°F, the interior temperature of the bus shall not fall below 55°F while bus is running on the Design Operating Profile.

- R.54.1.5.** System capacity testing, including pull down/warm-up, stabilization and profile, shall be conducted in

accordance to the APTA "Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System". Temperature measurements shall be made in accordance to this document with the following modifications:

- R.54.1.5.1. The temperatures measured from a height of 6 inches below the ceiling shall be within plus or minus 3°F of the average temperature at the top surface of the seat cushions.
- R.54.1.5.2. Temperatures measured more than 3 inches above the floor shall be within plus or minus 5°F of the average temperature at the top surface of the seat cushions. The interior temperatures, from front to rear of the bus, shall not vary more than plus or minus 3°F from the average.
- R.54.1.5.3. The recommended locations of temperature probes are only guidelines and may require slight modifications to address actual bus design. Care must be taken to avoid placement of sensing devices in immediate path of air duct outlet. In general, the locations are intended to accurately represent the interior passenger area.

R.54.1.6. 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 that may be activated by an operator-controlled device.

During the cool-down period the refrigerant pressure shall not exceed safe high-side pressures and the condenser discharge air temperature, measured 6 inches from the surface of the coil, shall be less than 45°F above the condenser inlet air temperature. 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 HFC R134a. The climate control blower motors and fan shall be designed such that their operation complies with the interior noise level requirements. There shall be manual shut off valves to isolate the drier, receiver, and compressor.

R.54.1.7. Air conditioning requirements for hybrid drive batteries, if necessary, shall not activate or degrade the efficiency of the passenger HVAC system.

R.54.1.8. As an option, the Thermo King TK 14 will be made available and priced separately.

R.54.1.9. As an option, the Thermo King X430 Compressor will be made available and priced separately.

R.54.2. CONTROLS AND TEMPERATURE UNIFORMITY

R.54.2.1. The HVAC system excluding the operator'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.

R.54.2.2. Hot engine coolant water shall be delivered to the HVAC system operator's defroster/heater and other heater cores by means of an auxiliary coolant pump, sized for the required flow, which is brushless and sealless having a minimum maintenance free service life for both the brushless motor and the pump of at least 40,000 hours at full power.

R.54.3. MANUAL MODE SELECTION OF CLIMATE CONTROL SYSTEM

R.54.3.1. After manual selection and/or activation of climate control system operation mode, all interior climate control system requirements for the selected mode shall be attained automatically to within plus or minus 2°F of specified temperature control set-point.

R.54.4. MANUALLY ADJUSTABLE TEMPERATURE CONTROL SET POINT

R.54.4.1. The climate control system shall have the provision to allow the operator to adjust the temperature control set-point at a minimum of between 68° and 72°F. From then on, all interior climate control system requirements shall be attained automatically, unless re-adjusted by operator.

R.54.4.2. 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 fans. The interior climate control system shall switch automatically to the ventilating mode if the refrigerant compressor or condenser fan fails.

R.54.4.3. Interior temperature distribution shall be uniform to the extent practicable to prevent hot and/or cold spots. After stabilization with doors closed, the temperatures between any two points in the passenger compartment in the same vertical plane, and 6 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 plus or minus 5°F from the front to the rear from the average temperature determined in accordance with APTA's "Recommended Instrumentation and Performance Testing for Transit Bus Air

Conditioning System.” Variations of greater than plus or minus 5°F will be allowed for limited, localized areas provided the majority of the measured temperatures fall within the specified requirement.

R.55. AIR FLOW

R.55.1. PASSENGER AREA

- R.55.1.1.** 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.
- R.55.1.2.** 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 120°F under any normal operating conditions.
- R.55.1.3.** The climate control blower motors and fan shall be designed such that their operation complies with the interior noise level requirements.

R.55.2. OPERATOR'S AREA

- R.55.2.1.** The bus interior climate control system shall deliver at least 100 cfm of air to the operator's area when operating in the ventilating and cooling modes. Adjustable nozzles shall permit variable distribution or shutdown of the airflow. Airflow in the heating mode shall be reduced proportionally to the reduction of airflow into the passenger area. The windshield defroster unit shall meet the requirements of SAE Recommended Practice J382, “Windshield Defrosting Systems Performance Requirements,” and shall have the capability of diverting heated air to the operator's feet and legs. The defroster or interior climate control system shall maintain visibility through the operator's side window.

R.55.3. CONTROLS FOR THE CLIMATE CONTROL SYSTEM (CCS)

- R.55.3.1.** The controls for the operator's compartment for heating, ventilation and cooling systems shall be integrated and shall meet the following requirements:
 - R.55.3.1.1.** The heat/defrost system fan shall be controlled by a separate switch 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 Agency, an “on-off” switch shall be located to the right of or near the main defroster switch.
 - R.55.3.1.2.** A manually operated control valve shall control the coolant flow through the heater core.
 - R.55.3.1.3.** If a cable-operated manual control valve is used, 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 concurrence of the Agency project manager.

R.55.4. OPERATOR'S COMPARTMENT REQUIREMENTS

- R.55.4.1.** The heating, ventilation and defroster system for the operator's area shall be controlled by the operator. The system shall meet the following requirements:
 - R.55.4.1.1.** 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 be able to draw air from the bus body interior and/or the exterior 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 the operator's area.
 - R.55.4.1.2.** The defroster supply outlets shall be located at the lower edge of the windshield. These outlets shall be durable and shall be free of sharp edges that can catch clothes during normal daily cleaning. The system shall be such that foreign objects such as coins or tickets cannot fall into the defroster air outlets. Adjustable ball vents or louvers shall be provided at the left of the operator's position to allow direction of air onto the side windows.
- R.55.4.2.** The bus interior climate control system shall deliver at least 100 cubic feet per minute of air to the operator's area when operating in the ventilation, heating, and cooling modes without use of the operator's booster fan. The climate control system blower motors will operate at the set speed during all operating modes. All return air ducts will be protected by guards constructed of a sturdy mesh which will resist damage.

R.55.4.3. Adjustable nozzles shall permit variable distribution or shut down of all air flow. The defroster and/or interior climate control system shall maintain visibility through the operator's side window. A booster fan with operator control shall be provided in the ductwork at the operator's area, forward of the operator's position, for increased air flow to the operator. The windshield defroster unit shall meet or exceed all requirements of SAE Recommended Practice J382, Windshield Defrosting Systems Performance Requirements, and shall have the capability of diverting heated air to the operator's feet and legs. **R.55.4.4.** An auxiliary drivers fan shall be provided and installed in a location for best use of the driver.

R.55.5. Air Filtration

R.55.5.1. Air shall be filtered before discharge into the passenger compartment. The filter shall meet the ANSI/ASHRAE 52.1 requirement for 5 percent or better atmospheric dust spot efficiency, 50 percent weight arrestance, and a minimum dust holding capacity of 120 g per 1000 cfm cell. Air filters shall be easily removable for service.

R.55.6. FILTERS

R.55.6.1. Hogs Hair filters shall be provided or approved equals.

R.55.7. ROOF VENTILATORS

R.55.7.1. One roof ventilator shall be provided in the roof of the bus, approximately over or just forward of the front axle of the bus.

R.55.7.2. The 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. inches and shall be capable of being positioned as a scoop with either the leading or trailing edge open no less than 4 inches, or with all four edges raised simultaneously to a height of no less than 3½ inches. An escape hatch shall be incorporated into the roof ventilator. Roof ventilator shall be sealed to prevent entry of water when closed.

R.56. EXTERIOR PANELS, FINISHES AND EXTERIOR LIGHTING

R.56.1. DESIGN

R.56.1.1. The bus shall have a clean, smooth, simple transit bus design, primarily derived from bus performance requirements and passenger service criteria. 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.

R.56.1.2. 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 on windows and mirrors.

R.56.2. MATERIALS

R.56.2.1. 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.

R.56.3. ROOF-MOUNTED EQUIPMENT

R.56.3.1. A non-skid, walkway shall be incorporated on the roof to provide access to equipment without climbing or over any equipment.

R.56.4. PEDESTRIAN SAFETY

R.56.4.1. Exterior protrusions along the side and front of the bus greater than 1/2 inch and within 80 inches of the ground shall have a radius no less than the amount of the protrusion. The exterior rearview mirrors, cameras and required lights and reflectors are exempt from the protrusion requirement. Advertising frames shall protrude no more than 7/8 inch from the body surface. Grilles, doors, bumpers and other features on the sides and rear of the bus shall be designed to minimize toeholds or handholds. **R.56.4.2.** Exterior protrusions shall not cause a line-of-sight blockage for the operator.

R.56.5. EASILY REPLACEABLE LOWER SIDE BODY PANELS

R.56.5.1. The lower section of the side body panels (low-floor buses) shall be made of aluminum can be quickly material and shall be easily and quickly replaceable.

R.56.6. RAIN GUTTERS

R.56.6.1. Rain gutters shall be provided to prevent water flowing from the roof onto the passenger doors and operator's side window. When the bus is decelerated, the gutters shall not drain onto the windshield, operator's side window or door boarding area. Cross-sections of the gutters shall be adequate for proper operation.

R.56.7. LICENSE PLATE PROVISIONS

R.56.7.1. Provisions shall be made to mount standard-size U.S. license plates per SAE J686 on the 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 rear license plate provision shall be illuminated per SAE J587.

R.56.8. FENDER SKIRTS

R.56.8.1. 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.

R.56.9. STANDARD SPLASH APRONS

R.56.9.1. Splash aprons, composed of 1/4 inch minimum composition or rubberized fabric, shall be installed behind and/or in front of wheels as needed to reduce road splash and protect under floor components. The splash aprons shall extend downward to within 6 inches 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. An approved method of grounding static electricity shall be provided on each bus such as a conductive nylon grounding strap.

R.57. SERVICE COMPARTMENTS AND ACCESS DOORS

R.57.1. ACCESS DOORS

R.57.1.1. 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 and transmission fluid. Access openings shall be sized for easy performance of tasks within the compartment, including tool operating space.

R.57.1.2. 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. All access doors shall be retained in the open position by props or counterbalancing with over-center or gas-filled springs with safety props and shall be easily operable by one person. Springs and hinges shall be corrosion resistant. 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.

R.57.1.3. If precluded by design, the manufacturer shall provide door design information specifying how the requirements are met.

R.57.2. ACCESS DOOR LATCH/LOCKS

R.57.2.1. The engine compartment, including the exhaust duct plenum, shall be completely sealed to prevent smoke or fumes from entering the bus interior. The engine bulkhead and exhaust duct plenum shall be insulated adequately to prevent discomfort to passengers due to heat, to minimize hazard in case of fire in the engine compartment, and to aid in controlling noise to meet required levels.

R.57.2.2. An engine air intake designed to minimize noise shall be provided. Insulation shall be provided as needed in the engine compartment area for sound suppression.

R.57.2.3. An adequate number of fire detectors shall be furnished in the engine compartment, as determined by the bus manufacturer. The detectors shall activate an alarm (visual as well as audible) at the operator's station.

R.57.2.4. Access panels to the left and right side of the engine compartment shall be provided with expanded metal inserts to provide heat dissipation in the engine compartment. Panels shall also be constructed so that maintenance personnel can easily reach all under the floor and engine compartment equipment requiring

access from outside the bus body. Access panels will be hinged to swing up and out of the way, and be secured with a 5/16 inch square latch.

R.57.2.5. Gas operated shocks with safety locks shall secure access doors in the open position during inspection and servicing. The engine compartment doors will be equipped with handles. Louvers shall be provided in the rear engine compartment door to optimize airflow. Access doors are not required in the engine door.

R.57.2.6. Forward edge hinges with positive action hold open springs shall be provided on the fuel connector and lay flat against the adjacent panel when fully opened. The battery access door shall have top edge hinges with gas operated shocks with safety devices when the battery is being serviced. A small access door shall be provided to the battery disconnect switch. Battery disconnect switch, fuel and air tank drain valve doors will be equipped with a well type securing latch.

R.58. BUMPERS

R.58.1. LOCATION

R.58.1.1. Bumpers shall provide impact protection for the front and rear of the bus with the top of the bumper being 27 inches, plus or minus 2 inches, above the ground. Bumper height shall be such that when one bus is parked behind another, a portion of the bumper faces will contact each other.

R.58.2. FRONT BUMPER

R.58.2.1. 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-degree angle to the longitudinal centerline of the bus.

R.58.2.2. 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 inches. Mounting provisions will be made for integrating bike rack if necessary.

R.58.2.3. As an option, a 2-position stainless steel and black powder coated bike rack will be made available and priced separately.

R.58.2.4. As an option a mounting bracket for a bicycle rack only shall be made available and priced separately.

R.58.3. REAR BUMPER

R.58.3.1. 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 preimpact 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 inch high, and at accelerations up to 2 mph/sec. The rear bumper shall protect the bus, when impacted anywhere along its width by the common carriage with contoured impact surface defined in Figure 2 of FMVSS 301 loaded to 4000 lbs., at 4 mph parallel to or up to a 30-degree angle to, the longitudinal centerline of the bus.

R.58.3.2. The rear bumper shall be shaped to preclude unauthorized riders standing on the bumper. The bumper shall not require service or maintenance or in normal operation during the service life of the bus. The bumper may increase the overall bus length specified by no more than 7 inches.

R.58.4. BUMPER MATERIAL

R.58.4.1. Bumper material shall be corrosion-resistant and withstand repeated impacts of the specified loads without sustaining damage. Visible surfaces shall be black. These bumper qualities shall be sustained throughout the service life of the bus.

R.59. FINISH AND COLOR

R.59.1. APPEARANCE

R.59.1.1. All exterior surfaces shall be smooth and free of wrinkles and dents. Exterior surfaces to be painted shall be properly prepared as required by the paint system Supplier prior to application of paint to assure a proper bond between the basic surface and successive coats of original paint for the service life of the bus. Drilled holes and cutouts in exterior surfaces shall be made prior to cleaning, priming and painting, where possible, to prevent corrosion. Body filler materials may be used for surface dressing, but not for repair of damaged or improperly fitted panels.

R.59.1.2. Paint shall be applied smoothly and evenly with the finished surface free of visible dirt and the following other imperfections:

R.59.1.2.1. blisters or bubbles appearing in the topcoat film

R.59.1.2.2. chips, scratches, or gouges of the surface finish

R.59.1.2.3. cracks in the paint film

R.59.1.2.4. craters where paint failed to cover due to surface contamination

R.59.1.2.5. overspray

R.59.1.2.6. peeling

R.59.1.2.7. runs or sags from excessive flow and failure to adhere uniformly to the surface

R.59.1.2.8. chemical stains and water spots

R.59.1.2.9. dry patch due to incorrect mixing of paint activators

R.59.1.2.10. buffing swirls

R.59.1.3. 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.

R.59.1.4. Proper adhesion between the basic surface and successive coats of the original paint shall be measured using an Elcometer adhesion tester as outlined in ASTM D4541-85. Adhesion shall be a minimum 300 ft.-lb. The bus manufacturer shall supply test samples of the exterior surface for each step of the painting process that may be subject to adhesion testing per ASTM G4541-87 and ASTM D414585. ASTM D4541-93 may be used for inspection testing during assembly of the vehicle.

R.59.1.5. Bus exteriors shall be painted and numbered to include numbers on the roof to the general design to be provided with each order. Minor variations to this color scheme may be required in order to accommodate the specific styling of the Contractor's buses.

R.59.1.6. Within 30 days of execution of contract, the Contractor shall supply to Procuring Agency the detailed drawings of the front, rear, both sides, and roof of the bus that will be supplied. Within 60 days of execution of the contract, the Procuring Agency will return these drawings to the Contractor with details of the color schemes included.

R.59.1.7. The bus exterior shall be primed as recommended by the manufacturer of the final finish, and shall be finished with the color scheme specified in the order. Proposers should provide listings of available colors. Current color schemes used by the various Procuring Agencies are publicly available.

R.59.1.8. There shall be no bare or exposed metal surfaces showing on the exterior of the bus, exclusive of ornamentation and accessories. The display of manufacturer's name or insignia on the exterior of the bus will be as specified in the individual order.

R.59.2. DECALS, NUMBERING AND SIGNING

R.59.2.1. Monograms, numbers 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. They may be painted signs, decals or pressure-sensitive appliques. All decals shall be installed per the decal Supplier recommendations. Signs shall be provided in compliance with the ADA requirements defined in 49 C.F.R. Part, Subpart B, 38.27.

R.59.2.2. Buses shall have fleet numbers applied both on the interior and exterior of the bus in sequence with factory serial numbers. Each individual order will include the correct starting number and the location, size and color of numbers.

R.59.3. PASSENGER INFORMATION

R.59.3.1. ADA priority seating signs as required and defined by 49 C.F.R., Part 38.27 shall be provided to identify the seats designated for passengers with disabilities.

R.59.3.2. Requirements for a public information system in accordance with 49 C.F.R., Part 38.35 shall be provided.

R.59.3.3. Interior decals such as but not limited to the following, "No Smoking", "Exit" door, "Emergency Exit", "Watch Your Step", Wheelchair instructions and "Reserved for Wheelchairs," etc. shall be provided. All decals shall be in English and Spanish. Optional Tri-Lingual decals will be made available, with the three languages being verified at the pre-production meeting. Decals containing identification of windows, hatches, etc., shall also be provided. All decals shall conform to Oklahoma state law.

R.59.4. EXTERIOR LIGHTING

R.59.4.1. Exterior lighting and reflectors shall comply, as applicable, with Part 393, Subpart B of the FMCSA and FMVSS 108.

R.59.4.2. All exterior lights shall be designed to prevent entry and accumulation of moisture or dust. Commercially available LED-type lamps shall be utilized at all exterior lamp locations except headlights. 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. 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.

R.59.4.3. Exterior lighting shall comply with all applicable State and Federal regulations. Replacement lamps shall be readily available from commercial sources; they shall not be a bus manufacturer unique item. Those applications which will not accommodate an LED lamp shall have a replaceable bulb with access to the bulb by removing the lens from outside the bus.

R.59.4.4. LED headlights are required with high and low beams controlled from a sealed, moisture-protected foot switch located on the floor in the operator's station. The sealed beam units shall be of the latest heavyduty type and be ruggedly mounted to maintain adjustment under transit operating conditions. Headlights shall be wired to operate on reduced voltage in the run position.

R.59.4.5. All other lights shall be LED as allowed by applicable State Laws. The stop lights and tail light shall be 4" diameter. Rear turn indicator lights shall be separate from the stop-tail lights.

R.59.4.6. The LED marker lights at the front and rear upper corners of the bus shall be of flush mounted type to preclude breakage by tree limbs, bus washers, etc.

R.59.4.7. Each doorway shall have an outside LED light(s) which, when the door is open, provides at least one foot candle of illumination of the street surface for a distance of three feet perpendicular to the bottom step tread outer edge. Light (s) shall be located below window level and shielded to protect the eyes of entering and exiting passengers.

R.59.5. BACKUP LIGHT/ALARM

R.59.5.1. 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.

R.59.6. DOORWAY LIGHTING

R.59.6.1. Lamps at the front and rear passenger doorways shall comply with ADA requirements and shall activate only when the doors open. These lamps shall illuminate the street surface to a level of no less than 1 foot-candle for a distance of 3 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.

R.59.7. SERVICE AREA LIGHTING (INTERIOR AND EXTERIOR)

R.59.7.1. 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.

R.59.7.2. Additional 7" amber alternating Hazard flashers - Required, located @ upper corners of HVAC door.

R.60. INTERIOR PANELS AND FINISHES

R.60.1. GENERAL REQUIREMENTS

R.60.1.1. Materials shall be selected on the basis of maintenance, durability, appearance, safety, flammability and tactile qualities. Materials shall be strong enough to resist everyday abuse and be vandalism and corrosion resistant. Trim and attachment details shall be kept simple and unobtrusive. Interior trim shall be secured to avoid resonant vibrations under normal operational conditions.

R.60.1.2. Interior surfaces more than 10 inches below the lower edge of the side windows or windshield shall be shaped so that objects placed on them fall to the floor when the bus is parked on a level surface. Any components and other electrical components within close proximity to these surfaces shall also be resistant to this cleaning method.

R.60.1.3. Vendor shall provide a list of available colors at their quoted price and may also include a list of colors available at additional cost.

R.60.2. INTERIOR PANELS

R.60.2.1. 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.

R.60.3. OPERATOR AREA BARRIER

R.60.3.1. A barrier or bulkhead between the operator 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. 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 passenger from reaching the operator by standing behind the operator's seat. The lower area between the seat and panel must be accessible to the operator. The partition must be strong enough in conjunction with entire partition assembly for mounting of such equipment as flare kits, fire extinguishers (1.2 kg), microcomputer, public address amplifier, etc. Dark or black panels are preferred behind the operator's head. The panel should be isolated for noise control and attached with rubber grommets.

R.60.4. MODESTY PANELS

R.60.4.1. 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.

R.60.4.2. Design and installation of modesty panels located in front of forward-facing seats shall include a handhold or grab handle along its top edge. These dividers shall be mounted on the sidewall and shall project toward the aisle no farther than passenger knee projection in longitudinal seats or the aisle side of the transverse seats. Modesty panels shall extend from at least the window opening of the side windows, and those forward of transverse seats shall extend downward to 1 and 1½ inches above the floor. Panels forward of longitudinal seats shall extend to below the level of the seat cushion. Dividers positioned at the doorways shall provide no less than a 2½ inches clearance between the modesty panel and a fully open, inward opening door, or the path of a deploying flip-out ramp to protect passengers from being pinched. Modesty panels installed at doorways shall be equipped with grab rails if passengers assist are not provided by other means.

R.60.4.3. The modesty panel and its mounting shall withstand a static force of 250 lbs. applied to a 4 × 4 inch area in the center of the panel without permanent visible deformation.

R.60.5. FRONT END

R.60.5.1. The entire front end of the bus shall be sealed to prevent debris accumulation behind the dash and to prevent the operator'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 operator'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 with a surface that reduces glare. Any mounted equipment must have provision to support the weight of equipment.

R.60.6. REAR BULKHEAD

R.60.6.1. 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.

R.60.6.2. 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 litter being thrown or drawn through the grille. If it is necessary to remove the panel to service components located on the rear bulkhead, the panel shall be hinged 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.

R.60.7. HEADLINING

R.60.7.1. 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.

R.60.8. FASTENING

R.60.8.1. 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 tamperresistant.

R.60.9. INSULATION

R.60.9.1. Any insulation material used between the inner and outer panels shall minimize the entry and/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.

R.60.9.2. 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 operator or passengers cannot feel drafts during normal operations with the passenger doors closed. Insulation shall meet the requirements of FMVSS 302.

R.60.10. FLOOR COVERING

R.60.10.1. The floor covering shall be RCA rubber floor material. 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 inch wide and shall extend across the bus aisle. This line and the edge of the steps shall be Yellow. The color and pattern shall be consistent throughout the floor covering.

R.60.10.2. 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.

R.60.10.3. 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.

R.60.10.4. The floor under the seats shall be covered with smooth surface flooring material. The floor covering shall closely fit the sidewall in a fully sealed butt joint or extend to the top of the cove.

R.61. INTERIOR LIGHTING

R.61.1. PASSENGER

R.61.1.1. The passenger interior lighting system shall be an I/O Controls LED lighting system. The interior lighting system shall provide a minimum 15 foot-candle illumination on a 1 square foot plane at an angle of 45 degree from horizontal, center 33 inches above the floor and 24 inches in front of the seat back at each seat position. Allowable average light level for the rear bench seats shall be 7 foot-candles. Floor surface in the aisles shall be a minimum of 10 foot-candles, vestibule area a minimum of 4 foot-candles with the front doors open and minimum of 2 foot-candles with the from doors closed. 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.

R.61.1.2. Step lighting for the intermediate platform between lower and upper floor levels shall be provided and shall illuminate in all engine run positions. The step lighting shall be low-profile to minimize tripping and snagging hazard for passengers and shall be shielded as necessary to protect passengers' eyes from glare.

R.61.1.3. 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 bus shall be equipped with interior advertising card tracks on each side of the interior passenger compartment, running the length of the bus, to hold 11 inches high ad cards. Photo sensor detects and adjusts light level automatically relative to ambient light for passenger comfort.

R.61.1.4. Lens material shall be clear polycarbonate. Lens shall be designed to effectively "mask" all individual LED's to make them invisible and there shall be no "hot spot" or "dark spot". Lens shall be sealed to inhibit incursion of dust and insects yet are easily removable for service. If threaded fasteners are used

they must be held captive in the lens. Access panels shall be provided to allow servicing of components located behind light panels.

R.61.1.5. Individual operator module shall be provided for each light fixture. Operator module shall have built-in self-protection of thermal shut-down and restart, PWM (Pulse Width Modulation) output to regulate light level, reverse polarity protect and rebuild able.

R.61.1.6. When the master switch is in the RUN or NITE/RUN mode, the first light module on each side of the bus shall slowly fades to darkness when the front door is in the closed position and light output shall gradually illuminate to reach maximum light level when the door is opened. Solid state LED lighting shall have unlimited on-off cycles.

R.61.1.7. The light system may be designed to form part of the entire air distribution duct.

R.61.1.8. Emergency backup system shall keep the light fixtures over the front and rear doors illuminated at minimum light output under a separated battery power for 10 to 15 minutes allowing passengers visibility and timely evacuation from the vehicle during emergency conditions.

R.61.2. OPERATOR AREA

R.61.2.1. The operator's area shall have a light to provide general illumination, and it shall illuminate the half of the steering wheel nearest the operator to a level of 5 to 10 foot-candles. This light shall be controlled by a toggle switch that is convenient to the operator. Light fixture shall be mounted in the ceiling above the farebox location. The fixture shall be capable of projecting a concentrated beam of light on the farebox. 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.

R.61.3. VESTIBULES/DOORS

R.61.3.1. 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. 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 the rear door is unlocked.

R.61.4. STEP LIGHTING

R.61.4.1. Step 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.

R.61.5. RAMP LIGHTING

R.61.5.1. Exterior and interior ramp lighting shall comply with C.F.R. Part 49, Sections 19.29 and 19.31.

R.61.6. Fare Collection

R.61.6.1. If selected, a farebox shall be installed in a space as far forward as practicable, and/or structural provisions shall be made for installation of a farebox (if not installed by manufacturer). Location of this fare collection device shall not restrict traffic in the vestibule and shall allow the operator to easily reach the coin levers and view the change platform. The farebox shall not restrict access to the operator's area and shall not restrict operation of operator controls. Farebox location shall permit accessibility to the vault for easy manual removal or attachment of suction devices. A 20 amp, 12-volt, DC, protected lead will be made available to power the farebox.

R.61.6.1.1. Farebox shall be of Diamond manufactured SV Model Rectangular Farebox with an additional vault, mounted using a heavy duty stanchion (or approved equal).

R.61.7. INTERIOR ACCESS PANELS AND DOORS

R.61.7.1. 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 or mechanical 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. Access doors shall be secured with hand screws or latches. All fasteners that retain access panels shall be captive in the cover.

R.61.8. FLOOR PANELS

R.61.8.1. 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 Agency 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.

R.61.8.2. The number of special fastener tools required for panel and access door fasteners shall be minimized.

R.61.9. SAFETY EQUIPMENT

R.61.9.1. 5 lb. Fire Extinguisher -Mounted behind driver's seat

R.61.9.2. Safety Triangle Kit -Mounted behind driver's seat

R.61.9.3. Medical Aid Kit

R.61.9.4. Blood borne Pathogens Kit

R.62. PASSENGER ACCOMMODATIONS

R.62.1. PASSENGER SEATING

R.62.1.1. Arrangements and Seat Style – Amseco 6468 passenger seats or approved equal) shall be arranged in the bus shall be such that seating capacity is maximized and shall accommodate as many forward facing seats as possible. Hip-to-knee room shall be a minimum of 26.50". Passenger seating shall be molded shell seats with vandal resistant fabric inserts. Installation shall be with cantilever mount and no closeout where possible.

R.62.1.2. Proposers shall indicate standard seating layout for each size bus.

R.62.1.3. Any exposed metal of the frame will be powder coated, color coordinated to match the seat inserts, or brushed aluminum, or brushed stainless steel.

R.62.1.4. NOTE: Proposers shall provide a proposed seating layout with their proposal.

R.62.1.5. The handholds shall be stainless steel.

R.62.1.6. The top area of the seat back shell will wrap around the upper portion of the seat back (below the grab rail) in a "bubble" to form a crash pad on the rear of each seat. The crash pad will be of continuous construction with the back.

R.62.1.7. Rear seat platform shall be hinged to gain access to engine compartment.

R.62.1.8. Proposers shall submit a certified test report as evidence of compliance with all testing activities, test diagrams, test equipment as well as test data related to loads, deflections and permanent deformation of the seat assembly as defined in the APTA Standard Bus Procurement Guidelines manual.

R.62.2. HIP-TO-KNEE ROOM

R.62.2.1. 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 vertical surface immediately in front, shall be a minimum of 26 inches. At all seating positions in paired transverse seats immediately behind other seating positions, hip-to-knee room shall be no less than 27 inches.

R.62.3. FOOT ROOM

R.62.3.1. Foot room, measured at the floor forward from a point vertically below the front of the seat cushion, shall be no less than 14 inches. Seats immediately behind the wheel housings and modesty panels may have foot room reduced.

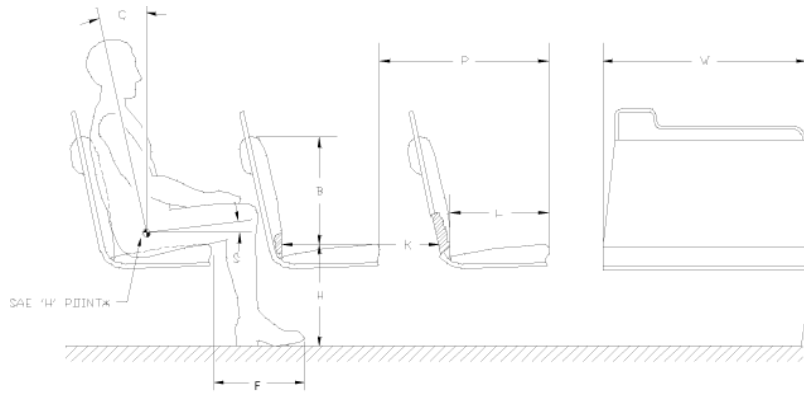
R.62.4. AISLES

R.62.4.1. The aisle between the seats shall be no less than 20 inches wide at seated passenger hip height. Seat backs shall be shaped to increase this dimension to no less than 24 inches at 32 inches above the floor (standing passenger hip height).

R.62.5. DIMENSIONS R.62.5.1.

FIGURE 7

R.62.5.1.1. Seating Dimensions and Standard Configuration



R.62.6. STRUCTURE AND DESIGN

- R.62.6.1.** 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.
- R.62.6.2.** Seats, structures and restraints around the securement area should not infringe into the mobility device envelope or maneuverability.
- R.62.6.3.** 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 inches of the aisle shall be at least 10 inches above the floor.
- R.62.6.4.** In locations at which cantilevered installation is precluded by design and/or structure, other seat mounting may be allowed.
- R.62.6.5.** 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 inches, measured at the aisle side of the seat frame at height H. The seat back should not deflect more than 14 inches, measured at the top of the seat back, in a controlled manner to minimize passenger injury. Structural failure of any part of the seat or sidewall shall not introduce a laceration hazard.
- R.62.6.6.** 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 1/4 inch 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 1/4 inch permanent deformation in the seat or its mountings. The seat backs at the aisle position and at the window position shall withstand repeated impacts of two 40-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-inch pendulum and shall strike the seat back 10,000 times each from distances of 6, 8, 10 and 12 inches. Seats at both seating positions shall withstand 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 inches. Seat cushions shall withstand 100,000 randomly positioned 3½ inch 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.
- R.62.6.7.** The back of each transverse seat shall incorporate a handhold no less than 7/8 inch in diameter for standees and seat access/egress. The handhold shall not be a safety hazard during severe decelerations. The handhold shall extend above the seat back near the aisle so that standees shall have a convenient vertical assist, no less than 4 inches long that may be grasped with the full hand. This handhold shall not cause a standee using this assist to interfere with a seated 50th-percentile male passenger. The handhold shall also be usable by a 5th-percentile female, as well as by larger passengers, to assist with seat access/egress for either transverse seating position. 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.
- R.62.6.8.** 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.

R.62.6.9. 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 operator'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 inches of the end of the seat cushion. Armrests shall be located from 7 to 9 inches above the seat cushion surface. The area between the armrest and the seat cushion shall be closed by a barrier or panel. The top and sides of the armrests shall have a minimum width of 1 inch and shall be free from sharp protrusions that form a safety hazard.

R.62.6.10. Seat back handhold and armrests shall withstand static horizontal and vertical forces of 250 lbs. applied anywhere along their length with less than 1/4 inch permanent deformation. Seat back handhold and armrests shall withstand 25,000 impacts in each direction of a horizontal force of 125 lbs. with less than 1/4 inch permanent deformation and without visible deterioration.

R.62.7. CONSTRUCTION AND MATERIALS

R.62.7.1. 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.

R.62.7.2. 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 1/4 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, allow the passenger to deform the seating materials in the impact areas. Complete seat assemblies shall be interchangeable to the extent practicable. Agency to select seat fabric.

R.62.8. PASSENGER ASSISTS

R.62.8.1. Passenger assists in the form of full grip, vertical stanchions or handholds shall be provided for the safety of standees and for ingress/egress. Passenger assists shall be convenient in location, shape, and size for both the 95th-percentile male and the 5th-percentile female standee. Starting from the entrance door and moving anywhere in the bus and out the exit door, a vertical assist shall be provided either as the vertical portion of seat back assist 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 stanchions shall be powder coated yellow steel finish.

R.62.9. ASSISTS

R.62.9.1. 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 1/4 inch. All passenger assists shall permit a full hand grip with no less than 1½ inches 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.

R.62.9.2. 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 12 inch lineal dimension in any direction normal to the assist without permanent visible deformation. All passenger assist components, including brackets, clamps, screw heads and other fasteners used on the passenger assists shall be designed to eliminate pinching, snagging and cutting hazards and shall be free from burrs or rough edges.

R.62.10. FRONT DOORWAY

R.62.10.1. Front doors, or the entry area, shall be fitted with ADA-compliant assists. Assists shall be as far outward as practicable, but shall be located no farther inboard than 6 inches from the outside edge of the entrance step and shall be easily grasped by a 5th-percentile female boarding from street level. Door assists shall be functionally continuous with the horizontal front passenger assist and the vertical assist and the assists on the wheel housing or on the front modesty panel.

R.62.11. VESTIBULE

R.62.11.1. The aisle side of the operator's barrier, the wheel housings, and when applicable the modesty panels shall be fitted with vertical passenger assists that are functionally continuous with the overhead assist and that extend to within 36 inches of the floor. These assists shall have sufficient clearance from the barrier to prevent inadvertent wedging of a passenger's arm.

R.62.11.2. 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 inches above the floor. The assists at the front of the bus shall be arranged to permit a 5th-percentile female passenger to easily reach from the door assist, to the front assist, to vertical assists on the operator's barrier, wheel housings or front modesty panel.

R.62.12. OVERHEAD

R.62.12.1. 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 inches above the floor.

R.62.12.2. There shall be fourteen (14) vinyl coated nylon grab straps (35' and 40' bus) and ten (10) on (30' bus) positioned throughout the bus interior mounted to the horizontal stanchions. A deduct will be made available for those agencies not desiring grab straps.

R.62.12.3. Overhead assists shall simultaneously support 150 lbs. on any 12-inch length. No more than 5 percent of the full grip feature shall be lost due to assist supports.

R.62.13. LONGITUDINAL SEAT ASSISTS

R.62.13.1. Longitudinal seats shall have vertical assists located between every other designated seating position, except for seats that fold/flip up to accommodate wheelchair securement. Assists shall extend from near the leading edge of the seat and shall be functionally continuous with the overhead assist. Assists shall be staggered across the aisle from each other where practicable and shall be no more than 52 inches apart or functionally continuous for a 5th percentile female passenger.

R.62.14. WHEEL HOUSING BARRIERS/ASSISTS

R.62.14.1. Unless passenger seating is provided on top of wheel housing, passenger assists shall be mounted around the exposed sides of the wheel housings which shall also be designed to prevent passengers from sitting on wheel housings. Such passenger assists shall also effectively retain items, such as bags and luggage, placed on top of wheel housing.

R.62.15. PASSENGER DOORS

R.62.15.1. The front door shall be a "slide glide" type inward opening, operator controlled, of corrosion-resistant construction. Minimum clear opening shall be 31.75" inches. The front door shall have a minimum height of 78 inches. The overhead clearance between the top of the door opening and the highest point of the ramp shall be a minimum of 68 inches. The step height shall not exceed 16.5 inches at either doorway without kneeling and shall not exceed 15.5 inches at the step. A maximum of two steps is allowed to accommodate a raised aisle floor in the rear of the bus.

R.62.15.2. Operation of, and power to, the front door shall be controlled by the operator. Door shall be opened completely in 1 to 3.5 seconds from the time of control actuation, and shall be subject to adjustment requirements of this specification. A control 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.

R.62.15.3. The rear or exit door shall be a two panel swing out type designed to provide a minimum clear opening of 34 inches panel to panel and a minimum height of 78 inches. Rear doors shall be operator opened and spring closed. The closing of the door shall begin after the control has been moved to the closed position, and after the door has been fully opened. Door opening and closing speeds shall be adjustable. The rear door shall be equipped with a sensitive edge which will open the door automatically if an object is trapped between the doors.

R.62.15.4. The doors shall have handrails (1.25 inches or equivalent surface area with a 1.50 inches knuckle clearance) mounted on the door panels and/or a modesty panel in the door well/step well. The clear opening dimension shall apply inside these handrails. Handrails whether on the door panel or in the body, shall be part of the systematic set of passenger assists.

R.62.15.5. To preclude movement of the bus, an accelerator interlock shall lock the accelerator in the closed position and a brake interlock shall engage the rear axle service brake system when the front and rear door control is activated and the vehicle is moving below 3 mph. When vehicle is moving above 3 mph the rear door shall remain locked. The braking effort shall be to the maximum capability of the rear axle brakes.

R.62.15.6. Locked doors shall require a force of more than 300 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.

R.62.16. EMERGENCY OPERATION

R.62.16.1. 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.

R.62.17. DOOR CONTROL

R.62.17.1. The door control shall be located in the operator's area within the hand reach envelope described in SAE Recommended Practice J287, "Operator Hand Control Reach." The operator's door control shall provide tactile feedback to indicate commanded door position and resist inadvertent door actuation.

R.63. DOOR CONTROLLER

R.63.1. TWO-POSITION OPERATOR'S DOOR CONTROLLER

R.63.1.1. The control device shall be protected from moisture. Mounting and location of the door control device handle shall be designed so that it is within comfortable, easy arm's reach of the seated operator. The door control device handle shall be free from interference by other equipment and have adequate clearance so as not to create a pinching hazard.

R.63.1.2. Position of the door control handle shall result in the following operation of the front door:

R.63.1.2.1. Center position: Front door closed, closed or set to lock.

R.63.1.2.2. First position forward: Front door open,

R.63.1.2.3. First position back: Front door open or set to open.

R.63.2. LOADING SYSTEMS

R.63.2.1. The bus shall be equipped with a front door Lift –U LU 18 ramp (or approved equal) mechanism that conforms to all requirements of the Americans with Disabilities Act (ADA). It is to be an all electrically operated system which will assume the normal entrance configuration when stowed. When stowed, the ramp should not exceed any of the normal bus undercarriage clearances. All ramp components and mechanisms shall be constructed of corrosion resistant materials and incorporate a design which affords maximum protection from the elements during normal bus operations. Ease of maintenance and servicing shall be a prime consideration in system design and construction.

R.63.2.2. The wheelchair ramp shall have a manual release, deploy, and stow mechanism. The components involved with manual operation shall be completely accessible. If ramp provides for a nylon strap, it must be located on the forward side of the ramp to preclude a trip hazard.

R.63.2.3. The ramp shall be controlled by toggle switches, master on-off, up-down and stow-deploy. The control switches shall be of the spring loaded to a safe position type so that constant manual pressure is required by the operator during ramp operation. All controls shall be clearly identified by function and present a reasonably foolproof and natural sequence of operation.

R.63.2.4. Visual and audible warning devices shall be located immediately to the rear of the front door. The audible warning device shall be activated only when the ramp is functioning. Interlocking and fast idle provisions shall be incorporated so the ramp cannot be extended unless the entrance door is in the full open position, the transmission in neutral, and the parking brake engaged. The entrance door cannot be closed unless the ramp is in the fully stowed position. The bus service brakes shall be automatically applied when the ramp is in any position other than the stowed and locked position. All ramp components mounted under the bus shall be protected from dirt, debris, and road splash through the use of appropriate enclosures, mud flaps, or sealed compartments, subject to approval by each Procuring Agency.

R.63.2.5. Weatherproof access panels/doors shall be provided to allow for servicing and troubleshooting both ramp and under-floor bus components. Lubing the ramp shall be accomplished without removing the belly pan. The electrical interfacing connections between the bus and the ramp shall be of the quick disconnect type to facilitate ramp removal and installation.

R.63.3. TWO FORWARD-FACING WHEELCHAIR SECUREMENT LOCATIONS

R.63.3.1. Two 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.

R.63.4. WHEELCHAIR SECURING SYSTEM

R.63.4.1. The wheelchair securement shall be the American Seating Company telescoping ARM with Q'Straint belts in the front and Q'Straint Belts and Retractors in the rear. At a minimum, all restraint systems must meet C.F.R. 49, FMVSS, FTA and ADA standards (or approved equal).

R.64. SIGNAGE AND COMMUNICATION

R.64.1. DESTINATION SIGNS

R.64.1.1. A Luminator all LED Amber automatic electronic destination sign system (or approved equal) shall be furnished and installed in each bus by the manufacturer. The destination sign system shall consist of:

R.64.1.1.1. One (1) Front sign 16 rows x 160 columns; display height minimum 7.9 inches, display width 63 inches, or a 24 rows x 200 columns sign

R.64.1.1.2. One (1) Side sign, on the curb side, 14 rows x 120 columns; display height minimum 4.2 inches, display width 42 inches.

R.64.1.1.3. One (1) Rear sign 16 row X 48 columns (Amber)

R.64.1.1.4. Operators Control Unit (OCU)

R.64.2. CABLES AND ACCESSORIES

R.64.2.1. The Front Sign shall be mounted on the front of the Bus, near the top edge of the body, behind windshield protection, and in an enclosed but accessible compartment. The Side Sign shall be located on the right side (curb side) of the bus near the front door, mounted near the top of an existing window. The Rear Sign (external) shall be mounted on the rear of the vehicle on an appropriate sized cutout.

R.64.2.2. The entire display area of all signs shall be readable in direct sunlight, at night, and in all lighting conditions between those two lighting extremes, with evenly distributed illumination appearance to the unaided eye.

R.64.2.3. The system shall be microprocessor-based; utilizing approved bi-directional serial communications, such as SAE J1708 or IBIS, EIA RS-485, between system components, and shall utilize error detection techniques within the communication protocol.

R.64.2.4. Independent Controller Boards shall be mounted in the front & side destination Sign. The system shall be capable of communicating with additional information devices, such as interior information Signs, Voice Annunciation devices, fare box, etc. The system shall provide for destination and/or Public Relations (P/R) message entry.

R.64.2.5. Flash memory integrated circuits shall be capable of storing and displaying up to 10,000 message lines. Message memory shall be changeable by the use of a PCMCIA Card of not less than one (1) megabyte memory capacity but sized according to the message listing noted herein.

R.64.2.6. The System shall have the ability to sequentially display multi-line destination messages, with the route number portion remaining in a constant "on" mode at all times, if so programmed. It shall also be capable of accepting manual entry of Route Alpha/Numeric information on any/all signs.

R.64.2.7. The various Signs shall be programmable to display independent messages or the same messages; up to two destination messages and one public relations message shall be pre-selectable. The operator shall be able to quickly change between the pre-selected messages without re-entering a message code. Public relations messages shall be capable of being displayed alternately with the regular text and route messages or displayed separately.

R.64.2.8. An emergency message shall be activated by a push button or toggle switch. The emergency message shall be displayed on signs facing outside the vehicle while signs inside the vehicle, including the OCU display, remain unchanged. The emergency message shall be canceled by entering a new destination code, or power cycling (after removal of the emergency signal).

R.64.2.9. The programming software shall provide means of adjusting the length of time messages are displayed in 0.1 second increments up to twenty-five seconds.

R.64.2.10. Power to the Sign system shall be controlled by the Master Bus Run Switch. The signs shall operate in all positions of this switch except off. The signs shall be internally protected against voltage transients and RFI interference to ensure proper operation in the local environment.

R.64.3. DISPLAY AND DISPLAY ILLUMINATION

R.64.3.1. All Sign displays shall consist of pixels utilizing High Intensity Light Emitting Diodes ("LED"), for superior outdoor environmental performance, (of Amber illumination appearance of light wavelength of 590 NM). LED should be made of AlInGaP II, superior UV resistant Epoxy lens and superior resistance to the effects of moisture. Each pixel shall have a dedicated LED for illumination of that pixel in all lighting conditions. The sign system shall have multi-level intensity changes, which adjust automatically as a function of

ambient lighting conditions. There shall be no requirement for any fan or any specialized cooling or air circulation.

R.64.3.2. This LED shall be mounted such as to be visible directly to the observer positioned in the viewing cone, allowing for full readability 65 degrees either side of the destination sign centerline. The LEDs shall be the only means of illumination of the sign system. The LED illumination source shall have an operating life M.T.B.F. of not less than 100,000 hours. Each LED shall not consume more than 0.02 Watts.

R.64.3.3. The characters formed by the System shall meet the requirements of the Americans with Disabilities Act (ADA) of 1990 Reference 49 C.F.R. Section 38.39.

R.64.4. SIGN ENCLOSURES

R.64.4.1. All Signs shall be enclosed in a manner such as to inhibit entry of dirt, dust, water and other contaminants during normal operation or cleaning. Access shall be provided to clean the inside of the bus window(s) associated with the Sign and to remove or replace the Sign components. Access panels and display boards shall be mounted for ease of maintenance/replacement. Any exterior Rear Sign enclosure used shall be made of Polycarbonate material containing fiberglass reinforcement. The vehicle manufacturer shall comply with the Sign manufacturer's recommended mounting, mounting configuration, and installation procedures to assure optimum visibility and service accessibility of the Sign System and System components.

R.64.5. ELECTRONIC SYSTEM REQUIREMENTS

R.64.5.1. All electronic circuit boards used in the Sign System shall be conformal coated to meet the requirements of military specification MIL-I-46058C. All Sign System components shall be certified to have been subjected to a "burn-in" test of a minimum of twelve (12) hours operation in a temperature of 150°F prior to final inspection.

R.64.6. OPERATOR CONTROL UNIT (OCU)

R.64.6.1. The OCU Unit shall be used to view and update display messages. It shall be recess mounted on the Bus vehicle front Sign compartment access cover or door. The OCU shall utilize a multi-key conductive rubber pad keyboard and be designed for transit operating conditions. Other mounting locations for the OCU shall be made available, with selection made at the pre-production meeting.

R.64.6.2. Only one switch is required to activate the 3 systems (radio, surveillance and sign.) Integration is required if the Twin Vision Sign and the Digital Recorders Talking Bus System are selected with a single OCU to control both systems.

R.64.6.3. The OCU Unit shall contain a display of at least two-lines of 20-character capability. The OCU Unit shall contain an audio annunciation that beeps indicating that a key is depressed. The OCU Unit shall continuously display the message associated with the selected destination readings (except the emergency message feature as noted above).

R.64.6.4. If the IBIS interface is required in the Destination Sign System, an auxiliary RS232 (DB9) port shall be made optionally available on the OCU under frame for inputs from any wireless technology that might be envisioned in the future. This auxiliary RS232 port shall operate at 9600 baud and accept commands from a wireless source (such as Spread Spectrum receivers) and will set destination sign addresses as if manually operated by the OCU operator.

R.64.6.5. If the J1708 interface is selected for the Destination Sign System, an auxiliary J1708 port shall be made available on the J1708 OCU so that auxiliary J1708 commands may be provided to the Destination Sign system from a wireless source that conforms to the J1708 command structure.

R.64.7. INTERCONNECTING CABLING

R.64.7.1. Data Communication Single twisted pair (two conductors) cable

R.64.7.2. Power Cabling - three conductor cable connecting to the switched and unswitched (battery) power and a return (battery)

R.64.7.3. OCU Unit cable single twisted pair cable between the OCU and front

R.65. WARRANTY REQUIREMENTS

R.65.1. The contractor warrants and guarantees to the original Agency submitting PO, each complete bus and specific subsystem and components for 100% parts and labor as follows:

R.65.1.1. OEM standard factory warranties for chassis and engine.

R.65.1.2. Add-on components shall have component manufacture's standard warranty.

R.65.1.3. Warranty shall begin on the date that the vehicle delivery is accepted by the agency issuing the purchase order.

R.66. GENERAL

R.66.1. All equipment cataloged as standard for the basic vehicle, unless superseded by these specifications, must be furnished and included in the purchase price of each vehicle. Complete printed specifications, published literature, and photos, or illustrations of the basic units that the bidder proposes to furnish with this bid must accompany each bid.

R.67. QUALITY OF MATERIALS

R.67.1. All materials and equipment used shall be built and/or attached in accordance with all applicable safety codes and design standards including but not limited to;

R.67.1.1. Society of Automotive Engineers (Electrical components and wiring, hydraulic components, fasteners)

R.67.1.2. American National Standards Institute (Chain drive and wire rope components)

R.67.1.3. American Welding Society (Welding code and recommended practices) **R.67.1.4.**

FMVSS

R.67.1.5. All parts shall be new.

R.67.1.6. All necessary servicing and adjustments shall be made on the equipment prior to delivery of the vehicle.

R.67.1.7. All exposed metal surfaces shall be painted or shall be corrosion-resistant.

R.68. PUBLICATIONS AND PRINTED MATERIALS

R.68.1. Each vehicle shall have a complete set of operation, quality assurance, and warranty publications. The information shall be organized in a three ring binder format with each sections clearly identified.

R.68.2. As built wiring diagram and as built parts manuals for body and all auxiliary equipment.

R.68.3. Maintenance and inspection schedule incorporating the required maintenance and inspection of the basic vehicle and its sub-systems.

R.68.4. Operator's manual: A complete operations manual and troubleshooting guide with a detailed manufacturer's parts list that covers the conversion features on the vehicle as listed in this specification. The manual will provide complete, comprehensive instructions for the wheelchair accessories, wheelchair list deployment, air conditioning system, tie downs, heater, deployment of seats, wiring diagram and related equipment. **R.68.5.** Warranty papers for chassis, body, and additional equipment.

R.68.6. Warranty Information: Each vehicle must have a published listing of contractor warranty repair locations, including address, telephone number, and contact names for the State of Oklahoma.

R.69. PRE-AWARD AUDIT

R.69.1. The vehicles are not considered delivered to the purchasing agency until the required FTA documents are completed by an ODOT staff member. A Pre-Award Audit shall be conducted to determine if the bid proposal specifications. The bidder shall submit documents, which include certification of the manufacturer's compliance with the Federal Transit Administration (FTA) Pre-Award Buy America Audit Requirements. The document submitted shall include the following information for each major component used on vehicle bid: **R.69.1.1.** Name and address of each supplier.

R.69.1.2. Cost of each major component and subcomponent. In order to protect proprietary information, the document may reflect the percentage of total cost each item represents instead of the actual cost. **R.69.1.3.**

Country of origin of each major component and subcomponent.

R.69.1.4. Name and address of company where final assembly occurs.

R.69.1.5. Cost of final assembly

R.69.1.6. Signature of authorized representative of vehicle manufacturer.

R.70. POST- DELIVERY AUDIT

R.70.1. A Post Delivery Audit of the vehicle(s) shall be conducted at the purchaser's facility, to determine that the completed vehicle(s) meets specifications. Once this process has been satisfactorily completed, the vehicle(s) shall be considered acceptable.

R.71. ACCESSIBILITY REQUIREMENTS

R.71.1. When submitting a bid for an accessible vehicle for the disabled, the vendor shall provide a list of the vehicle related equipment illustrating the component cost and related installation charges. The purpose of this list is to reflect an accurate cost for those vehicle related items, which are required to make the vehicle accessible to the disabled.

R.72. ACCEPTANCE OF VEHICLES

R.72.1. Upon delivery at the designed location specified within this document the final acceptance will occur after the vehicles have been inspected, road tested and all FTA required post audit delivery requirements have been met. **R.72.2.** All vehicles shall be insured by the bidder until the post audit delivery has been conducted at minimum.

R.72.3. Passenger Information and Advertising

R.72.4. INTERIOR DISPLAYS

R.72.4.1. Advertising media 11 inches high and 0.09 inch 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.

R.72.5. PASSENGER STOP REQUEST/EXIT SIGNAL

R.72.5.1. The ambulatory passenger signal shall be clear pull cords conveniently located so standing and seated passengers can easily reach it, this includes down the mullions. The pull cords shall be accessible from the exit door area. There shall be a lighted display sign which indicates "STOP REQUESTED" when the signal is activated. The signal chime shall operate once, and the sign shall light and remain lit with the chime disabled until the next stop when the front doors or rear doors have been opened, resetting the system.

R.72.5.2. There shall be a second passenger signal of a different tone that meets the ADA requirements mounted to the bottom of the flip seat for the mobility aid users to alert the operator when a mobility aid user wishes to disembark. One such system that meets these minimum requirements is the Tape Switch Corp. 3.5" x 7" yellow push pad. There shall be two lights on the operator's front dash that indicate when an ambulatory or non-ambulatory passenger wishes to disembark.

R.72.6. VIDEO SURVEILLANCE SYSTEM

R.72.6.1. The system will require pre-wiring for (6) six internal cameras, (1) external camera, and (1) one GPS antenna and wired to the secured electrical cabinet in support of an Apollo System. The GPS antenna shall be roof mounted. An event / status indicator switch shall be located on the right side of the operator's dash. The DVR will be installed by transit agency.

R.72.7. ELECTRONICS/EQUIPMENT COMPARTMENT

R.72.7.1. Each bus shall be equipped a fully sealed compartment located on the left front wheelhouse to provide a mounting location for radio equipment, video recording equipment, APC equipment and other electronic equipment. The compartment shall be lockable, completely water resistant and of steel construction. It shall be accessible from inside the bus, shall have 3 slide trays that automatically lock into place for easy maintenance of the equipment. The compartment shall be water resistant when the service door is secured. The compartment shall be supplied with power and ground circuit requirements.

R.72.7.2. A location convenient to the operator shall be provided for the radio control head, speaker and handset. The antenna mounting and lead termination shall be accessible from the bus interior. Conduit shall lead to the radio compartment and shall have a minimum bend radius adequate for easy pulling of coaxial cable. An access plate shall be provided in the ceiling. The compartment door shall have a lock. A sealing provision (gasket) shall be incorporated in the door of this compartment. The radio compartment finish shall be powder coated Black, standard black, or agency designated color.

R.72.8. VOICE ANNUNCIATION AND ITS

R.72.8.1. A Luminator automated voice announcement system shall be integrated into the ITS solution. Proposers will be required to contact Luminator for detailed requirements of procuring agencies architecture and pricing.

R.73. 2-WAY RADIO

R.73.1. Vehicle to be equipped with a 2-way radio for the agency submitting the PO. 2-way radio must be UHF, VHF, or 800 MHz and include radio antenna.

R.74. AM/FM/CD/AUX Radio

R.74.1. Vehicle Radio shall be provided and configured in a manner that does not transmit to the passenger compartment speakers, only the speakers in the driver's area shall be connected to this system.

R.75. BIKE RACK

R.75.1. Sportsworks DL2 SSTL or equivalent.

R.75.2. As an option, the TFT INFOtransit system will be made available and priced separately.

R.76. ACCEPTANCE OF VEHICLES

R.76.1. The Offeror shall submit for review by the agency a completely filled-in Vehicle Technical Information form to confirm his proposed vehicle and components are in compliance with the requirements. A separate form is to be completed for each length and/or fuel type of bus proposed. Brochures/Manufacture specification sheet will not be accepted for the following items.

R.76.2. BUS MANUFACTURER

BUS MANUFACTURER	
MODEL NUMBER	

R.76.3. MANUFACTURER

UNDERSTRUCTURE MANUFACTURER	
MODEL NUMBER	

R.76.4. DIMENSIONS

OVERALL VEHICLE LENGTH	
OVERALL VEHICLE LENGTH (OVER BUMPERS)	
OVERALL VEHICLE LENGTH (OVER BODY)	
OVERALL VEHICLE WIDTH	
OVERALL VEHICLE WIDTH (EXCLUDING MIRRORS)	
OVERALL VEHICLE WIDTH (INCLUDING MIRRORS)	
OVERALL VEHICLE HEIGHT	
OVERALL HEIGHT (MAXIMUM)	

R.76.5. ENGINE

MANUFACTURER	
TYPE	
MODEL NUMBER	
NET SAE HORSEPOWER	
NET SAE TORQUE	

R.76.6. TURBO CHARGER

MAKE	
MODEL	

R.76.7. TRANSMISSION

MANUFACTURER	
TYPE	
MODEL NUMBER	
SPEEDS	

R.76.8. VOLTAGE REGULATOR

MANUFACTURER	
MODEL	

R.76.1. VOLTAGE EQUALIZER

MANUFACTURER	
MODEL	

R.76.2. ALTERNATOR

MANUFACTURER	
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TYPE	
MODEL	

R.76.3. STARTER MOTOR

MANUFACTURER	
TYPE	
MODEL	

R.76.4. AIR COMPRESSOR

MANUFACTURER	
TYPE	

R.76.5. AXLE, FRONT

MANUFACTURER	
TYPE	
MODEL	

R.76.6. AXLE, REAR

MANUFACTURER	
TYPE	
MODEL	

R.76.7. SUSPENSION SYSTEM

MANUFACTURER	
TYPE: FRONT	
TYPE: REAR	
SPRINGS: FRONT	
SPRINGS: REAR	

R.76.8. WHEELS AND TIRES

R.76.8.1. Wheels

MAKE	
SIZE	
CAPACITY (LBS)	
MATERIAL	

R.76.8.2. Tires

MAKE	
SIZE	
CAPACITY (LBS)	
MATERIAL	

R.76.9. STEERING, POWER

R.76.9.1. Pump

MANUFACTURER	
MODEL NUMBER	
TYPE	
RELIEF PRESSURE (PSI)	

R.76.10. BOOSTER/GEAR BOX

MANUFACTURER	
TYPE	
MODEL	

R.76.11. STERRING WHEEL

MANUFACTURER	
DIAMETER	

R.76.12. BRAKES

MADKE OF FUNDATMENTAL BREAK SYSTM	
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R.76.13. COOLING SYSTEM

MANUFACTURER	
TYPE	
MODEL NUMBER	
TOTAL COOLING AND HEATING SYSTEM CAPACITY (GALS)	

R.76.14. AIR RESERVOIR CAPACITY

SUPPLY RESERVOIR (CUBIC INCHES)	
PRIMARY RESERVOIR (CUBIC INCHES)	

R.76.15. HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

HEATING SYSTEM CAPACITY (BTU)	
AIR CONDITIONING CAPACITY (BTU)	
VENTILATING CAPCITY (CFM)	

R.76.16. DOORS: R.76.16.1.

Front

MANUFACTURER OF OPERATING EQUIPMENT	
TYPE OF DOOR	
TYPE OF OPERATING EQUIPMENT	

R.76.16.2. Rear

MANUFACTURER OF OPERATING EQUIPMENT	
TYPE OF DOOR	
TYPE OF OPERATING EQUIPMENT	

R.76.17. PASSENGER WINDOWS

MANUFACTURER	
MODEL	
TYPE	

R.76.18. SEATS

MANUFACTURER	
MODEL	
TYPE	

R.76.19. PAINT

MANUFACTURER	
TYPE	

R.76.20. WHEELCHAIR RAMP EQUIPMENT

MANUFACTURER	
MODEL NUMBER	

TYPE	
CAPACITY (LBS)	
WIDTH OF PLATFORM (IN)	
LENGTH OF PLATFORM (IN)	

R.76.21. WHEELCHAIR SECUREMENT EQUIPMENT

MANUFACTURER	
MODEL NUMBER	

R.76.22. DESTINATION SIGNS

MANUFACTURER	
MODEL	
TYPE	

R.76.23. MULTIPLEX SYSTEM

MANUFACTURER	
MODEL NUMBER	

R.76.24. BATTERIES

MANUFACTURER	
MODEL	
TYPE	

R.76.25. PASSENGER INTERIOR LIGHTING

MANUFACTURER	
MODEL	

R.76.26. GPS

MANUFACTURER	
MODEL	

R.76.27. P.A. System

MANUFACTURER	MODEL NUMBER
AMPLIFIER	
MICROPHONE	
INTERNAL SPEAKERS	

R.76.28. BASE COST PER BUS

BASE VEHICLE	
30 FOOT TRANSIT BUS	
35 FOOT TRANSIT BUS	
40 FOOT TRANSIT BUS	

R.77. PROPOSAL EXCEPTIONS

Supplier must list any exceptions here to be used as a part of the proposal evaluation and analysis. Please list the roman numerical on the standard specs or the number for the options when listing any proposal exceptions.



**Oklahoma Department
of Transportation**

TRANSIT PROGRAMS DIVISION

**FTA'S
SPECIAL PROVISIONS
FOR THE PROCUREMENT OF CAPITAL EQUIPMENT
WITH AN ESTIMATED CUMULATIVE COST
IN EXCESS OF \$100,000**

STATEMENT OF FEDERAL PARTICIPATION

THIS PROCUREMENT IS DEPENDENT UPON THE AVAILABILITY OF FEDERAL FUNDS THROUGH THE FEDERAL TRANSIT ADMINISTRATION (FTA)

**PAGES 2 THRU 15 OF THIS DOCUMENT ARE TO BE COMPLETED BY
BIDDER/VENDOR**

**PAGES 18 THRU 24 OF THIS DOCUMENT ARE TO BE COMPLETED BY ODOT AT
TIME OF THE BID AWARD**

**PAGES 26 THRU 32 ARE TO BE COMPLETED BY THE PURCHASER AT THE
TIME OF VEHICLE DELIVERY**

**SPECIAL PROVISIONS FOR THE PROCUREMENT OF CAPITAL EQUIPMENT
USING FEDERAL FUNDS**

**THE FOLLOWING REQUIREMENTS AND CONDITIONS ARE INCLUDED AS AN
ESSENTIAL PART OF THE SPECIFICATIONS ATTACHED HERETO.**

SECTION I. FOR ALL BIDS:

**FMVSS CERTIFICATION - 49 CFR 571 Part D
(Circle all applicable standard #s)**

#	Title	#	Title
101	#*Controls and Displays	102	#*Transmission shift lever sequence, starter, interlock, transmission braking effect
103	#*Windshield defrost and defogging system	104	#*Windshield wiping and washing system.
105	#*Hydraulic brake system.	106	#*Brake hoses
107	#*Reflecting surfaces	108	#*Lamps, reflective devices, and assoc. equip.
109	#New pneumatic tires	110	#Tire selection and rims.
111	#*Rearview mirrors	112	#*Headlamps concealment devices.
113	#*Hood latch system	114	#Theft Protection (not for walk-in vans)
115	#*VIN -basic requirements.	116	#*Motor vehicle brake fluids.
117	#Re-treaded pneumatic tires (to be used on rear wheels only)	118	#Power-operated window, partition, roof panel system (GVWR < 10K)
119	*New pneumatic tires for vehicles other than passenger cars	120	*Tire selection & rims for vehicles other than passenger cars
121	*Air brake system	124	#*Accelerator control system.
129	#New non-pneumatic tires for passenger cars.	201	#@Occupant protection in interior impact
202	#@Head restraints	203	#@Impact protect, driver steering control system
204	#*Steering control rearward displace (not walk-in vans)	205	#*Glazing materials
206	#Doors, locks, and door retention components.	207	#*Seating system
208	#*Occupant crash protection	209	#*Seat belt assemblies.
210	#@Seat belt assembly anchorages.	211	#Wheels, nuts, wheel discs, and hub caps
212	#@Windshield mounting	213	#*Child restraint system.
214	#@Side impact protection (not walk-in vans)	217	*Bus emergency. exits / window retention & release
219	#@Windshield zone intrusion	220	*School Bus rollover protection
301	#@Fuel system integrity (+School Bus >10K GVWR)	302	#*Flammability of interior materials.

The undersigned **BIDDER/VENDOR** hereby certifies that all vehicles furnished meet the **FMVSS IAW 49 CFR 571.**

Name of Company	Date
Printed Name of Person Signing Form	Signature

*Bus

@Bus with GVWR below 10,000 lbs.

#Passenger Car

In submitting this bid, the undersigned **BIDDER/VENDOR** as noted in Section III - Certification to Purchaser, certifies and agrees to the following clauses, assurances and certifications.

The **BIDDER/VENDOR** agrees to include these requirements in subcontracts financed in whole or in part by Federal Transit Administration funding. The bidder/vendor must execute all certifications below.

A. No Federal Government Commitment or Liability to Third Parties

B.A.1. Except as the Federal Government expressly consents in writing, the Recipient agrees that:

B.A.1.1. The Federal Government does not and shall not have any commitment or liability related to the Underlying Agreement, to any Third Party Participant at any tier, or to any other person or entity that is not a party (FTA or the Recipient) to the Underlying Agreement, and

B.A.1.2. Notwithstanding that the Federal Government may have concurred in or approved any Solicitation or Third Party Agreement at any tier that may affect the Underlying Agreement, the Federal Government does not and shall not have any commitment or liability to any Third Party Participant or other entity or person that is not a party (FTA or the Recipient) to the Underlying Agreement.

B. False or Fraudulent Statements or Claims.

B.B.1. Civil Fraud. The Recipient acknowledges and agrees that:

B.B.1.1. Federal laws, regulations, and requirements apply to itself and its Underlying Agreement, including the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § 3801 et seq., and U.S. DOT regulations, "Program Fraud Civil Remedies," 49 C.F.R. part 31.

B.B.1.2. By executing the Underlying Agreement, the Recipient certifies and affirms to the Federal Government the truthfulness and accuracy of any claim, statement, submission, certification, assurance, affirmation, or representation that the Recipient provides to the Federal Government.

B.B.1.3. The Federal Government may impose the penalties of the Program Fraud Civil Remedies Act of 1986, as amended, and other applicable penalties if the Recipient presents, submits, or makes available any false, fictitious, or fraudulent information.

B.B.2. Criminal Fraud. The Recipient acknowledges that 49 U.S.C. § 5323(l)(1) authorizes the Federal Government to impose the penalties under 18 U.S.C. § 1001 if the Recipient provides a false, fictitious, or fraudulent claim, statement, submission, certification assurance, or representation in connection with a federal public transportation program under 49 U.S.C. chapter 53 or any other applicable federal law.

C. Access to Recipient and Third Party Participant Records.

B.C.1. The Recipient agrees and assures that each Subrecipient, if any, will agree to:

B.C.1.1. Provide, and require its Third Party Participants at each tier to provide, sufficient access to inspect and audit records and information related to its Award, the accompanying Underlying Agreement, and any Amendments thereto to the U.S. Secretary of Transportation or the Secretary's duly authorized representatives, to the Comptroller General of the United States, and the Comptroller General's duly authorized representatives, and to the Recipient and each of its Subrecipients,

B.C.1.2. Permit those individuals listed above to inspect all work and materials related to its Award, and to audit any information related to its Award under the control of the Recipient or Third Party Participant within books, records, accounts, or other locations, and

B.C.1.3. Otherwise comply with 49 U.S.C. § 5325(g), and federal access to records requirements as set forth in the applicable U.S. DOT Common Rules.

D. FEDERAL CHANGES

B.D.1. The Recipient shall at all times comply with all applicable Federal regulations, policies, procedures and directives, including without limitation those listed directly or by reference in the Master Agreement as amended or promulgated from time to time during the term of this contract.

E. Civil Rights Requirements

B.E.1. The Recipient agrees that it must comply with applicable federal civil rights laws, regulations, and requirements, and follow applicable federal guidance, except as the Federal Government determines otherwise in writing. Therefore, unless a Recipient or a federal program, including the Tribal Transit Program or the Indian Tribe Recipient, is specifically exempted from a civil rights statute, FTA requires compliance with that civil rights statute, including compliance with equity in service.

- B.E.2.** Nondiscrimination in Federal Public Transportation Programs. The Recipient agrees to, and assures that it and each Third Party Participant, will:
- B.E.2.1.** Prohibit discrimination on the basis of race, color, religion, national origin, sex (including gender identity), disability, or age.
- B.E.3.** Prohibit the:
- B.E.3.1.** Exclusion from participation in employment or a business opportunity for reasons identified in 49 U.S.C. § 5332,
- B.E.3.2.** Denial of program benefits in employment or a business opportunity identified in 49 U.S.C. § 5332, or
- B.E.3.3.** Discrimination identified in 49 U.S.C. § 5332, including discrimination in employment or a business opportunity identified in.
- B.E.4.** Follow:
- B.E.4.1.** The most recent edition of FTA Circular 4702.1, "Title VI Requirements and Guidelines for Federal Transit Administration Recipients," to the extent consistent with applicable federal laws, regulations, requirements, and guidance, and other applicable federal guidance that may be issued, but
- B.E.4.2.** FTA does not require an Indian Tribe to comply with FTA program-specific guidelines for Title VI when administering its Underlying Agreement supported with federal assistance under the Tribal Transit Program.
- B.E.5.** Nondiscrimination – Title VI of the Civil Rights Act. The Recipient agrees to, and assures that each Third Party Participant, will:
- B.E.5.1.** Prohibit discrimination on the basis of race, color, or national origin,
- B.E.6.** Comply with:
- B.E.6.1.** Title VI of the Civil Rights Act of 1964, as amended, 42 U.S.C. § 2000d et seq.,
- B.E.6.2.** U.S. DOT regulations, "Nondiscrimination in Federally-Assisted Programs of the Department of Transportation – Effectuation of Title VI of the Civil Rights Act of 1964," 49 C.F.R. part 21, and
- B.E.6.3.** Federal transit law, specifically 49 U.S.C. § 5332, and
- B.E.7.** Follow:
- B.E.7.1.** The most recent edition of FTA Circular 4702.1, "Title VI Requirements and Guidelines for Federal Transit Administration Recipients," to the extent consistent with applicable federal laws, regulations, requirements, and guidance,
- B.E.7.2.** U.S. DOJ, "Guidelines for the enforcement of Title VI, Civil Rights Act of 1964," 28 C.F.R. § 50.3, and
- B.E.7.3.** All other applicable federal guidance that may be issued.
- B.E.8.** Equal Employment Opportunity.
- B.E.8.1.** Federal Requirements and Guidance. The Recipient agrees to, and assures that each Third Party Participant will, prohibit, discrimination on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin, and:
- B.E.8.2.** Comply with Title VII of the Civil Rights Act of 1964, as amended, 42 U.S.C. § 2000e et seq.,
- B.E.8.3.** Facilitate compliance with Executive Order No. 11246, "Equal Employment Opportunity" September 24, 1965, 42 U.S.C. § 2000e note, as amended by any later Executive Order that amends or supersedes it in part and is applicable to federal assistance programs,
- B.E.8.4.** Comply with federal transit law, specifically 49 U.S.C. § 5332, as provided in section 12 of this Master Agreement,
- B.E.8.5.** FTA Circular 4704.1 "Equal Employment Opportunity (EEO) Requirements and Guidelines for Federal Transit Administration Recipients," and
- B.E.8.6.** Follow other federal guidance pertaining to EEO laws, regulations, and requirements, and prohibitions against discrimination on the basis of disability,
- B.E.8.7.** Specifics. The Recipient agrees to, and assures that each Third Party Participant will:
- B.E.8.8.** Prohibited Discrimination. Ensure that applicants for employment are employed and employees are treated during employment without discrimination on the basis of their race, color, religion, national origin, disability, age, sexual orientation, gender identity, or status as a parent, as provided in Executive Order No. 11246 and by any later Executive Order that amends or supersedes it, and as specified by U.S. Department of Labor regulations,
- B.E.8.9.** Affirmative Action. Take affirmative action that includes, but is not limited to:

- B.E.8.9.1. Recruitment advertising, recruitment, and employment,
- B.E.8.9.2. Rates of pay and other forms of compensation,
- B.E.8.9.3. Selection for training, including apprenticeship, and upgrading, and
- B.E.8.9.4. Transfers, demotions, layoffs, and terminations, but
- B.E.8.10.** Indian Tribe. Recognize that Title VII of the Civil Rights Act of 1964, as amended, exempts Indian Tribes under the definition of "Employer," and
- B.E.8.11.** Equal Employment Opportunity Requirements for Construction Activities. Comply, when undertaking "construction" as recognized by the U.S. Department of Labor (U.S. DOL), with:
- B.E.8.12.** U.S. DOL regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. chapter 60, and
- B.E.8.13.** Executive Order No. 11246, "Equal Employment Opportunity in Federal Employment," September 24, 1965, 42 U.S.C. § 2000e note, as amended by any later Executive Order that amends or supersedes it, referenced in 42 U.S.C. § 2000e note.

F. Incorporation Of Federal Transit Administration (FTA) Terms

- B.F.1.** The preceding provisions include, in part, certain Standard Terms and Conditions required by DOT, whether or not expressly set forth in the preceding contract provisions. All contractual provisions required by DOT, as set forth in the most current FTA Circular 4220, 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 Consultant shall not perform any act, fail to perform any act, or refuse to comply with any NCTD requests which would cause NCTD to be in violation of the FTA terms and conditions.

G. Energy Conservation

- B.G.1.** The Recipient agrees to, and assures that its Subrecipients, if any, will comply with the mandatory energy standards and policies of its state energy conservation plans under the Energy Policy and Conservation Act, as amended, 42 U.S.C. § 6321 *et seq.*, and perform an energy assessment for any building constructed, reconstructed, or modified with federal assistance required under FTA regulations, "Requirements for Energy Assessments," 49 C.F.R. part 622, subpart C.

H. Right of the Federal Government to Terminate

- B.H.1.** Justification. After providing written notice to the Recipient, the Recipient agrees that the Federal Government may suspend, suspend then terminate, or terminate all or any part of the federal assistance for the Award if:
 - B.H.1.1.** The Recipient has failed to make reasonable progress implementing the Award,
 - B.H.1.2.** The Federal Government determines that continuing to provide federal assistance to support the Award does not adequately serve the purposes of the law authorizing the Award, or
 - B.H.1.3.** The Recipient has violated the terms of the Underlying Agreement, especially if that violation would endanger substantial performance of the Underlying Agreement.
- B.H.2.** Financial Implications. In general, termination of federal assistance for the Award will not invalidate obligations properly incurred before the termination date to the extent that the obligations cannot be canceled. The Federal Government may recover the federal assistance it has provided for the Award, including the federal assistance for obligations properly incurred before the termination date if it determines that the Recipient has misused its federal assistance by failing to make adequate progress, failing to make appropriate use of the Project property, or failing to comply with the Underlying Agreement, and require the Recipient to refund the entire amount or a lesser amount, as the Federal Government may determine including obligations properly incurred before the termination date.
- B.H.3.** Expiration of the Period of Performance. Except for a Full Funding Grant Agreement, expiration of any period of performance established for the Award does not, by itself, constitute an expiration or termination of the Award; FTA may extend the period of performance to assure that each Formula Project or related activities and each Project or related activities funded with "no year" funds can receive FTA assistance to the extent FTA deems appropriate.

I. Debarment and Suspension

- B.I.1.** The Recipient agrees to the following:
 - B.I.1.1.** It will comply with the following requirements of 2 C.F.R. part 180, subpart C, as adopted and supplemented by U.S. DOT regulations at 2 C.F.R. part 1200.
 - B.I.1.2.** It will not enter into any arrangement to participate in the development or implementation of the Underlying Agreement with any Third Party Participant that is debarred or suspended except as authorized by:
 - B.I.1.2.1.** U.S. DOT regulations, "Nonprocurement Suspension and Debarment," 2 C.F.R. part 1200,

- B.I.1.2.2. U.S. OMB regulatory guidance, "Guidelines to Agencies on Governmentwide Debarment and Suspension (Nonprocurement)," 2 C.F.R. part 180, including any amendments thereto,
- B.I.1.2.3. Executive Orders No. 12549, "Uniform Suspension, Debarment or Exclusion of Participants from Procurement or Nonprocurement Activity," October 13, 1994, 31 U.S.C. § 6101 note, as amended by Executive Order No. 12689, "Debarment and Suspension," August 16, 1989, 31 U.S.C. § 6101 note, and
- B.I.1.2.4. Other applicable federal laws, regulations, or guidance regarding participation with debarred or suspended Recipients or Third Party Participants.
- B.I.1.3.** It will review the U.S. GSA "System for Award Management – Lists of Parties Excluded from Federal Procurement and Nonprocurement Programs," <https://www.sam.gov>, if required by U.S. DOT regulations, 2 C.F.R. part 1200.
- B.I.1.4.** It will include, and require each Third Party Participant to include, a similar provision in each lower tier covered transaction, ensuring that each lower tier Third Party Participant:
 - B.I.1.4.1. Complies with federal debarment and suspension requirements, and
 - B.I.1.4.2. Reviews the SAM at <https://www.sam.gov>, if necessary to comply with U.S. DOT regulations, 2 C.F.R. part 1200.
- B.I.1.5.** If the Recipient suspends, debars, or takes any similar action against a Third Party Participant or individual, the Recipient will provide immediate written notice to the:
 - B.I.1.5.1. FTA Regional Counsel for the Region in which the Recipient is located or implements the Underlying Agreement,
 - B.I.1.5.2. FTA Headquarters Manager that administers the Grant or Cooperative Agreement, or
 - B.I.1.5.3. FTA Chief Counsel.

J. Buy America

- B.J.1.** The domestic preference procurement requirements of 49 U.S.C. § 5323(j), and FTA regulations, "Buy America Requirements," 49 C.F.R. part 661, to the extent consistent with 49 U.S.C. § 5323(j),

K. Disputes, Breaches, Defaults, or Other Litigation

- B.K.1.** FTA Interest. FTA has a vested interest in the settlement of any violation of federal law, regulation, or disagreement involving the Award, the accompanying Underlying Agreement, and any Amendments thereto including, but not limited to, a default, breach, major dispute, or litigation, and FTA reserves the right to concur in any settlement or compromise.
- B.K.2.** Notification to FTA. If a current or prospective legal matter that may affect the Federal Government emerges, the Recipient must promptly notify the FTA Chief Counsel, or FTA Regional Counsel for the Region in which the Recipient is located. (1) The types of legal matters that require notification include, but are not limited to, a major dispute, breach, default, litigation, or naming the Federal Government as a party to litigation or a legal disagreement in any forum for any reason.
- B.K.3.** Matters that may affect the Federal Government include, but are not limited to, the Federal Government's interests in the Award, the accompanying Underlying Agreement, and any Amendments thereto, or the Federal Government's administration or enforcement of federal laws, regulations, and requirements.
- B.K.4.** If the Recipient has credible evidence that a Principal, Official, Employee, Agent, or Third Party Participant of the Recipient, or other person has submitted a false claim under the False Claims Act, 31 U.S.C. § 3729 *et seq.*, or has committed a criminal or civil violation of law pertaining to such matters as fraud, conflict of interest, bribery, gratuity, or similar misconduct involving federal assistance, the Recipient must promptly notify the U.S. DOT Inspector General, in addition to the FTA Chief Counsel or Regional Counsel for the Region in which the Recipient is located.
- B.K.5.** Federal Interest in Recovery. The Federal Government retains the right to a proportionate share of any proceeds recovered from any third party, based on the percentage of the federal share for the Underlying Agreement. Notwithstanding the preceding sentence, the Recipient may return all liquidated damages it receives to its Award Budget for its Underlying Agreement rather than return the federal share of those liquidated damages to the Federal Government, provided that the Recipient receives FTA's prior written concurrence.
- B.K.6.** Enforcement. The Recipient must pursue its legal rights and remedies available under any third party agreement, or any federal, state, or local law or regulation.

L. Lobbying Restrictions

- B.L.1.** The Recipient agrees that neither it nor any Third Party Participant will use federal assistance to influence any officer or employee of a federal agency, member of Congress or an employee of a member of Congress, or officer or employee of Congress on matters that involve the Underlying Agreement, including any extension or modification, according to the following:
 - B.L.1.1.** Laws, Regulations, Requirements, and Guidance. This includes:

B.L.1.1.1. The Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352, as amended,

B.L.1.1.2. U.S. DOT regulations, “New Restrictions on Lobbying,” 49 C.F.R. part 20, to the extent consistent with 31 U.S.C. § 1352, as amended, and

B.L.1.1.3. Other applicable federal laws, regulations, requirements, and guidance prohibiting the use of federal assistance for any activity concerning legislation or appropriations designed to influence the U.S. Congress or a state legislature, and

B.L.1.2. Exception. If permitted by applicable federal law, regulations, requirements, or guidance, such lobbying activities described above may be undertaken through the Recipient’s or Subrecipient’s proper official channels.

M. Clean Air Act

B.M.1. (42 U.S.C. §§ 7401 – 7671q.) and the Federal Water Pollution Control Act (33 U.S.C. §§ 1251 – 1387), as amended—Contracts and subgrants of amounts in excess of \$150,000 must contain a provision that requires the non-Federal award to agree to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. §§ 7401 – 7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. §§ 1251 – 1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

N. Clean Water

B.N.1. The Common Grant Rules specifically prohibit the use of facilities included in the EPA “List of Violating Facilities,” in the performance of any third party contract at any tier exceeding \$100,000. The contractor must also comply with all applicable standards, orders, or regulations issued under Section 508 of the Clean Water Act, as amended, 33 U.S.C. Section 1368, and other applicable requirements of the Clean Water Act, as amended, 33 U.S.C. Sections 1251 through 1377.

O. Cargo Preference.

B.O.1. Use of United States-Flag Vessels. The shipping requirements of 46 U.S.C. § 55305, and U.S. Maritime Administration regulations, “Cargo Preference – U.S.-Flag Vessels,” 46 C.F.R. part 381, and

P. Fly America

B.P.1. The air transportation requirements of Section 5 of the International Air Transportation Fair Competitive Practices Act of 1974, as amended, 49 U.S.C. § 40118, and U.S. General Services Administration (U.S. GSA) regulations, “Use of United States Flag Air Carriers,” 41 C.F.R. §§ 301-10.131 – 301-10.143.

Q. Davis-Bacon Act, as amended (40 U.S.C. §§ 3141 – 3148)

B.Q.1. When required by Federal program legislation, all prime construction contracts in excess of \$2,000 awarded by non-Federal entities must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. §§ 3141 - 3144, and 3146 – 3148) as supplemented by Department of Labor regulations (29 C.F.R. part 5, “Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction”). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. The contracts must also include a provision for compliance with the Copeland “Anti-Kickback” Act (40 U.S.C. § 3145), as supplemented by Department of Labor regulations (29 C.F.R. part 3, “Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States”). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency.

R. “Anti-Kickback” Prohibitions of:

B.R.1. Section 1 of the Copeland “Anti-Kickback” Act, as amended, 18 U.S.C. § 874,

B.R.2. Section 2 of the Copeland “Anti-Kickback” Act, as amended, 40 U.S.C. § 3145, and

B.R.3. U.S. DOL regulations, “Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States,” 29 C.F.R. part 3.

S. Contract Work Hours and Safety Standards Act (40 U.S.C. §§ 3701 – 3708)

- B.S.1.** Where applicable, all contracts awarded by the non-Federal entity in excess of \$100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. §§ 3702 and 3704, as supplemented by Department of Labor regulations (29 C.F.R. part 5). Under 40 U.S.C. § 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. § 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

T. Disadvantaged Business Enterprises

- B.T.1.** The Recipient acknowledges and understands that the statutory and regulatory provisions relating to disadvantaged business enterprises (DBE) differ significantly between FTA and FRA, including Section 1101(b) of the FAST Act (23 U.S.C. § 101 note) and U.S. DOT regulations, "Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs," 49 C.F.R. part 26, both of which apply to FTA, but not to FRA.
- B.T.2.** FRA is not authorized to use FTA's DBE regulations, and consequently the Recipient agrees to comply with the statutory and regulatory DBE provisions that apply to federal assistance provided by FTA when using that federal assistance for purchases.
- B.T.3.** The Recipient agrees to use the "contracting with small and minority firms, women's business enterprise" provisions of the applicable U.S. DOT Common Rules.

U. Prompt Payment and Return of Retainage

- B.U.1.** The entity utilizing this Contract declines to hold retainage from prime contractor and requires a contract clause obligating the prime contractor to make prompt and full payment of any retainage kept by a prime contractor to the subcontractor within 30 days after the subcontractor's work is satisfactorily completed.

V. RECYCLED PRODUCTS

- B.V.1.** 42 U.S.C. 6962
- B.V.2.** 40 CFR Part 247
- B.V.3.** Executive Order 12873
- B.V.4. Applicability to Contracts:** The Recycled Products requirements apply to all contracts for items designated by the EPA, when the Recipient procures \$10,000 or more of one (1) of these items during the fiscal year, or has procured \$10,000 or more of such items in the previous fiscal year, using Federal funds.
- B.V.5. Flow down Requirements:** These requirements flow down to all recipient and sub-recipient tiers.
- B.V.6. Recovered Materials -** The Recipient agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. 6962), including but not limited to the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247. The recipient agrees to comply with the U.S. Environmental Protection Agency (US EPA), "Comprehensive Procurement Guideline for Products Containing Recovered Materials," 40 CFR part 247.

W. ADA ACCESS REQUIREMENTS

- B.W.1.** 49 U.S.C. § 5301, 29 U.S.C. § 794, 42 U.S.C. § 12101
- B.W.2. Applicability to Contracts:** The Recipient shall comply with 49 USC 5301(d), stating Federal policy that the elderly and persons with disabilities have the same rights as other persons to use mass transportation services and facilities and that special efforts shall be made in planning and designing those services and facilities to implement that policy. Recipient shall also comply with all applicable requirements of Sec. 504 of the Rehabilitation Act (1973), as amended, 29 USC 794, which prohibits discrimination on the basis of handicaps, and the Americans with Disabilities Act of 1990 (ADA), as amended, 42 USC 12101 et seq., which requires that accessible facilities and services be made available to persons with disabilities, including any subsequent amendments thereto.

X. ALTOONA TEST CERTIFICATION: (Check one of the following):

- ☐ The vehicle has been Altoona tested, report number: _____
- ☐ The vehicle is exempt from testing in accordance with 49 CFR 665
- ☐ The vehicle is currently being tested at Altoona

Y. Rolling Stock

B.Y.1. The Recipient agrees that any procurement for rolling stock will comply with 49 U.S.C. § 5325 (Contract Requirements), 49 U.S.C. § 5323(j) (Buy America Requirements), 49 U.S.C. § 5323(m) (Pre-Award and Post Delivery Requirements), and 49 U.S.C. § 5318(e) (Bus Testing Requirements), and their implementing regulations.

FEDERAL FUNDS WILL NOT BE RELEASED UNTIL THE PURCHASING AGENCY RECEIVES A COPY OF THE ALTOONA TEST REPORT IF REQUIRED IN ACCORDANCE WITH 49 CFR 665



SECTION II

A. BUY AMERICA CERTIFICATION:

BIDDER/VENDOR to complete the Buy America Certification listed below. **BIDDER/VENDOR** shall certify **EITHER COMPLIANCE OR NON-COMPLIANCE** (not both).

Certification requirement for procurement of buses, other rolling stock, and associated equipment.

Certificate of Compliance with 49 U.S.C. 5323(j)(2)(C)

The **bidder/vendor** or offer or hereby certifies that it **will meet** the requirements of 49 U.S.C. 5323(j)(2)(C) and the regulations at 49 C.F.R. Part 661.11.

Signature _____

Company Name _____

Title _____

Date _____

Certificate of Non-Compliance with 49 U.S.C. 5323(j)(2)(C)

The **bidder/vendor** or offer or hereby certifies that it **cannot comply** with the requirements of 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11, but it may qualify for an exception pursuant to 49 U.S.C. 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 C.F.R. 661.7.

Signature _____

Company Name _____

Title _____

Date _____

Instructions:

Special Note: Make sure you have signed only one of the above statements -- either Compliance OR Non-Compliance (not both).

Subscribed and sworn to before me this ____ day of _____ 20__.

Notary Public

Commission Expiration Date

My Commission Number

Seal:

This form MUST be prepared and signed by the offeror/vendor and submitted with all bids or offers on FTA-funded contracts. Bids or offers not accompanied by this form will be REJECTED

B. DOMESTIC CONTENT WORKSHEET:

(Typical Components of Buses from Appendix B to 49 CFR Sec. 661.11, an itemized component listing from the **manufacturer** that verifies compliance with the Buy America Provisions may be submitted in lieu of this form)

If you plan on using another components listing, you must include it with your bid and place an X in the following box. ☐

I. Components	% Domestic	X % Value	Dom. Value
engines			
transmissions			
front axle assemblies			
rear axle assemblies			
drive shaft assemblies			
front suspension assemblies			
rear suspension assemblies			
air compressor and pneumatic systems			
generator, alternator & electrical systems			
steering system assemblies			
front and rear air brake assemblies			
air conditioning compressor assemblies			
air conditioning evaporator/condenser assemblies			
heating systems.			
passenger seats			
driver's seat assemblies			
window assemblies			
entrance and exit door assemblies			
door control systems			
destination sign assemblies			
interior lighting assemblies			
front and rear end cap assemblies			
front and rear bumper assemblies			
specialty steel (structural steel tubing etc.) and aluminum extrusions			
aluminum, steel or fiberglass exterior panels and interior trim			
flooring and floor coverings			
TOTAL DOMESTIC CONTENT OF COMPONENTS (%)			

B. **CONTINUED DOMESTIC CONTENT WORKSHEET:**

II. Construction Activities (Describe Activities)	
Location of Construction Activities:	% OF DOMESTIC CONSTRUCTION ACTIVITIES:

Vehicle Manufacturer	Model	Model Year
Vendor Name	Signature	Date



C. LOBBYING:

The **BIDDER/VENDOR** certifies compliance with the Anti-Lobbying amendment, 31 U.S.C. ' 1352, as amended by the Lobbying Disclosure Act of 1995, Public Law 104-65 [to be codified at 2 U.S.C. ' 1601, et seq.]. The **BIDDER/VENDOR** also certifies that it will execute the following, "Certification Regarding Lobbying", as required by 49 CFR Part 20, AA New Restriction on Lobbying.®

EXECUTE THE FOLLOWING

CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements
(To be submitted with each bid or offer exceeding \$100,000)

The undersigned,

(Bidder/Vendor)

certifies, to the best of his or her knowledge and belief, that:

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

B. If any funds other than Federal appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal Contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/96). Note: Language in paragraph "B" herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (Public Law 104-65, to be codified at 2 U.S.C. ' 1601, et seq .)]

C. 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 Subrecipient's shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. ' 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

C. CONTINUED LOBBYING:

[Note: Pursuant to 31 U.S.C. ' 1352(c)(1)-(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such expenditure or failure.

_____,
(Bidder/Vendor)

certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the **BIDDER/VENDOR** understands and agrees that the provisions of 31 U.S.C. ' 3801, et seq., apply to this certification and disclosure, if any.

Signature of BIDDER/VENDOR's Authorized Official

Name and Title of BIDDER's Authorized Official

Date



SECTION III

CERTIFICATION TO PURCHASER:

The undersigned **BIDDER/VENDOR** certifies that the vehicle(s) furnished will meet or exceed the specifications.

The **BIDDER/VENDOR** hereby certifies that it has attached all applicable documentation including:

1. Federal Motor Vehicle Safety Standards (**FMVSS**)
2. Altoona Test Certification
3. Buy America Certification Form
4. Domestic Content Worksheet
5. Lobbying Certification Form
6. Government wide Debarment & Suspension Certification Form
7. Certification to Purchaser Form
8. Drawing of proposed floor plan.
9. Printed product literature of the vehicle and all ancillary equipment

The undersigned **BIDDER/VENDOR** certifies that it has read all of the bid documents and agrees to abide by the terms, certifications, and conditions thereof.

Name of Company:	Printed Name of Person Completing Form:
Address: (City, State, Zip)	SS# or Tax ID #:
Telephone: (Area Code)	Signature:

Disadvantaged Business Enterprise Information (DBE)	Bidders type of organization (circle)	
Is your firm a DBE?	Sole Proprietorship	General Proprietorship
(yes) (no)	Corporation	Limited Partnership
If yes, what type?	Other? Please List	

BIDDER/VENDOR CHECKLIST

THE FOLLOWING CHECKLIST MUST BE COMPLETED BY THE BIDDER/VENDOR BEFORE THE BID IS SUBMITTED.

This checklist will be used to ensure that all required procurement clauses and certifications listed within these special provisions have been read, initialed, and signed by the Bidder/Vendor along with any necessary signed certifications.

Section I. FOR ALL BIDS:

Bidder's initial all lines below:

FMVSS CERTIFICATION: Circled all applicable Standards & Signed? _____

A. Incorporation of Federal Transit Administration Terms: Read? _____

B. Federal Changes: Read? _____

C. DBE Certification: Read? _____

D. Air Conditioning Performance: Read? _____

E. Interest of Members of or Delegates to Congress: Read? _____

F. Prohibited Interest: Read? _____

G. Cargo Preference: Read? _____

H. Energy Conservation: Read? _____

I. Clean Water and Air: Read? _____

J. No Obligation By the Federal Government: Read? _____

K. Program Fraud and False or Fraudulent Statements: Read? _____

L. Contract Work Hours: Read? _____

1. Overtime requirements: _____

2. Violation; liability for unpaid wages: _____

3. Withholding for unpaid wages: _____

4. Subcontracts: _____

5. Payrolls and basic records: _____

M. Civil Rights: Read? _____

1. Nondiscrimination: _____

2. Equal Employment Opportunity: _____

N. Altoona Test Certification: Completed the following? _____

1. Report Summary enclosed? Attached? _____

2. Report # _____: Completed? _____

O. Debarment and Suspensions: Read & Understood? _____

1. EPLS Report www.epls.gov (Must Not be Debarred) _____

CONTINUED BIDDER/VENDOR CHECKLIST

Section II.

- A. **Buy America Certification:** Completed and signed? _____
- B. **Domestic Content Worksheet:** Calculated, Completed & Signed? _____
- C. **Lobbying Certification signed:** Completed and signed? _____

Section III. **CERTIFICATION TO PURCHASER** Completed and signed? _____

I hereby attest that each item was reviewed and that my initials above indicate that the item was properly executed on this date.

Bidder/Vendor Company

Date

Bidder/Vendor Representative

Date



Pre-Award Reviewer
Replace This Blank Page
With A Screen Print
Of The
EPLS Report

***NOTE: PAGES 18 THRU 24
ARE TO BE COMPLETED BY ODOT
AT TIME OF THE BID AWARD***

SECTION IV PRE AWARD AUDIT:

A. Purchaser's Certification - 49 CFR 663, subpart B:

The **bidder/vendor** has certified that the vehicle to be provided will be the same product as described in the advertised specification. (See attached consolidated certification form signed by the **bidder/vendor**, part III -A). ODOT certifies that the **bidder/vendor** is responsible and will provide a vehicle that will meet or exceed the specifications.

EXECUTE THE FOLLOWING

PRE-AWARD PURCHASER'S REQUIREMENTS CERTIFICATION

As required by Title 49 of the CFR, Part 663 – Subpart B,

(ODOT)

certifies that the buses to be purchased,

(Number and Description of Buses)

from

(The Manufacturer),

are the same product described in the recipient's solicitation specification and that the proposed **bidder/vendor** is a responsible **bidder/vendor** with the capability to produce a bus that meets the specifications.

Date:

Signature:

Title:

B. BUY AMERICA - 49 CFR 663, subpart B:

The total price of this purchase is less than the small purchase threshold of \$100,000 and is not subject to Buy America requirements. **OR**

The vehicles provided by the **bidder/vendor** (# of vehicles, make, and model) cannot comply with the Buy America requirements, but may qualify for an exception (see attached consolidated certification form signed by the **bidder/vendor**, part II-A).. **OR**

The **bidder/vendor** has certified that the vehicles (# of vehicles, make, and model) will comply with the Buy America requirements. (See attached consolidated certification form signed by the **bidder/vendor**, part II-A). The **bidder/vendor** has also completed the attached domestic content worksheet. (Or the **bidder/vendor** has provided a certificate from the manufacturer that lists the domestic content of each component, states that the vehicle is composed of at least 60% domestic content, describes construction activities, and gives the location of construction activities.) The agency certifies that the vehicles provided will meet the Buy America requirements.

NOTE: Only one of the following Certifications should be signed, not both.

PRE-AWARD BUY AMERICA COMPLIANCE CERTIFICATION:

As required by Title 49 of the CFR, Part 663 – Subpart B,

(ODOT)

is satisfied that the buses to be purchased,

(Number and Description of Buses)

from

(The Manufacturer)

meet all requirements of Section 165(b)(3) of the Surface Transportation Assistance Act of 1982, as amended. The recipient, or its appointed analyst

(The Analyst Not the Manufacturer or Its Agent)

has reviewed documentation provided by the **manufacturer**, which lists (1) the actual component and subcomponent parts of the buses identified by the **manufacturer**, country of origin, and cost; and (2) the actual location of the final assembly point for the buses, including a description of the activities that took place at the final assembly point and the cost of final assembly.

Date:

Signature:

Title:

OR

**If not applicable, execute the following exemption certification
On next page**

B. PRE-AWARD BUY AMERICA EXEMPTION CERTIFICATION

For the Procurement of vehicle(s) that require an FTA waiver:

As required by Title 49 of the CFR, Part 663 – Subpart B,

(ODOT)

certifies that there is a letter from FTA that grants a waiver to the buses to be purchased

(Manufacturer, Number and Description of Buses)

from the Buy America requirements under Section 165(b)(1), (b)(2), or (b)(4) of the Surface Transportation Assistance Act of 1982, as amended.

Date:

Signature:

Title:

C. FEDERAL MOTOR VEHICLE SAFETY STANDARDS (FMVSS) - 49 CFR 663, subpart D:

The **bidder/vendor** has certified that the vehicle complies with relevant **FMVSS** issued by the National Highway Traffic Safety Administration in 49 CFR Part 571 (see attached **FMVSS** certification form signed by **bidder/vendor**). The **PURCHASER** certifies that the vehicles that the vehicles will meet **FMVSS**.

EXECUTE THE FOLLOWING:

EXECUTE THE FOLLOWING (Only one of the following FMVSS Certifications should be signed, not both.

PRE-AWARD FMVSS COMPLIANCE CERTIFICATION:

As required by Title 49 of the CFR, Part 663 – Subpart D,

(ODOT)

certifies that it received, at the post-delivery stage, a copy of

(The Manufacturer)

self-certification information stating that the buses,

(Manufacturer, Number and Description of Buses)

comply with the relevant Federal Motor Vehicle Safety Standards issued by the National Highway Traffic Safety Administration in Title 49 Code of Federal Regulations, Part 571.

Date:

Signature:

Title:

OR

NEXT PAGE

C. PRE-AWARD FMVSS EXEMPTION CERTIFICATION:

As required by Title 49 of the CFR, Part 663 – Subpart D,

(ODOT)

certifies that it received at the pre-award stage, a statement from

(The Manufacturer)

indicated that the buses,

(Number and Description of Buses)

will not be subject to the Federal Motor Vehicle Safety Standards issued by the National Highway Traffic Safety Administration in Title 49 Code of Federal Regulations, Part 571.

Date:

Signature:

Title:

PRE- AWARD CHECKLIST:

THE FOLLOWING CHECKLIST IS TO BE COMPLETED BY THE BUYER AND ODOT PERSONNEL BEFORE BID IS AWARDED.

This checklist will be used to ensure that all required clauses and certifications are included in the vendor=s returned bid packet and that all required certifications have been signed by the vendor.

Section I. FOR ALL BIDS:

Buyer's initial all lines below:

FMVSS CERTIFICATION: Signed by Bidder/Vendor? _____

- A. Incorporation of Federal Transit Administration Terms:** Initialed by Bidder? _____
- B. Federal Changes:** Initialed by Bidder? _____
- C. DBE Certification:** Initialed by Bidder? _____
- D. Air Conditioning Performance:** Initialed by Bidder? _____
- E. Interest of Members of or Delegates to Congress:** Initialed by Bidder? _____
- F. Prohibited Interest:** Initialed by Bidder? _____
- G. Cargo Preference:** Initialed by Bidder? _____
- H. Energy Conservation:** Initialed by Bidder? _____
- I. Clean Water and Air:** Initialed by Bidder? _____
- J. No Obligation By the Federal Government:** Initialed by Bidder? _____
- K. Program Fraud and False or Fraudulent Statements:** Initialed by Bidder? _____
- L. Contract Work Hours:** Initialed by Bidder? _____
 - 1. Overtime requirements: _____
 - 2. Violation; liability for unpaid wages: _____
 - 3. Withholding for unpaid wages: _____
 - 4. Subcontracts: _____
 - 5. Payrolls and basic records: _____
- M. Civil Rights:** Initialed by Bidder? _____
 - 1. Nondiscrimination: _____
 - 2. Equal Employment Opportunity: _____
- N. Altoona Test Certification completed:** Initialed by Bidder? _____
 - 1. Report Summary enclosed? Attached to bid? _____
 - 2. Altoona Test Report # listed by Bidder? _____
- O. Debarment and Suspensions:** Initialed by Bidder? _____
 - 1. **EPLS Report** from www.epls.gov: Attached to bid by Procuring Agency? _____

CONTINUED PRE- AWARD CHECKLIST:

Section II.

- A. Buy America Certification signed:** Signed by Bidder/Vendor? _____
- B. Domestic Content Worksheet signed:** Signed by Bidder/Vendor? _____
- C. Lobbying Certification signed:** Signed by Bidder/Vendor? _____

Section III. CERTIFICATION TO PURCHASER:

- A.** Completed and signed? _____

The previous checklist was to determine if the Bidder/Vendor read and completed all required necessary documentation. The following checklist is to determine if ODOT signed and completed the required Certifications.

Section IV. PRE AWARD AUDIT (signed by ODOT STAFF)

- A. Purchaser=s Certification - 49 CFR 663, subpart B:** Executed by ODOT?
Pre-Award Purchaser's Requirements Certification: _____
- B. Buy America - 49 CFR 663, subpart B:** Executed by ODOT?
**Pre-Award Buy America Compliance Certification, or
Pre-Award Buy America Exemption Certification:** _____
- C. FMVSS - 49 CFR 663, subpart D:** Executed by ODOT?
**Pre-Award FMVSS Compliance Certification, or
Pre-Award FMVSS Exemption Certification:** _____

I hereby attest that each item was reviewed and that my initials above indicate that the item was properly executed on this date.

ODOT

Date

ODOT Reviewer

Date

***NOTE: PAGES 26 THRU 32
ARE TO BE COMPLETED BY THE PURCHASER
AT TIME OF VEHICLE DELIVERY***

SECTION V POST DELIVERY AUDIT:

A. Purchaser's Certification - 49 CFR 663, subpart C:

After visually inspecting and road testing the contract buses, the agency certifies that the (# of vehicles, make, and model) meet the contract specifications.

- or, Grantees in areas with populations of 200,000 or less that purchase more than 20 buses.

The agency's resident inspector monitored manufacturing and completed a report providing accurate records of all construction activities. The report addresses how the construction and operation of the vehicles fulfill the contract specifications. After reviewing the report, visually inspecting and road testing the contract buses, the agency certifies that the (# of vehicles, make, and model) meet the contract specifications.

EXECUTE THE FOLLOWING:

NOTE: Only one of the following Certifications should be signed, not both.

POST-DELIVERY PURCHASER'S REQUIREMENTS CERTIFICATION

As required by Title 49 of the CFR, Part 663 – Subpart C, after visually inspecting and road testing the contract buses,

(The Purchaser)

certifies that the buses,

(Number and the Description of Buses)

from

(The Manufacturer),

meet the contract specifications.

Date:

Signature:

Title:

OR

NEXT PAGE

A. POST-DELIVERY PURCHASER'S REQUIREMENTS CERTIFICATION:

As required by Title 49 of the CFR, Part 663 – Subpart C,

(The Purchaser)

certifies that a resident inspector,

(Not an Agent or Employee of the Manufacturer),

was at manufacturing site during the period of manufacture of

(Number and Description of Buses)

The inspector monitored manufacturing and completed a report on the manufacture of the buses providing accurate records of all bus construction activities. The report addresses how the construction and operation of the buses fulfill the contract specifications. After reviewing the report, visually inspecting the buses, and road testing the buses, the recipient certifies that the buses meet the contract specifications.

Date:

Signature:

Title:

B. BUY AMERICA - 49 CFR 663, subpart C:

The total price of this purchase is less than the small purchase threshold of \$100,000 and is not subject to Buy America requirements. **OR**

The agency certifies that there is a letter from FTA, which grants a waiver to the vehicles provided by the vendor (# of vehicles, make, and model) from the Buy America requirements, under Section 165 (b)(1), (b)(2), or (b)(4) of the Surface Transportation Assistance Act of 1982, as amended. **OR**

The agency certifies that it is satisfied that the (# of vehicles, make, and model) meet the requirements of Section 165 (b)(3) . The agency has reviewed documentation provided by the **manufacturer** that lists the domestic content of each component, states that the vehicle is composed of at least 60% domestic content, describes construction activities, and gives the location of final construction activities.

NOTE: Only one of the following Certifications should be signed, not both.

POST-DELIVERY BUY AMERICA COMPLIANCE CERTIFICATION:

As required by Title 49 of the CFR, Part 663 – Subpart C,

(The Purchaser)

certifies that the buses received are in fact what they ordered and are satisfied with the,

(Number and Description of Buses)

from

(The Manufacturer)

meet the requirements of section 165(b)(3) of the Surface Transportation Assistance Act of 1982, as amended. The recipient or its appointed analyst

(The Analyst Not the Manufacturer or Its Agent)

has reviewed documentation provided by the **manufacturer**, which lists (1) the actual component and subcomponent parts of the buses identified by the **manufacturer**, country of origin, and cost; and (2) the actual location of the final assembly point for the buses, including a description of the activities that took place at the final assembly point and the cost of final assembly.

Date:

Signature:

Title:

OR

**If not applicable, execute the following exemption certification
On next page**

B. POST-DELIVERY BUY AMERICA EXEMPTION CERTIFICATION:

As required by Title 49 of the CFR, Part 663 – Subpart C,

(The Purchaser)

certifies that there is a letter from FTA, which grants a waiver to the buses received,

(Manufacturer, Number and Description of Buses)

from the Buy America requirements under Section 165(b)(1), (b)(2), or (b)(4) of the Surface Transportation Assistance Act of 1982, as amended.

Date:

Signature:

Title:

Vehicle Vin Numbers:

[illegible]

C. FEDERAL MOTOR VEHICLE SAFETY STANDARDS (FMVSS) - 49 CFR 663, subpart D:

The vendor has certified that the vehicle complies with relevant FMVSS issued by the National Highway Traffic Safety Administration in 49 CFR Part 571 (see attached FMVSS certification form provided by the **bidder** upon vehicle delivery). The agency certifies that the vehicles provided meet FMVSS.

EXECUTE THE FOLLOWING:

NOTE: Only one of the following Certifications should be signed, not both.

POST-DELIVERY FMVSS COMPLIANCE CERTIFICATION:

As required by Title 49 of the CFR, Part 663 – Subpart D,

(The Purchaser)

certifies that it received, at the post-delivery stage, a copy of

(The Manufacturer)

self-certification information stating that the buses,

(Manufacturer, Number and Description of Buses)

comply with the relevant Federal Motor Vehicle Safety Standards issued by the National Highway Traffic Safety Administration in Title 49 Code of Federal Regulations, Part 571.

Date:

Signature:

Title:

OR

NEXT PAGE

C. POST-DELIVERY FMVSS EXEMPTION CERTIFICATION:

As required by Title 49 of the CFR, Part 663 – Subpart D,

(The Purchaser)

certifies that it received, at the Post-delivery stage, a statement from

(The Manufacturer)

indicating that the buses,

(Number and Description of Buses)

are not subject to the Federal Motor Vehicle Safety Standards issued by the National Highway Traffic Safety Administration in Title 49 Code of Federal Regulations, Part 571.

Date

Signature

Title

POST DELIVERY AUDIT

THE FOLLOWING CHECKLIST IS TO BE COMPLETED BY THE BUYER AND ODOT PERSONNEL BEFORE THE VEHICLE(S) ARE ACCEPTED.

Section V VEHICLE DELIVERY CHECKLIST: (to be signed by buyer upon acceptance of vehicle)

Buyer initials all lines below:

A. Purchaser's Certification - 49 CFR 663, subpart C:

Post-Delivery Purchaser's Requirements Certification or
Post-Delivery Purchaser's Requirements Certification (Inspector): _____

B. Buy America - 49 CFR 663, subpart C:

Post-Delivery Buy America Compliance Certification or
Post-Delivery Buy America Exemption Certification: _____

B. FMVSS - 49 CFR 663, subpart D:

Post-Delivery FMVSS Compliance Certification or
Post-Delivery FMVSS Exemption Certification: _____

Section VI CERTIFICATION OF DELIVERY:

By executing this document,

A. You hereby request that a Lien Entry Form – Motor Vehicle be issued naming the Oklahoma Department of Transportation as Secured Party and that said form(s) will be delivered by the purchaser to a local tag agent for executing and

B. Assure the vehicle be used in accordance with the federal regulations and current provisions, as applicable.

I hereby attest that each item was reviewed and that my initials above indicate that the item was properly executed.

Purchaser

Date

ODOT Reviewer

Date

State of Oklahoma

ADA Transit Buses

RFP # 0900000377 / SW0797

Attachment T: Reference List and Past Performance Information Template

Respondent Name:

	Customer Name	Point of Contact Name	Email Address	Phone Number	Date of Services
1					
2					
3					



Amendment of Solicitation

Date of Issuance: 07/18/2019

Solicitation No. 0900000377-Rebid

Requisition No. _____

Amendment No. 001

Hour and date specified for receipt of offers is changed: ☐ No ☒ Yes, to: August 14, 2019 3:00 PM CST

Pursuant to OAC 260:115-7-30(d), this document shall serve as official notice of amendment to the solicitation identified above. Such notice is being provided to all suppliers to which the original solicitation was sent.

Suppliers submitting bids or quotations shall acknowledge receipt of this solicitation amendment prior to the hour and date specified in the solicitation as follows:

- (1) Sign and return a copy of this amendment with the solicitation response being submitted; or,
- (2) If the supplier has already submitted a response, this acknowledgement must be signed and returned prior to the solicitation deadline. All amendment acknowledgements submitted separately shall have the solicitation number and bid opening date printed clearly on the front of the envelope.

ISSUED BY and RETURN TO:

U.S. Postal Delivery:

Office of Management & Enterprise Services
Solicitation 0900000377-Rebid
5005 N Lincoln Blvd, Ste.300
Oklahoma City, OK 73105 -

Jennifer McCaulla
Contracting Officer

405 - 521 - 4772
Phone Number

Personal or Common Carrier Delivery:

Office of Management & Enterprise Services
Solicitation 0900000377-Rebid
5005 N Lincoln Blvd, Ste.300
Oklahoma City, OK 73105 -

Jennifer.McCaulla@omes.ok.gov
E-Mail Address

Description of Amendment:

a. This is to incorporate the following:

This Amendment 001 is to provide answers to questions received during the Question and Answer Period of this solicitation. All questions and answers received are provided below:

Question #	Solicitation Reference	Question:
#1	Evaluation D.1.1.	<p>"Bids shall be evaluated on the 'best value' determination."</p> <p>i. The FTA Best Practices Procurement & Lessons Learned Manual, October 2016 states the following:</p> <p>"Best Value describes a competitive procurement process in which the recipient reserves the right to select the most advantageous offer by evaluating and comparing factors in addition to cost or price such that a recipient may acquire technical superiority even if it must pay a premium price. A "premium" is the difference between the price of the lowest priced proposal and the one that the recipient believes offers the best value. The term "best value" also means the expected outcome of an acquisition that, in the recipient's estimation, provides the greatest overall benefit in response to its material requirements. To achieve best value in the context of</p>

acquisitions for public transportation purposes, the evaluation factors for a specific procurement should reflect the subject matter and the elements that are most important to the recipient. While FTA does not mandate any specific evaluation factors, the recipient must disclose those factors in its solicitation. Evaluation factors may include, but are not limited to, technical design, technical approach, length of delivery schedules, quality of proposed personnel, past performance, and management plan. This definition is intended neither to limit nor to dictate qualitative measures a recipient may employ, except that those qualitative measures must support the purposes of the Federal public transportation program.”

ii. We request that OMES provide us a detail as to how the “Best Value” determination is to be made. In addition we would like to clarify whether OMES will make multiple awards in each category. In the previous solicitation there were multiple awards made in several categories yet it was not clear whether there would be multiple awards made.

Answer:

The best value criteria for this solicitation are pricing, the technical response and past performance. OMES may make multiple awards in each category.

#2

None

As per the FTA Best Practices Manual, “To ensure that protests are received and processed efficiently, recipients should have adequate written bid protest procedures. FTA recommends that these procedures be included or referenced in the solicitation document. If they are referenced, information should be included on how a copy of the procedures may be acquired by any interested party. When the procedures are requested, they should be provided immediately. The written procedures typically address the following elements:

- Difference in procedures for pre-bid, pre-award, and post-award protests;
- Specific deadlines (in working days) for filing a protest, filing a request for reconsideration, and for the recipient’s response to a protest;
- Specific contents of a protest (name of protester, solicitation/contract number or description, statement of grounds for protest);
- Location where protests are to be filed;
- Statement that the recipient will respond, in detail, to each substantive issue raised in the protest;
- Identification of the responsible official who has the authority to make the final determination;
- Statement that the recipient’s determination will be final; and
- Allowance for request for reconsideration (if data becomes available that were not previously known, or there has been an error of law or regulation).”

Answer:

There was no question within this statement.

#3 Instructions to Bidder
E.6 and E.7.

This solicitation is requesting the Administrative Review Questions (Section E.6) to be presented by no later than 3:00pm CST on July 18, 2019. In the next section E.7, the general questions regarding the solicitation are due on Saturday July 20, 2019. We are unaware of questions being due on a non-working day as typical for this type of solicitation. In addition, there will be insufficient time provided for the vendors to provide their questions and approved/equal requests to OMES within less than one (1) business day, and that is if OMES can return the responses to the Administrative Review questions immediately upon receipt.

b. We request that OMES extend the due date of Questions & Approved/Equal requests to a minimum of five (5) working days from the receipt of the responses to the Administrative Review. It is not possible for Alliance Bus Group, Inc. to provide a comprehensive list of questions and approved/equal requests without having the responses to this inquiry in advance.

c. We request that OMES provide the vendors ten (10) working days to provide responses to the solicitation post the receipt of the answers to general questions and responses to the approved/equal requests.

Answer:

The Question and Answer Period and Administrative Review Dates remain unchanged.

Approved equivalents will be reviewed upon bid submission during the technical evaluation.

“General Provisions A.11. Unless otherwise specified in the solicitation, manufacturers' names, brand names, information and/or catalog numbers listed in a specification are for information and not intended to limit competition. Bidder may offer any brand for which they are an authorized representative, and which meets or exceeds the specification for any item(s). However, if bids are based on equivalent products, indicate on the bid form the manufacturer's name and number. Bidder shall submit sketches, descriptive literature, and/or complete specifications with their bid. Reference to literature submitted with a previous bid will not satisfy this provision. The bidder shall also explain in detail the reason(s) why the proposed equivalent will meet the specifications and not be considered an exception thereto. Bids that do not comply with these requirements are subject to rejection.”

#4 None

Why was the bid re-issued?

Answer:

Specifications were modified.

#5 None

Please clarify response delivery date. The web site shows a response date of 8/14 but the solicitation cover sheet shows 8/7 with no amendment.

Answer:

The closing date of this solicitation is August 14, 2019 at 3:00 PM Central Time Zone.

#6

Instructions to Bidder
E.9.2.1.

E.9.2.1. States a form to be forwarded to references is provided in Attachment T but there is no form.

Answer:

The form to be forwarded to references will be forwarded by the Contracting Officer.

b. All other terms and conditions remain unchanged.

Supplier Company Name (**PRINT**)

Date

Authorized Representative Name (**PRINT**) Title

Authorized Representative Signature



Amendment of Solicitation

Date of Issuance: 08/12/2019

Solicitation No. 0900000377-Rebid

Requisition No. _____

Amendment No. 002

Hour and date specified for receipt of offers is changed: ☐ No ☒ Yes, to: August 29, 2019 3:00 PM CST

Pursuant to OAC 260:115-7-30(d), this document shall serve as official notice of amendment to the solicitation identified above. Such notice is being provided to all suppliers to which the original solicitation was sent.

Suppliers submitting bids or quotations shall acknowledge receipt of this solicitation amendment prior to the hour and date specified in the solicitation as follows:

- (1) Sign and return a copy of this amendment with the solicitation response being submitted; or,
- (2) If the supplier has already submitted a response, this acknowledgement must be signed and returned prior to the solicitation deadline. All amendment acknowledgements submitted separately shall have the solicitation number and bid opening date printed clearly on the front of the envelope.

ISSUED BY and RETURN TO:

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5005 N Lincoln Blvd, Ste.300
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Jennifer McCaulla
Contracting Officer

405 - 521 - 4772
Phone Number

or

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Office of Management & Enterprise Services
Solicitation 0900000377-Rebid
5005 N Lincoln Blvd, Ste.300
Oklahoma City, OK 73105 -

Jennifer.McCaulla@omes.ok.gov
E-Mail Address

Description of Amendment:

a. This is to incorporate the following:

Change of closing date. Please see above.

b. All other terms and conditions remain unchanged.

Supplier Company Name (**PRINT**)

Date

Authorized Representative Name (**PRINT**)

Title

Authorized Representative Signature