

CONTRACT AWARD

# STATE OF CONNECTICUT

DEPARTMENT OF TRANSPORTATION  
 DIV. OF PURCHASING & MATERIALS MGMT.  
 2800 Berlin Turnpike

PO Box 317546  
 Newington, CT 06131-7546

Mary Matuszak  
 Fiscal Administrative  
 Supervisor

(860) 594-2342  
 Telephone Number

CONTRACT AWARD NO.:

16DOT7002

DATE AWARDED:  
 29 November 2016

RFP DUE DATE:  
 October 13, 2016

AUTHORIZATION:  
 CGS 13b-34

## CONTRACT AWARD

COMMODITY CLASS/SUBCLASS AND DESCRIPTION: 45' Heavy Duty High Floor Suburban Commuter Buses

<b>FOR:</b> Department of Transportation 2800 Berlin Turnpike Newington, CT 06131-7546	<b>TERM OF CONTRACT /DELIVERY DATE REQUIRED:</b> Contract Term: Five (5) Years From Date of Award Delivery: 180 Days After Receipt of Order (ARO)
	<b>TOTAL CONTRACT AWARD VALUE:</b> CONTRACT AMOUNT IS ESTIMATED, AND WILL ULTIMATELY BE DETERMINED BY THE NUMBER OF BUSES, SPARE PARTS, AND OPTIONS PURCHASED OVER THE LIFE OF THE CONTRACT. ACTUAL COSTS ARE NOTED ON THE ATTACHED EXHIBIT B (PRICE SCHEDULE).
<b>NOTICE TO CONTRACTORS:</b> This notice of award is not an order to ship or to produce services. Purchase Orders against this contract will be furnished by the Department of Transportation. INVOICES SHALL BE RENDERED DIRECTLY TO THE DEPARTMENT OF TRANSPORTATION.	
<b>CASH DISCOUNTS:</b> Cash discounts, if any, shall be given SPECIAL ATTENTION, but such cash discount shall not be taken unless payment is made within the discount period.	
<b>PRICE BASIS:</b> Unless otherwise noted, prices include delivery and transportation charges fully prepaid f.o.b. agency. No extra charge is to be made for packing or packages.	
<b><u>THE ATTACHED DOCUMENTS ARE HEREBY INCORPORATED INTO CONTRACT AWARD NO. 16DOT7002 AND MADE A PART HEREOF</u></b>	

NAME AND ADDRESS OF CONTRACTOR(S):

Company Name: <i>Motor Coach Industries Inc.</i>		CORE Award No.: 16DOT7002AA	
Address: 200 East Oakton Street, Des Plaines, IL 60018			
Tel. No.: (484)663-4742	SSN/FEIN No.: 45-0277789	Est. Award Amount: \$55,451,984.00	DW 12/15/16
Contact Person: <i>Lou Quaglia</i>	Contact Person e-mail: <i>lou.quaglia@mcicoach.com</i>		
Certification Type (SBE, MBE, WBE or None): <i>none</i>	Terms: <i>Net 45 Days</i>	RWA 12/19/16	
Company e-mail address and/or company web site: <i>www.mcicoach.com</i>			

# CONTRACT

Between

**THE STATE OF CONNECTICUT**

Acting by its

**DEPARTMENT OF TRANSPORTATION**

AND

**MOTOR COACH INDUSTRIES INC.**

**45' HEAVY DUTY HIGH FLOOR SUBURBAN COMMUTER DIESEL BUSES**

December 30<sup>th</sup>

, 2016

Contract Award Date

Contract #16DOT7002

Contract Document

DOT-50 Rev. 7/16

Contract Table of Contents

1. Definitions
  2. Contracting Vehicle
  3. Term of Contract
  4. Description of Goods and Services
  5. Price Schedule, Payment Terms and Billing
  6. Rejected Items; Abandonment
  7. Order and Delivery
  8. Contract Amendments
  9. Assignment
  10. Termination
  11. Cost Modifications
  12. Breach
  13. Waiver
  14. Open Market Purchases
  15. Purchase Orders
  16. Indemnification
  17. Forum and Choice of Law
  18. Contractor Guaranties
  19. Implied Warranties
  20. Goods, Standards and Appurtenances
  21. Delivery
  22. Goods Inspection
  23. Emergency Standby for Goods and/or Services
  24. Setoff
  25. Force Majeure
  26. Advertising
  27. Americans With Disabilities Act
  28. Representations and Warranties
  29. Representations and Warranties Concerning Motor Vehicles
  30. Disclosure of Contractor Parties Litigation
  31. Entirety of Contract
  32. Exhibits
  33. Executive Orders
  34. Non-Discrimination
  35. Tangible Personal Property
  36. Whistleblowing
  37. Notice
  38. Insurance
  39. Headings
  40. Number and Gender
  41. Parties
  42. Contractor Changes
  43. Further Assurances
  44. Audit and Inspection of Plants, Places of Business and Records
  45. Background Checks
  46. Continued Performance
  47. Working and Labor Synergies
  48. Contractor Responsibility
  49. Severability
  50. Confidential Information
  51. References to Statutes, Public Acts, Regulations, Codes and Executive Orders
  52. Cross-Default
  53. Disclosure of Records
  54. Summary of State Ethics Laws
  55. Sovereign Immunity
  56. Time of the Essence
  57. Certification as Small Contractor or Minority Business Enterprise
  58. Campaign Contribution Restriction
  59. Health Insurance Portability and Accountability Act
  60. Protection of Confidential Information
  61. Audit Requirements for Recipients of State Financial Assistance
  62. Antitrust Claims
- EXHIBIT A** - Description of Goods & Services and Additional Terms and Conditions
- EXHIBIT A.1** – Technical Specifications
- EXHIBIT A.2** – Vehicle Technical Information
- EXHIBIT A.3** – FTA Federally Required Clauses
- EXHIBIT B** – Price Schedule
- EXHIBIT C** – SEEC Form 11

This contract (the "Contract") is made as of the 6<sup>th</sup> day of December, by and between, MOTOR COACH INDUSTRIES, INC. (the "Contractor,") with a principal place of business at 200 E Oakton St. Des Plaines, IL 60018, acting by PATRICK SCULLY, its Exec. VP Sales + MARKETING and the State of Connecticut, Department of Transportation (the "Agency"; CTDOT, or the Authority), with a principal place of business at 2800 Berlin Turnpike, Newington, Connecticut, acting by Richard Andreski, its Bureau of Public Transportation Bureau Chief, in accordance with Section 13b-34 of the Connecticut General Statutes.

Now therefore, in consideration of these presents, and for other good and valuable consideration, the receipt and sufficiency of which the parties acknowledge, the Contractor and the State agree as follows:

1. Definitions. Unless otherwise indicated, the following terms shall have the following corresponding definitions:

- (a) Bid: A Bid submitted in response to a Solicitation
- (b) Claims: All actions, suits, claims, demands, investigations and proceedings of any kind, open, pending or threatened, whether mature, unmaturing, contingent, known or unknown, at law or in equity, in any forum.
- (c) Confidential Information: This shall mean any name, number or other information that may be used, alone or in conjunction with any other information, to identify a specific individual including, but not limited to, such individual's name, date of birth, mother's maiden name, motor vehicle operator's license number, Social Security number, employee identification number, employer or taxpayer identification number, alien registration number, government passport number, health insurance identification number, demand deposit account number, savings account number, credit card number, debit card number or unique biometric data such as fingerprint, voice print, retina or iris image, or other unique physical representation. Without limiting the foregoing, Confidential Information shall also include any information that the Agency classifies as "confidential" or "restricted." Confidential Information shall not include information that may be lawfully obtained from publicly available sources or from federal, state, or local government records which are lawfully made available to the general public.
- (d) Confidential Information Breach: This shall mean, generally, an instance where an unauthorized person or entity accesses Confidential Information in any manner, including but not limited to the following occurrences: (1) any Confidential Information that is not encrypted or protected is misplaced, lost, stolen or in any way compromised; (2) one or more third parties have had access to or taken control or possession of any Confidential Information that is not encrypted or protected without prior written authorization from the State; (3) the unauthorized acquisition of encrypted or protected Confidential Information together with the confidential process or key that is capable of compromising the integrity of the Confidential Information; or (4) if there is a substantial risk of identity theft or fraud to the Agency, the Contractor, or the State.
- (e) Contract: The agreement, as of its Effective Date, between the Contractor and the State for any or all Goods or Services at the Bid price.
- (f) Contractor: A person or entity who submits a Bid and who executes a Contract.

Contract #16DOT7002

Contract Document

DOT-50 Rev. 7/16

- (g) Contractor Parties: A Contractor's members, directors, officers, shareholders, partners, managers, principal officers, representatives, agents, servants, consultants, employees or any one of them or any other person or entity with whom the Contractor is in privity of oral or written contract and the Contractor intends for such other person or entity to Perform under the Contract in any capacity.
  - (h) Day: All calendar days other than Saturdays, Sundays and days designated as national or State of Connecticut holidays upon which banks in Connecticut are closed.
  - (i) Force Majeure: Events that materially affect the cost of the Goods or Services or the time schedule within which to Perform and are outside the control of the party asserting that such an event has occurred, including, but not limited to, labor troubles unrelated to the Contractor, failure of or inadequate permanent power, unavoidable casualties, fire not caused by the Contractor, extraordinary weather conditions, disasters, riots, acts of God, insurrection or war.
  - (j) Goods: For purposes of the Contract, all things which are movable at the time that the Contract is effective and which include, without limiting this definition, supplies, materials and equipment, as specified in the Solicitation and set forth in Exhibit A.
  - (k) Goods or Services: Goods, Services or both, as specified in the Solicitation and set forth in Exhibit A.
  - (l) Records: All working papers and such other information and materials as may have been accumulated by the Contractor in performing the Contract, including but not limited to, documents, data, plans, books, computations, drawings, specifications, notes, reports, records, estimates, summaries and correspondence, kept or stored in any form.
  - (m) Services: The performance of labor or work, as specified in the Solicitation and set forth in Exhibit A.
  - (n) Solicitation: A State request, in whatever form issued, inviting bids, proposals or quotes for Goods or Services, typified by, but not limited to, an invitation to bid, request for proposals, request for information or request for quotes. The Solicitation and this Contract shall be governed by the statutes, regulations and procedures of the State of Connecticut, Department of Administrative Services, even if the Agency has statutes, regulations and procedures which overlap DAS's. However, to the extent that the Agency has statutes, regulations or procedures which the Agency determines in its sole discretion to be inconsistent with DAS's, the Agency's shall control over those of DAS's. The Solicitation is incorporated into and made a part of the Contract as if it had been fully set forth in it if, but only if, the Solicitation is in the form of an invitation to bid, request for information or request for quotes. A Solicitation in the form of a request for proposals is not incorporated into the Contract in its entirety, but, rather, it is incorporated into the Contract only to the extent specifically stated in Exhibit A.
  - (o) State: The State of Connecticut, including the Agency and any office, department, board, council, commission, institution or other agency of the State.
  - (p) Termination: An end to the Contract prior to the end of its term whether effected pursuant to a right which the Contract creates or for a breach.
  - (q) Title: all ownership, title, licenses, rights and interest, including, but not limited to, perpetual use, of and to the Goods or Services.
2. Contracting Vehicle. The Solicitation may involve an invitation to bid, request for proposals, request for information or request for quotes, each of which may be governed by different statutory, regulatory and administrative procedures. **ALTHOUGH THIS CONTRACT USES THE TERMS**

"SOLICITATION" AND "BID" IT'S USE OF THOSE TERMS IS INTENDED ONLY FOR PURPOSES OF CONVENIENCE AND SHALL NOT BE DEEMED TO BE A CONTROLLING STATEMENT AS TO THE TYPE OF SOLICITATION USED OR THE RESPECTIVE RIGHTS AND OBLIGATIONS OF THE PARTIES. THE IDENTIFICATION IN THE SOLICITATION OF THE PARTICULAR PROCUREMENT VEHICLE THE STATE IS USING TO SOLICIT GOODS OR SERVICES SHALL CONTROL. Therefore, if the Solicitation identifies the procurement vehicle as something other than an Invitation to Bid, the terms "Solicitation" and "Bid," as used in this Contract shall be read to mean "Request for Proposals," "Proposal" and "Proposer" or to mean such other terms as are consistent with the Solicitation in order to preserve the integrity of the statutory, regulatory and procedural distinctions among the various procurement vehicles and their corresponding principles.

3. Term of Contract; Effective Date. The Contract will be in effect for five (5) years from the date the contract is approved by the Office of the Attorney General.
4. Description of Goods or Services and Additional Terms and Conditions. The Contractor shall perform as set forth in Exhibit A and Exhibit A.1, A.2, and A.3. For purposes of this Contract, to perform and the performance in Exhibit A and Exhibit A.1, A.2 and A.3 is referred to as "Perform" and the "Performance."
5. Price Schedule, Payment Terms and Billing.
  - (a) Payment terms under this Contract are set forth in Exhibit B.
  - (b) The State shall make all payments to the Contractor through electronic funds transfer via the Automated Clearing House ("ACH") or through the State of Connecticut Purchasing Card (MasterCard) in accordance with Memorandum No. 2011-11 issued by the Office of the State Comptroller.
  - (c) Contractor shall enroll in ACH through the Office of the State Comptroller prior to sending any invoice to the State. The Contractor may obtain detailed information regarding ACH at: <http://www.osc.ct.gov/vendor/directdeposit.html>
  - (d) Contractor shall be equipped to receive orders issued by the Client Agency using the MasterCard. The Contractor shall be responsible for the credit card user-handling fee associated with MasterCard purchases. The Contractor shall charge to the MasterCard only upon acceptance of Goods delivered to the Client Agency or the rendering of Services.
  - (e) The Contractor shall capture and provide to its merchant bank, Level 3 reporting at the line item level for all orders placed by MasterCard.
  - (f) Questions regarding the state of Connecticut MasterCard Program may be directed to Ms. Kerry DiMatteo, Procurement Card Program Administrator at 860-713-5072.
  - (g) Notwithstanding any language regarding Contractor price increases herein, the Price Schedule will be adjusted to reflect any increase in the minimum wage rate that may occur during the term of this Contract as mandated by State law and in accordance with the terms of this section. Contractor shall provide documentation, in the form of certified payroll or other documentation acceptable to the State, substantiating the amount of any increase in Contractor labor costs as a result of changes to the minimum wage rate within ninety (90) days of the statutorily identified effective date of any increase in the minimum wage. Upon receipt, and verification of Contractor documentation DAS shall adjust the Price Schedule accordingly through a supplement to this Contract.

(h) Price Adjustments: See Exhibit A; (2.) Additional Terms and Conditions; Section 2.14 – Price Escalation/Economic Price Adjustment.

6. Rejected Items; Abandonment.

(a) The Contractor may deliver, cause to be delivered, or, in any other way, bring or cause to be brought, to any State premises or other destination, Goods, as samples or otherwise, and other supplies, materials, equipment or other tangible personal property. The State may, by written notice and in accordance with the terms and conditions of the Contract, direct the Contractor to remove any or all such Goods (“the “Rejected Goods”) and any or all other supplies, materials, equipment or other tangible personal property (collectively, the “Contractor Property”) from and out of State premises and any other location which the Agency or State manages, leases or controls. The Contractor shall remove the Rejected Goods and the Contractor Property in accordance with the terms and conditions of the written notice. Failure to remove the Rejected Goods or the Contractor Property in accordance with the terms and conditions of the written notice shall mean, for itself and all Contractor Parties, that:

(1) they have voluntarily, intentionally, unconditionally, unequivocally and absolutely abandoned and left unclaimed the Rejected Goods and Contractor Property and relinquished all ownership, title, licenses, rights, possession and interest of, in and to (collectively, “Title”) the Rejected Goods and Contractor Property with the specific and express intent of (A) terminating all of their Title to the Rejected Goods and Contractor Property, (B) vesting Title to the Rejected Goods and Contractor Property in the State of Connecticut and (C) not ever reclaiming Title or any future rights of any type in and to the Rejected Goods and Contractor Property;

(2) there is no ignorance, inadvertence or unawareness to mitigate against the intent to abandon the Rejected Goods or Contractor Property;

(3) they vest authority, without any further act required on their part or the Agency’s part, in the Agency and the State to use or dispose of the Rejected Goods and Contractor Property, in the Agency’s sole discretion, as if the Rejected Goods and Contractor Property were the Agency’s or State’s own property and in accordance with law, without incurring any liability or obligation to the Contractor or any other party;

(4) if the Agency or State incur any costs or expenses in connection with disposing of the Rejected Goods and Contractor Property, including, but not limited to, advertising, moving or storing the Rejected Goods and Contractor Property, auction and other activities, the Agency shall invoice the Contractor for all such cost and expenses and the Contractor shall reimburse the State no later than thirty (30) days after the date of invoice; and

(5) they do remise, release and forever discharge the Agency and all State employees, departments, commissions, boards, bureaus, agencies, instrumentalities or political subdivisions and their respective successors, heirs, executors and assigns (collectively, the “State and Its Agents”) of and from all Claims which they and their respective successors or assigns, jointly or severally, ever had, now have or will have against the Agency and the State and Its Agents arising from the use or disposition of the Rejected Goods and Contractor Property.

(b) The Contractor shall secure from each Contractor Party, as appropriate, such document or instrument as necessary or appropriate as will vest in the Contractor plenary authority to bind the Contractor Parties to the full extent necessary or appropriate to give full effect to all of the terms and conditions of this section. The Contractor shall provide, no later than fifteen (15) days after

Contract #16DOT7002

Contract Document

DOT-50 Rev. 7/16

receiving a request from the Agency, such information as the Agency may require to evidence, in the Agency's sole determination, compliance with this section.

7. Order and Delivery. The Contract shall bind the Contractor to furnish and deliver the Goods or Services in accordance with Exhibit A and at the prices set forth in Exhibit B. Subject to the sections in this Contract concerning Force Majeure, Termination and Open Market Purchases, the Contract shall bind the Agency to order the Goods or Services from the Contractor, and to pay for the accepted Goods or Services in accordance with Exhibit B.
8. Contract Amendments. No amendment to or modification or other alteration of the Contract shall be valid or binding upon the State unless made in writing, signed by both parties and, if applicable, approved by the Connecticut Attorney General.
9. Assignment. The Contractor shall not assign any of its rights or obligations under the Contract, voluntarily or otherwise, in any manner without the prior written consent of the Agency. The Agency may void any purported assignment in violation of this section and declare the Contractor in breach of Contract. Any Termination by the Agency for a breach is without prejudice to the Agency's or the State's rights or possible Claims.
10. Termination.
  - (a) Notwithstanding any provisions in this Contract, the Agency, through a duly authorized employee, may Terminate the Contract whenever the Agency makes a written determination that such Termination is in the best interests of the State. The Agency shall notify the Contractor in writing of Termination pursuant to this section, which notice shall specify the effective date of Termination and the extent to which the Contractor must complete its Performance under the Contract prior to such date.
  - (b) Notwithstanding any provisions in this Contract, the Agency, through a duly authorized employee, may, after making a written determination that the Contractor has breached the Contract, Terminate the Contract in accordance with the provisions in the Breach section of this Contract.
  - (c) The Agency shall send the notice of Termination via certified mail, return receipt requested, to the Contractor at the most current address which the Contractor has furnished to the Agency for purposes of correspondence, or by hand delivery. Upon receiving the notice from the Agency, the Contractor shall immediately discontinue all services affected in accordance with the notice, undertake all commercially reasonable efforts to mitigate any losses or damages, and deliver to the Agency all Records. The Records are deemed to be the property of the Agency and the Contractor shall deliver them to the Agency no later than thirty (30) days after the Termination of the Contract or fifteen (15) days after the Contractor receives a written request from the Agency for the Records. The Contractor shall deliver those Records that exist in electronic, magnetic or other intangible form in a non-proprietary format, such as, but not limited to, ASCII or .TXT.
  - (d) Upon receipt of a written notice of Termination from the Agency, the Contractor shall cease operations as the Agency directs in the notice, and take all actions that are necessary or appropriate, or that the Agency may reasonably direct, for the protection, and preservation of the Goods and any other property. Except for any work which the Agency directs the Contractor to Perform in the notice prior to the effective date of Termination, and except as otherwise provided in the notice, the Contractor shall terminate or conclude all existing subcontracts and purchase orders and shall not enter into any further subcontracts, purchase orders or commitments.



- (e) The Agency shall, within forty-five (45) days of the effective date of Termination, reimburse the Contractor for its Performance rendered and accepted by the Agency in accordance with Exhibit A, in addition to all actual and reasonable costs incurred after Termination in completing those portions of the Performance which the notice required the Contractor to complete. However, the Contractor is not entitled to receive and the Agency is not obligated to tender to the Contractor any payments for anticipated or lost profits. Upon request by the Agency, the Contractor shall assign to the Agency, or any replacement contractor which the Agency designates, all subcontracts, purchase orders and other commitments, deliver to the Agency all Records and other information pertaining to its Performance, and remove from State premises, whether leased or owned, all of Contractor's property, equipment, waste material and rubbish related to its Performance, all as the Agency may request.
  - (f) For breach or violation of any of the provisions in the section concerning Representations and Warranties, the Agency may Terminate the Contract in accordance with its terms and revoke any consents to assignments given as if the assignments had never been requested or consented to, without liability to the Contractor or Contractor Parties or any third party.
  - (g) Upon Termination of the Contract, all rights and obligations shall be null and void, so that no party shall have any further rights or obligations to any other party, except with respect to the sections which survive Termination. All representations, warranties, agreements and rights of the parties under the Contract shall survive such Termination to the extent not otherwise limited in the Contract and without each one of them having to be specifically mentioned in the Contract.
  - (h) Termination of the Contract pursuant to this section shall not be deemed to be a breach of contract by the Agency.
11. Cost Modifications. The parties may agree to a reduction in the cost of the Contract at any time during which the Contract is in effect. Without intending to impose a limitation on the nature of the reduction, the reduction may be to hourly, staffing or unit costs, the total cost of the Contract or the reduction may take such other form as the State deems to be necessary or appropriate.
12. Breach. If either party breaches the Contract in any respect, the non-breaching party shall provide written notice of such breach to the breaching party and afford the breaching party an opportunity to cure the breach within ten (10) days from the date that the breaching party receives such notice. Any other time provided for in the notice shall trump such ten (10) days. Such right to cure period shall be extended if the non-breaching party is satisfied that the breaching party is making a good faith effort to cure but the nature of the breach is such that it cannot be cured within the right to cure period. The notice may include an effective Contract Termination date if the breach is not cured by the stated date and, unless otherwise modified by the non-breaching party in writing prior to the Termination date, no further action shall be required of any party to effect the Termination as of the stated date. If the notice does not set forth an effective Contract Termination date, then the non-breaching party may Terminate the Contract by giving the breaching party no less than twenty four (24) hours' prior written notice. If the Agency believes that the Contractor has not performed according to the Contract, the Agency may withhold payment in whole or in part pending resolution of the Performance issue, provided that the Agency notifies the Contractor in writing prior to the date that the payment would have been due in accordance with Exhibit B.
13. Waiver.
- (a) No waiver of any breach of the Contract shall be interpreted or deemed to be a waiver of any other or subsequent breach. All remedies afforded in the Contract shall be taken and construed as

cumulative, that is, in addition to every other remedy provided in the Contract or at law or in equity.

- (b) A party's failure to insist on strict performance of any provision of the Contract shall only be deemed to be a waiver of rights and remedies concerning that specific instance of Performance and shall not be deemed to be a waiver of any subsequent rights, remedies or breach.

14. Open Market Purchases. Failure of the Contractor to Perform within the time specified in the Contract, or failure to replace rejected or substandard Goods or fulfill unperformed Services when so requested and as the Contract provides or allows, constitutes a breach of the Contract and as a remedy for such breach, such failure shall constitute authority for the Agency, if it deems it to be necessary or appropriate in its sole discretion, to Terminate the Contract and/or to purchase on the open market, Goods or Services to replace those which have been rejected, not delivered, or not Performed. The Agency shall invoice the Contractor for all such purchases to the extent that they exceed the costs and expenses in Exhibit B and the Contractor shall pay the Agency's invoice immediately after receiving the invoice. If the Agency does not Terminate the Contract, the Agency will deduct such open market purchases from the Contract quantities. However, if the Agency deems it to be in the best interest of the State, the Agency may accept and use the Goods or Services delivered which are substandard in quality, subject to an adjustment in price to be determined by the Agency.

15. Purchase Orders.

- (a) The Contract itself is not an authorization for the Contractor to ship Goods or begin Performance in any way. The Contractor may begin Performance only after it has received a duly issued purchase order against the Contract for Performance.
- (b) The Agency shall issue a purchase order against the Contract directly to the Contractor and to no other party.
- (c) All purchase orders shall be in written or electronic form, bear the Contract number (if any) and comply with all other State and Agency requirements, particularly the Agency's requirements concerning procurement. Purchase orders issued in compliance with such requirements shall be deemed to be duly issued.
- (d) A Contractor making delivery without a duly issued purchase order in accordance with this section does so at the Contractor's own risk.
- (e) The Agency may, in its sole discretion, deliver to the Contractor any or all duly issued purchase orders via electronic means only, such that the Agency shall not have any additional obligation to deliver to the Contractor a "hard copy" of the purchase order or a copy bearing any hand-written signature or other "original" marking.

16. Indemnification.

- (a) The Contractor shall indemnify, defend and hold harmless the State and its officers, representatives, agents, servants, employees, successors and assigns from and against any and all (1) Claims arising, directly or indirectly, in connection with the Contract, including the acts of commission or omission (collectively, the "Acts") of the Contractor or Contractor Parties; and (2) liabilities, damages, losses, costs and expenses, including but not limited to, attorneys' and other professionals' fees, arising, directly or indirectly, in connection with Claims, Acts or the Contract. The Contractor shall use counsel reasonably acceptable to the State in carrying out its obligations under this section. The Contractor's obligations under this section to indemnify, defend and hold harmless against Claims

includes Claims concerning confidentiality of any part of or all of the Contractor's bid, proposal or any Records, any intellectual property rights, other proprietary rights of any person or entity, copyrighted or uncopyrighted compositions, secret processes, patented or unpatented inventions, articles or appliances furnished or used in the Performance.

- (b) The Contractor shall not be responsible for indemnifying or holding the State harmless from any liability arising due to the negligence of the State or any other person or entity acting under the direct control or supervision of the State.
- (c) The Contractor shall reimburse the State for any and all damages to the real or personal property of the State caused by the Acts of the Contractor or any Contractor Parties. The State shall give the Contractor reasonable notice of any such Claims.
- (d) The Contractor's duties under this section shall remain fully in effect and binding in accordance with the terms and conditions of the Contract, without being lessened or compromised in any way, even where the Contractor is alleged or is found to have merely contributed in part to the Acts giving rise to the Claims and/or where the State is alleged or is found to have contributed to the Acts giving rise to the Claims.
- (e) The Contractor shall carry and maintain at all times during the term of the Contract, and during the time that any provisions survive the term of the Contract, sufficient general liability insurance to satisfy its obligations under this Contract. The Contractor shall cause the State to be named as an additional insured on the policy and shall provide (1) a certificate of insurance, (2) the declaration page and (3) the additional insured endorsement to the policy to DAS and the Client Agency all in an electronic format acceptable to DAS prior to the Effective Date of the Contract evidencing that the State is an additional insured. The Contractor shall not begin Performance until the delivery of these 3 documents to the Client Agency. Contractor shall provide an annual electronic update of the 3 documents to the Client Agency and DAS on or before each anniversary of the Effective Date during the Contract term. State shall be entitled to recover under the insurance policy even if a body of competent jurisdiction determines that State is contributorily negligent.
- (f) This section shall survive the Termination of the Contract and shall not be limited by reason of any insurance coverage.

17. Forum and Choice of Law. The parties deem the Contract to have been made in the City of Hartford, State of Connecticut. Both parties agree that it is fair and reasonable for the validity and construction of the Contract to be, and it shall be, governed by the laws and court decisions of the State of Connecticut, without giving effect to its principles of conflicts of laws. To the extent that any immunities provided by Federal law or the laws of the State of Connecticut do not bar an action against the State, and to the extent that these courts are courts of competent jurisdiction, for the purpose of venue, the complaint shall be made returnable to the Judicial District of Hartford only or shall be brought in the United States District Court for the District of Connecticut only, and shall not be transferred to any other court, provided, however, that nothing here constitutes a waiver or compromise of the sovereign immunity of the State of Connecticut. The Contractor waives any objection which it may now have or will have to the laying of venue of any Claims in any forum and further irrevocably submits to such jurisdiction in any suit, action or proceeding.

18. Contractor Guaranties. Contractor shall:

- (a) Perform fully under the Contract;

- (b) Guarantee the Goods or Services against defective material or workmanship and to repair any damage or marring occasioned in transit or, at the Agency's option, replace them;
- (c) Furnish adequate protection from damage for all work and to repair damage of any kind, for which its workers are responsible, to the premises, Goods, the Contractor's work or that of Contractor Parties;
- (d) With respect to the provision of Services, pay for all permits, licenses and fees and give all required or appropriate notices;
- (e) Adhere to all Contractual provisions ensuring the confidentiality of Records that the Contractor has access to and are exempt from disclosure under the State's Freedom of Information Act or other applicable law; and
- (f) Neither disclaim, exclude nor modify the implied warranties of fitness for a particular purpose or of merchantability.

19. Implied Warranties. The Agency does not disclaim, exclude or modify the implied warranty of fitness for a particular purpose or the warranty of merchantability.

20. Goods, Standards and Appurtenances. Any Goods delivered must be standard new Goods, latest model, except as otherwise specifically stated in the Contract. Remanufactured, refurbished or reconditioned equipment may be accepted but only to the extent allowed under the Contract. Where the Contract does not specifically list or describe any parts or nominal appurtenances of equipment for the Goods, it shall be understood that the Contractor shall deliver such equipment and appurtenances as are usually provided with the manufacturer's stock model.

21. Delivery.

- (a) Delivery shall be made as ordered and in accordance with the Contract. Unless otherwise specified in the Contract, delivery shall be to a loading dock or receiving platform. The Contractor or Contractor's shipping designee shall be responsible for removal of Goods from the carrier and placement on the Agency loading dock or receiving platform. The receiving personnel of the Agency are not required to assist in this process. The decision of the Agency as to reasonable compliance with delivery terms shall be final and binding. The burden of proof of proper receipt of the order shall rest with the Contractor.
- (b) In order for the time of delivery to be extended, the Agency must first approve a request for extension from the time specified in the Contract, such extension applying only to the particular item or shipment.
- (c) Goods shall be securely and properly packed for shipment, according to accepted standard commercial practice, without extra charge for packing cases, baling or sacks. The containers shall remain the property of the Agency unless otherwise stated in the Contract.
- (d) All risk of loss and damage to the Goods transfers to the Agency upon Title vesting in the Agency.

22. Goods Inspection. The Agency shall determine the manner and prescribe the inspection of all Goods and the tests of all samples submitted to determine whether they comply with all of the specifications in the Contract. If any Goods fail in any way to meet the specifications in the Contract, the Agency may, in its sole discretion, either reject it and owe nothing or accept it and pay for it on

an adjusted price basis, depending on the degree to which the Goods meet the specifications. Any decision pertaining to any such failure or rejection shall be final and binding.

23. Emergency Standby for Goods and/or Services. If any Federal or State official, having authority to do so, declares an emergency or the occurrence of a natural disaster within the State of Connecticut, the Agency may request the Goods and Services on an expedited and prioritized basis. Upon receipt of such a request the Contractor shall make all necessary and appropriate commercially reasonable efforts to reallocate its staffing and other resources in order to give primary preference to Performing this Contract ahead of or prior to fulfilling, in whole or in part, any other contractual obligations that the Contractor may have. The Contractor is not obligated to make those efforts to Perform on an expedited and prioritized basis in accordance with this paragraph if doing so will make the Contractor materially breach any other contractual obligations that the Contractor may have. Contractor shall acknowledge receipt of any request made pursuant to this paragraph within 2 hours from the time that the Contractor receives it via purchase order or through a request to make an expedited or prioritized purchase through the State of Connecticut Purchasing Card (MasterCard) Program (the "P-Card Program"). If the Contractor fails to acknowledge receipt within 2 hours, confirm its obligation to Perform or actually Perform, as set forth in the purchase order or through the P-Card Program, then the Agency may procure the Performance from another source without further notice to Contractor and without creating any right of recourse at law or in equity against the Agency.
24. Setoff. In addition to all other remedies available hereunder, the State, in its sole discretion, may setoff (1) any costs or expenses that the State incurs resulting from the Contractor's unexcused nonperformance under the Contract and under any other agreement or arrangement that the Contractor has with the State and (2) any other amounts that are due or may become due from the State to the Contractor, against amounts otherwise due or that may become due to the Contractor under the Contract, or under any other agreement or arrangement that the Contractor has with the State. The State's right of setoff shall not be deemed to be the State's exclusive remedy for the Contractor's or Contractor Parties' breach of the Contract, all of which shall survive any setoffs by the State.
25. Force Majeure. The Agency and the Contractor shall not be excused from their obligation to Perform in accordance with the Contract except in the case of Force Majeure events and as otherwise provided for in the Contract. In the case of any such exception, the nonperforming party shall give immediate written notice to the other, explaining the cause and probable duration of any such nonperformance.
26. Advertising. The Contractor shall not refer to sales to the State for advertising or promotional purposes, including, but not limited to, posting any material or data on the Internet, without the Agency's prior written approval.
27. Americans With Disabilities Act. The Contractor shall be and remain in compliance with the Americans with Disabilities Act of 1990 ("Act"), to the extent applicable, during the term of the Contract. The Agency may Terminate the Contract if the Contractor fails to comply with the Act.
28. Representations and Warranties. The Contractor, represents and warrants to Agency for itself and Contractor Parties, that:
  - (a) if they are entities, they are duly and validly existing under the laws of their respective states of organization and authorized to conduct business in the State of Connecticut in the manner contemplated by the Contract. Further, as appropriate, they have taken all necessary action to

Contract #16DOT7002

Contract Document

DOT-50 Rev. 7/16

authorize the execution, delivery and Performance of the Contract and have the power and authority to execute, deliver and Perform their obligations under the Contract;

- (b) they will comply with all applicable State and Federal laws and municipal ordinances in satisfying their obligations to the Agency under and pursuant to the Contract, including, but not limited to (1) Connecticut General Statutes Title 1, Chapter 10, concerning the State's Codes of Ethics and (2) Title 4a concerning State purchasing, including, but not limited to Section 22a-194a concerning the use of polystyrene foam;
- (c) the execution, delivery and Performance of the Contract will not violate, be in conflict with, result in a breach of or constitute (with or without due notice and/or lapse of time) a default under any of the following, as applicable: (1) any provision of law; (2) any order of any court or the State; or (3) any indenture, agreement, document or other instrument to which it is a party or by which it may be bound;
- (d) they are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any governmental entity;
- (e) as applicable, they have not, within the three years preceding the Contract, in any of their current or former jobs, been convicted of, or had a civil judgment rendered against them or against any person who would Perform under the Contract, for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a transaction or contract with any governmental entity. This includes, but is not limited to, 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;
- (f) they are not presently indicted for or otherwise criminally or civilly charged by any governmental entity with commission of any of the offenses listed above;
- (g) they have not within the three years preceding the Contract had one or more contracts with any governmental entity Terminated;
- (h) they have not employed or retained any entity or person, other than a bona fide employee working solely for them, to solicit or secure the Contract and that they have not paid or agreed to pay any entity or person, other than a bona fide employee working solely for them, any fee, commission, percentage, brokerage fee, gifts, or any other consideration contingent upon or resulting from the award or making of the Contract or any assignments made in accordance with the terms of the Contract;
- (i) to the best of their knowledge, there are no Claims involving the Contractor or Contractor Parties that might reasonably be expected to materially adversely affect their businesses, operations, assets, properties, financial stability, business prospects or ability to Perform fully under the Contract;
- (j) they shall disclose, to the best of their knowledge, to the Agency in writing any Claims involving them that might reasonably be expected to materially adversely affect their businesses, operations, assets, properties, financial stability, business prospects or ability to Perform fully under the Contract, no later than ten (10) Days after becoming aware or after they should have become aware of any such Claims. For purposes of the Contractor's obligation to disclose any Claims to the Agency, the ten (10) Days in the section of this Contract concerning Disclosure of Contractor Parties Litigation shall run consecutively with the ten (10) Days provided for in this representation and warranty;

Contract #16DOT7002

Contract Document

DOT-50 Rev. 7/16

- (k) their participation in the Solicitation process is not a conflict of interest or a breach of ethics under the provisions of Title 1, Chapter 10 of the Connecticut General Statutes concerning the State's Code of Ethics;
- (l) the Bid was not made in connection or concert with any other person or entity, including any affiliate (as defined in the Tangible Personal Property section of this Contract) of the Contractor, submitting a bid for the same Goods or Services, and is in all respects fair and without collusion or fraud;
- (m) they are able to Perform under the Contract using their own resources or the resources of a party who is not a Contractor;
- (n) the Contractor shall obtain in a written contract all of the representations and warranties in this section from any Contractor Parties and to require that provision to be included in any contracts and purchase orders with Contractor Parties;
- (o) they have paid all applicable workers' compensation second injury fund assessments concerning all previous work done in Connecticut;
- (p) they have a record of compliance with Occupational Health and Safety Administration regulations without any unabated, willful or serious violations;
- (q) they owe no unemployment compensation contributions;
- (r) they are not delinquent in the payment of any taxes owed, or, that they have filed a sales tax security bond, and they have, if and as applicable, filed for motor carrier road tax stickers and have paid all outstanding road taxes;
- (s) all of their vehicles have current registrations and, unless such vehicles are no longer in service, they shall not allow any such registrations to lapse;
- (t) each Contractor Party has vested in the Contractor plenary authority to bind the Contractor Parties to the full extent necessary or appropriate to ensure full compliance with and Performance in accordance with all of the terms and conditions of the Contract and that all appropriate parties shall also provide, no later than fifteen (15) days after receiving a request from the Agency, such information as the Agency may require to evidence, in the Agency's sole determination, compliance with this section;
- (u) except to the extent modified or abrogated in the Contract, all Title shall pass to the Agency upon complete installation, testing and acceptance of the Goods or Services and payment by the Agency;
- (v) if either party Terminates the Contract, for any reason, they shall relinquish to the Agency all Title to the Goods delivered, accepted and paid for (except to the extent any invoiced amount is disputed) by the Agency;
- (w) with regard to third party products provided with the Goods, they shall transfer all licenses which they are permitted to transfer in accordance with the applicable third party license;
- (x) they shall not copyright, register, distribute or claim any rights in or to the Goods after the Effective Date of the Contract without the Agency's prior written consent;
- (y) they either own or have the authority to use all Title of and to the Goods, and that such Title is not the subject of any encumbrances, liens or claims of ownership by any third party;

- (z) the Goods do not infringe or misappropriate any patent, trade secret or other intellectual property right of a third party;
- (aa) the Agency's use of any Goods shall not infringe or misappropriate any patent, trade secret or other intellectual property right of a third party;
- (bb) if they procure any Goods, they shall sub-license such Goods and that the Agency shall be afforded the full benefits of any manufacturer or subcontractor licenses for the use of the Goods; and
- (cc) they shall assign or otherwise transfer to the Agency, or afford the Agency the full benefits of any manufacturer's warranty for the Goods, to the extent that such warranties are assignable or otherwise transferable to the Agency.

29. Representations and Warranties Concerning Motor Vehicles. If in the course of Performance or in any other way related to the Contract the Contractor at any time uses or operates "motor vehicles," as that term is defined by Conn. Gen. Stat. §14-1 (including, but not limited to such services as snow plowing, sanding, hauling or delivery of materials, freight or merchandise, or the transportation of passengers), the Contractor, represents and warrants for itself and the Contractor Parties, that:

(a) It is the owner of record or lessee of record of each such motor vehicle used in the Performance of the Contract, and each such motor vehicle is duly registered with the Connecticut Department of Motor Vehicles ("ConnDMV") in accordance with the provisions of Chapter 246 of the Connecticut General Statutes. Each such registration shall be in valid status, and shall not be expired, suspended or revoked by ConnDMV, for any reason or cause. If such motor vehicle is not registered with ConnDMV, then it shall be duly registered with another state or commonwealth in accordance with such other state's or commonwealth's applicable statutes. Each such registration shall be in valid status, and shall not be expired, suspended or revoked by such other state or commonwealth for any reason or cause.

(b) Each such motor vehicle shall be fully insured in accordance with the provisions of Sections 14-12b, 14-112 and 38a-371 of the Connecticut General Statutes, as amended, in the amounts required by the said sections or in such higher amounts as have been specified by ConnDMV as a condition for the award of the Contract, or in accordance with all substantially similar provisions imposed by the law of the jurisdiction where the motor vehicle is registered.

(c) Each Contractor Party who uses or operates a motor vehicle at any time in the Performance of the Contract shall have and maintain a motor vehicle operator's license or commercial driver's license of the appropriate class for the motor vehicle being used or operated. Each such license shall bear the endorsement or endorsements required by the provisions of Section 14-36a of the Connecticut General Statutes, as amended, to operate such motor vehicle, or required by substantially similar provisions imposed by the law of another jurisdiction in which the operator is licensed to operate such motor vehicle. The license shall be in valid status, and shall not be expired, suspended or revoked by ConnDMV or such other jurisdiction for any reason or cause.

(d) Each motor vehicle shall be in full compliance with all of the terms and conditions of all provisions of the Connecticut General Statutes and regulations, or those of the jurisdiction



where the motor vehicle is registered, pertaining to the mechanical condition, equipment, marking and operation of motor vehicles of such type, class and weight, including, but not limited to, requirements for intrastate carriers with motor vehicles having a gross vehicle weight rating or gross combination weight rating or gross vehicle weight or gross combination weight of 18,001 pounds or more or interstate carriers with motor vehicles having a gross vehicle weight rating or gross combination weight rating or gross vehicle weight or gross combination weight of 10,001 pounds or more otherwise described by the provisions of Conn. Gen. Stat. § 14-163c(a) and all applicable provisions of the Federal Motor Carrier Safety Regulations, as set forth in Title 49, Parts 382 to 399, inclusive, of the Code of Federal Regulations. If the Contractor is a "motor carrier," as that term is defined in section 49 CFR Part 390, and the Contractor is subject to an order issued by the Federal Motor Carrier Safety Administration that prohibits such Contractor from operating or allowing the operation of a motor vehicle, then the Contractor shall comply fully with such order. In addition, if a motor vehicle or its operator is declared out of service pursuant to Conn. Gen. Stat. § 14-163c(d)(4), then the Contractor shall not operate or allow the operation of that motor vehicle and shall not allow the operator to operate a motor vehicle while the respective subject out-of-service order is in effect.

30. Disclosure of Contractor Parties Litigation. The Contractor shall require that all Contractor Parties, as appropriate, disclose to the Contractor, to the best of their knowledge, any Claims involving the Contractor Parties that might reasonably be expected to materially adversely affect their businesses, operations, assets, properties, financial stability, business prospects or ability to Perform fully under the Contract, no later than ten (10) Days after becoming aware or after they should have become aware of any such Claims. Disclosure shall be in writing.
31. Entirety of Contract. The Contract is the entire agreement between the parties with respect to its subject matter, and supersedes all prior agreements, proposals, offers, counteroffers and understandings of the parties, whether written or oral. The Contract has been entered into after full investigation, neither party relying upon any statement or representation by the other unless such statement or representation is specifically embodied in the Contract.
32. Exhibits. All exhibits referred to in and attached to this Contract are incorporated in this Contract by such reference and shall be deemed to be a part of it as if they had been fully set forth in it.
33. Executive Orders. This Contract is subject to the provisions of Executive Order No. Three of Governor Thomas J. Meskill, promulgated June 16, 1971, concerning labor employment practices, Executive Order No. Seventeen of Governor Thomas J. Meskill, promulgated February 15, 1973, concerning the listing of employment openings and Executive Order No. Sixteen of Governor John G. Rowland promulgated August 4, 1999, concerning violence in the workplace, all of which are incorporated into and are made a part of the Contract as if they had been fully set forth in it. The Contract may also be subject to Executive Order No. 14 of Governor M. Jodi Rell, promulgated April 17, 2006, concerning procurement of cleaning products and services and to Executive Order No. 49 of Governor Dannel P. Malloy, promulgated May 22, 2015, mandating disclosure of certain gifts to public employees and contributions to certain candidates for office. If Executive Order 14 and/or Executive Order 49 are applicable, they are deemed to be incorporated into and are made a part of the Contract as if they had been fully set forth in it. At the Contractor's request, the Client Agency or DAS shall provide a copy of these orders to the Contractor.
34. Non-discrimination.
  - (a) For purposes of this Section, the following terms are defined as follows:

- (1) "Commission" means the Commission on Human Rights and Opportunities;
- (2) "Contract" and "contract" include any extension or modification of the Contract or contract;
- (3) "Contractor" and "contractor" include any successors or assigns of the Contractor or contractor;
- (4) "Gender identity or expression" means a person's gender-related identity, appearance or behavior, whether or not that gender-related identity, appearance or behavior is different from that traditionally associated with the person's physiology or assigned sex at birth, which gender-related identity can be shown by providing evidence including, but not limited to, medical history, care or treatment of the gender-related identity, consistent and uniform assertion of the gender-related identity or any other evidence that the gender-related identity is sincerely held, part of a person's core identity or not being asserted for an improper purpose.
- (5) "good faith" means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations;
- (6) "good faith efforts" shall include, but not be limited to, those reasonable initial efforts necessary to comply with statutory or regulatory requirements and additional or substituted efforts when it is determined that such initial efforts will not be sufficient to comply with such requirements;
- (7) "marital status" means being single, married as recognized by the state of Connecticut, widowed, separated or divorced;
- (8) "mental disability" means one or more mental disorders, as defined in the most recent edition of the American Psychiatric Association's "Diagnostic and Statistical Manual of Mental Disorders", or a record of or regarding a person as having one or more such disorders;
- (9) "minority business enterprise" means any small contractor or supplier of materials fifty-one percent or more of the capital stock, if any, or assets of which is owned by a person or persons: (1) who are active in the daily affairs of the enterprise, (2) who have the power to direct the management and policies of the enterprise, and (3) who are members of a minority, as such term is defined in subsection (a) of Connecticut General Statutes § 32-9n; and
- (10) "public works contract" means any agreement between any individual, firm or corporation and the State or any political subdivision of the State other than a municipality for construction, rehabilitation, conversion, extension, demolition or repair of a public building, highway or other changes or improvements in real property, or which is financed in whole or in part by the State, including, but not limited to, matching expenditures, grants, loans, insurance or guarantees.

For purposes of this Section, the terms "Contract" and "contract" do not include a contract where each contractor is (1) a political subdivision of the state, including, but not limited to, a municipality, (2) a quasi-public agency, as defined in Conn. Gen. Stat. Section 1-120, (3) any other state, including but not

limited to any federally recognized Indian tribal governments, as defined in Conn. Gen. Stat. Section 1-267, (4) the federal government, (5) a foreign government, or (6) an agency of a subdivision, agency, state or government described in the immediately preceding enumerated items (1), (2), (3), (4) or (5).

(b)

(1) The Contractor agrees and warrants that in the performance of the Contract such Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such Contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or of the State of Connecticut; and the Contractor further agrees to take affirmative action to insure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to their race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by the Contractor that such disability prevents performance of the work involved; (2) the Contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, to state that it is an "affirmative action-equal opportunity employer" in accordance with regulations adopted by the Commission; (3) the Contractor agrees to provide each labor union or representative of workers with which the Contractor has a collective bargaining agreement or other contract or understanding and each vendor with which the Contractor has a contract or understanding, a notice to be provided by the Commission, advising the labor union or workers' representative of the Contractor's commitments under this section and to post copies of the notice in conspicuous places available to employees and applicants for employment; (4) the Contractor agrees to comply with each provision of this Section and Connecticut General Statutes §§ 46a-68e and 46a-68f and with each regulation or relevant order issued by said Commission pursuant to Connecticut General Statutes §§ 46a-56, 46a-68e and 46a-68f; and (5) the Contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the Commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor as relate to the provisions of this Section and Connecticut General Statutes § 46a-56. If the contract is a public works contract, the Contractor agrees and warrants that he will make good faith efforts to employ minority business enterprises as subcontractors and suppliers of materials on such public works projects.

(c) Determination of the Contractor's good faith efforts shall include, but shall not be limited to, the following factors: The Contractor's employment and subcontracting policies, patterns and practices; affirmative advertising, recruitment and training; technical assistance activities and such other reasonable activities or efforts as the Commission may prescribe that are designed to ensure the participation of minority business enterprises in public works projects.

(d) The Contractor shall develop and maintain adequate documentation, in a manner prescribed by the Commission, of its good faith efforts.

(e) The Contractor shall include the provisions of subsection (b) of this Section in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the State and such provisions shall be binding on a subcontractor, vendor or manufacturer unless exempted by

regulations or orders of the Commission. The Contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with Connecticut General Statutes §46a-56; provided if such Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission, the Contractor may request the State of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the State and the State may so enter.

(f) The Contractor agrees to comply with the regulations referred to in this Section as they exist on the date of this Contract and as they may be adopted or amended from time to time during the term of this Contract and any amendments thereto.

(g)

(1) The Contractor agrees and warrants that in the performance of the Contract such Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of sexual orientation, in any manner prohibited by the laws of the United States or the State of Connecticut, and that employees are treated when employed without regard to their sexual orientation; (2) the Contractor agrees to provide each labor union or representative of workers with which such Contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such Contractor has a contract or understanding, a notice to be provided by the Commission on Human Rights and Opportunities advising the labor union or workers' representative of the Contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment; (3) the Contractor agrees to comply with each provision of this section and with each regulation or relevant order issued by said Commission pursuant to Connecticut General Statutes § 46a-56; and (4) the Contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the Commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor which relate to the provisions of this Section and Connecticut General Statutes § 46a-56.

(h) The Contractor shall include the provisions of the foregoing paragraph in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the State and such provisions shall be binding on a subcontractor, vendor or manufacturer unless exempted by regulations or orders of the Commission. The Contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with Connecticut General Statutes § 46a-56; provided, if such Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission, the Contractor may request the State of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the State and the State may so enter.

### 35. Tangible Personal Property.

(a) The Contractor on its behalf and on behalf of its Affiliates, as defined below, shall comply with the provisions of Conn. Gen. Stat. §12-411b, as follows:

- (1) For the term of the Contract, the Contractor and its Affiliates shall collect and remit to the State of Connecticut, Department of Revenue Services, any Connecticut use tax due under the provisions of Chapter 219 of the Connecticut General Statutes for items of tangible personal property sold by the Contractor or by any of its Affiliates in the same manner as if the Contractor and such Affiliates were engaged in the business of selling tangible personal property for use in Connecticut and had sufficient nexus under the provisions of Chapter 219 to be required to collect Connecticut use tax;
  - (2) A customer's payment of a use tax to the Contractor or its Affiliates relieves the customer of liability for the use tax;
  - (3) The Contractor and its Affiliates shall remit all use taxes they collect from customers on or before the due date specified in the Contract, which may not be later than the last day of the month next succeeding the end of a calendar quarter or other tax collection period during which the tax was collected;
  - (4) The Contractor and its Affiliates are not liable for use tax billed by them but not paid to them by a customer; and
  - (5) Any Contractor or Affiliate who fails to remit use taxes collected on behalf of its customers by the due date specified in the Contract shall be subject to the interest and penalties provided for persons required to collect sales tax under chapter 219 of the general statutes.
- (b) For purposes of this section of the Contract, the word "Affiliate" means any person, as defined in section 12-1 of the general statutes, that controls, is controlled by, or is under common control with another person. A person controls another person if the person owns, directly or indirectly, more than ten per cent of the voting securities of the other person. The word "voting security" means a security that confers upon the holder the right to vote for the election of members of the board of directors or similar governing body of the business, or that is convertible into, or entitles the holder to receive, upon its exercise, a security that confers such a right to vote. "Voting security" includes a general partnership interest.
- (c) The Contractor represents and warrants that each of its Affiliates has vested in the Contractor plenary authority to so bind the Affiliates in any agreement with the State of Connecticut. The Contractor on its own behalf and on behalf of its Affiliates shall also provide, no later than 30 days after receiving a request by the State's contracting authority, such information as the State may require to ensure, in the State's sole determination, compliance with the provisions of Chapter 219 of the Connecticut General Statutes, including, but not limited to, §12-411b.
36. Whistleblowing. This Contract may be subject to the provisions of Section 4-61dd of the Connecticut General Statutes. In accordance with this statute, if an officer, employee or appointing authority of the Contractor takes or threatens to take any personnel action against any employee of the Contractor in retaliation for such employee's disclosure of information to any employee of the contracting state or quasi-public agency or the Auditors of Public Accounts or the Attorney General under the provisions of subsection (a) of such statute, the Contractor shall be liable for a civil penalty of not more than five thousand dollars for each offense, up to a maximum of twenty per cent of the value of this Contract. Each violation shall be a separate and distinct offense and in the case of a continuing violation, each calendar day's continuance of the violation shall be deemed to be a separate and distinct offense. The State may request that the Attorney General bring a civil action in the Superior Court for the Judicial District of Hartford to seek imposition and recovery of such civil penalty. In accordance with subsection (f) of such statute, each large state contractor, as defined in the statute, shall post a notice of the provisions of the statute relating to large state

contractors in a conspicuous place which is readily available for viewing by the employees of the Contractor.

37. Notice. All notices, demands, requests, consents, approvals or other communications required or permitted to be given or which are given with respect to this Contract (for the purpose of this section collectively called "Notices") shall be deemed to have been effected at such time as the notice is placed in the U.S. mail, first class and postage pre-paid, return receipt requested or placed with a recognized, overnight express delivery service that provides for a return receipt. All such Notices shall be in writing and shall be addressed as follows:

If to the Agency:

State of Connecticut Department of Transportation

ADDRESS 2800 Berlin Turnpike

Room 2418, SW2

Newington, CT 06131-7546

Attention: Mary Matuszak

If to the Contractor:

NAME Motor Coach Industries, Inc.

ADDRESS 200 E Oakton St.  
Des Plaines, IL 60018

Attention: Tom Wagner

38. Insurance. Before commencing Performance, the Contractor shall obtain and maintain at its own cost and expense for the duration of the Contract, the following insurance as described in (a) through (h) below. Contractor shall assume any and all deductibles in the described insurance policies. The Contractor's insurers shall have no right of recovery or subrogation against the State and the described Contractor's insurance shall be primary coverage. Any failure to comply with the claim reporting provisions of the policy shall not affect coverage provided to the State.

- (a) Commercial General Liability: \$1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage. Coverage shall include, Premises and Operations, Independent Contractors, Products and Completed Operations, Contractual Liability and Broad Form Property Damage coverage. If a general aggregate is used, the general aggregate limit shall apply separately to the project or the general aggregate limit shall be twice the occurrence limit.
- (b) Automobile Liability: \$1,000,000 combined single limit per accident for bodily injury. Coverage extends to owned, hired and non-owned automobiles. If the vendor/contractor does not own an

automobile, but one is used in the execution of the contract, then only hired and non-owned coverage is required. If a vehicle is not used in the execution of the contract then automobile coverage is not required.

- (c) **Workers' Compensation and Employers Liability:** Statutory coverage in compliance with the Compensation laws of the State of Connecticut. Coverage shall include Employer's Liability with minimum limits of \$100,000 each accident, \$500,000 Disease – Policy limit, \$100,000 each employee.
39. **Headings.** The headings given to the sections in the Contract are inserted only for convenience and are in no way to be construed as part of the Contract or as a limitation of the scope of the particular section to which the heading refers.
40. **Number and Gender.** Whenever the context so requires, the plural or singular shall include each other and the use of any gender shall include all genders.
41. **Parties.** To the extent that any Contractor Party is to participate or Perform in any way, directly or indirectly in connection with the Contract, any reference in the Contract to "Contractor" shall also be deemed to include "Contractor Parties," as if such reference had originally specifically included "Contractor Parties" since it is the parties' intent for the terms "Contractor Parties" to be vested with the same respective rights and obligations as the term "Contractor."
42. **Contractor Changes.** The Contractor shall notify the Agency in writing no later than ten (10) Days from the effective date of any change in:
- (a) its certificate of incorporation or other organizational document;
  - (b) more than a controlling interest in the ownership of the Contractor; or
  - (c) the individual(s) in charge of the Performance.

This change shall not relieve the Contractor of any responsibility for the accuracy and completeness of the Performance. The Agency, after receiving written notice by the Contractor of any such change, may require such agreements, releases and other instruments evidencing, to the Agency's satisfaction, that any individuals retiring or otherwise separating from the Contractor have been compensated in full or that provision has been made for compensation in full, for all work performed under terms of the Contract. The Contractor shall deliver such documents to the Agency in accordance with the terms of the Agency's written request. The Agency may also require, and the Contractor shall deliver, a financial statement showing that solvency of the Contractor is maintained. The death of any Contractor Party, as applicable, shall not release the Contractor from the obligation to Perform under the Contract; the surviving Contractor Parties, as appropriate, must continue to Perform under the Contract until Performance is fully completed.

43. **Further Assurances.** The parties shall provide such information, execute and deliver any instruments and documents and take such other actions as may be necessary or reasonably requested by the other party which are not inconsistent with the provisions of this Contract and which do not involve the vesting of rights or assumption of obligations other than those provided for in the Contract, in order to give full effect to the Contract and to carry out the intent of the Contract.
44. **Audit and Inspection of Plants, Places of Business and Records.**

- (a) The State and its agents, including, but not limited to, the Connecticut Auditors of Public Accounts, Attorney General and State's Attorney and their respective agents, may, at reasonable hours, inspect and examine all of the parts of the Contractor's and Contractor Parties' plants and places of business which, in any way, are related to, or involved in, the performance of this Contract.
  - (b) The Contractor shall maintain, and shall require each of the Contractor Parties to maintain, accurate and complete Records. The Contractor shall make all of it's and the Contractor Parties' Records available at all reasonable hours for audit and inspection by the State and its agents.
  - (c) The State shall make all requests for any audit or inspection in writing and shall provide the Contractor with at least twenty-four (24) hours' notice prior to the requested audit and inspection date. If the State suspects fraud or other abuse, or in the event of an emergency, the State is not obligated to provide any prior notice.
  - (d) The Contractor will pay for all costs and expenses of any audit or inspection which reveals information that, in the sole determination of the State, is sufficient to constitute a breach by the Contractor under this Contract. The Contractor will remit full payment to the State for such audit or inspection no later than 30 days after receiving an invoice from the State. If the State does not receive payment within such time, the State may setoff the amount from any moneys which the State would otherwise be obligated to pay the Contractor in accordance with this Contract's Setoff provision.
  - (e) The Contractor shall keep and preserve or cause to be kept and preserved all of its and Contractor Parties' Records until three (3) years after the latter of (i) final payment under this Contract, or (ii) the expiration or earlier termination of this Contract, as the same may be modified for any reason. The State may request an audit or inspection at any time during this period. If any Claim or audit is started before the expiration of this period, the Contractor shall retain or cause to be retained all Records until all Claims or audit findings have been resolved.
  - (f) The Contractor shall cooperate fully with the State and its agents in connection with an audit or inspection. Following any audit or inspection, the State may conduct and the Contractor shall cooperate with an exit conference.
  - (g) The Contractor shall incorporate this entire Section verbatim into any contract or other agreement that it enters into with any Contractor Party.
45. Background Checks. The State may require that the Contractor and Contractor Parties undergo criminal background checks as provided for in the State of Connecticut Department of Emergency Services and Public Protection Administration and Operations Manual or such other State document as governs procedures for background checks. The Contractor and Contractor Parties shall cooperate fully as necessary or reasonably requested with the State and its agents in connection with such background checks.
46. Continued Performance. The Contractor and Contractor Parties shall continue to Perform their obligations under the Contract while any dispute concerning the Contract is being resolved.
47. Working and Labor Synergies. The Contractor shall be responsible for maintaining a tranquil working relationship between the Contractor work force, the Contractor Parties and their work force, State employees, and any other contractors present at the work site. The Contractor shall



quickly resolve all labor disputes which result from the Contractor's or Contractor Parties' presence at the work site, or other action under their control. Labor disputes shall not be deemed to be sufficient cause to allow the Contractor to make any claim for additional compensation for cost, expenses or any other loss or damage, nor shall those disputes be deemed to be sufficient reason to relieve the Contractor from any of its obligations under the Contract.

48. Contractor Responsibility.

(a) The Contractor shall be responsible for the entire Performance under the Contract regardless of whether the Contractor itself performs. The Contractor shall be the sole point of contact concerning the management of the Contract, including Performance and payment issues. The Contractor is solely and completely responsible for adherence by the Contractor Parties to all applicable provisions of the Contract.

(b) The Contractor shall exercise all reasonable care to avoid damage to the State's property or to property being made ready for the State's use, and to all property adjacent to any work site. The Contractor shall promptly report any damage, regardless of cause, to the State.

49. Severability. If any term or provision of the Contract or its application to any person, entity or circumstance shall, to any extent, be held to be invalid or unenforceable, the remainder of the Contract or the application of such term or provision shall not be affected as to persons, entities or circumstances other than those as to whom or to which it is held to be invalid or unenforceable. Each remaining term and provision of the Contract shall be valid and enforced to the fullest extent possible by law.

50. Confidential Information. The Agency will afford due regard to the Contractor's request for the protection of proprietary or confidential information which the Agency receives. However, all materials associated with the Bid and the Contract are subject to the terms of the Connecticut Freedom of Information Act ("FOIA") and all corresponding rules, regulations and interpretations. In making such a request, the Contractor may not merely state generally that the materials are proprietary or confidential in nature and not, therefore, subject to release to third parties. Those particular sentences, paragraphs, pages or sections that the Contractor believes are exempt from disclosure under the FOIA must be specifically identified as such. Convincing explanation and rationale sufficient to justify each exemption consistent with the FOIA must accompany the request. The rationale and explanation must be stated in terms of the prospective harm to the competitive position of the Contractor that would result if the identified material were to be released and the reasons why the materials are legally exempt from release pursuant to the FOIA. To the extent that any other provision or part of the Contract, especially including the Bid, the Records and the specifications, conflicts or is in any way inconsistent with this section, this section controls and shall apply and the conflicting provision or part shall not be given effect. If the Contractor indicates that certain documentation is submitted in confidence, by specifically and clearly marking said documentation as "CONFIDENTIAL," the Agency will endeavor to keep said information confidential to the extent permitted by law. The Agency, however, has no obligation to initiate, prosecute or defend any legal proceeding or to seek a protective order or other similar relief to prevent disclosure of any information that is sought pursuant to a FOIA request. The Contractor shall have the burden of establishing the availability of any FOIA exemption in any proceeding where it is an issue. In no event shall the Agency or the State have any liability for the disclosure of any documents or information in its possession which the Agency believes are required to be disclosed pursuant to the FOIA or other requirements of law.

51. References to Statutes, Public Acts, Regulations, Codes and Executive Orders.

All references in this Contract to any statute, public act, regulation, code or executive order shall mean such statute, public act, regulation, code or executive order, respectively, as it has been amended, replaced or superseded at any time. Notwithstanding any language in this Contract that relates to such statute, public act, regulation, code or executive order, and notwithstanding a lack of a formal amendment to this Contract, this Contract shall always be read and interpreted as if it contained the most current and applicable wording and requirements of such statute, public act, regulation, code or executive order as if their most current language had been used in and requirements incorporated into this Contract at the time of its execution.

52. Cross-Default.

- (a) If the Contractor or Contractor Parties breach, default or in any way fail to Perform satisfactorily under the Contract, then the Agency may, in its sole discretion, without more and without any action whatsoever required of the Agency, treat any such event as a breach, default or failure to perform under any or all other agreements or arrangements ("Other Agreements") that the Contractor or Contractor Parties have with the Agency. Accordingly, the Agency may then exercise at its sole option any and all of its rights or remedies provided for in the Contract or Other Agreements, either selectively or collectively and without such election being deemed to prejudice any rights or remedies of the Agency, as if the Contractor or Contractor Parties had suffered a breach, default or failure to perform under the Other Agreements.
- (b) If the Contractor or Contractor Parties breach, default or in any way fail to Perform satisfactorily under any or all Other Agreements with the Agency or the State, then the Agency may, in its sole discretion, without more and without any action whatsoever required of the Agency, treat any such event as a breach, default or failure to Perform under the Contract. Accordingly, the Agency may then exercise at its sole option any and all of its rights or remedies provided for in the Other Agreements or the Contract, either selectively or collectively and without such election being deemed to prejudice any rights or remedies of the Agency or the State, as if the Contractor or Contractor Parties had suffered a breach, default or failure to Perform under the Contract.

53. Disclosure of Records. This Contract may be subject to the provisions of section 1-218 of the Connecticut General Statutes. In accordance with this statute, each contract in excess of two million five hundred thousand dollars between a public agency and a person for the performance of a governmental function shall (a) provide that the public agency is entitled to receive a copy of records and files related to the performance of the governmental function, and (b) indicate that such records and files are subject to FOIA and may be disclosed by the public agency pursuant to FOIA. No request to inspect or copy such records or files shall be valid unless the request is made to the public agency in accordance with FOIA. Any complaint by a person who is denied the right to inspect or copy such records or files shall be brought to the Freedom of Information Commission in accordance with the provisions of sections 1-205 and 1-206 of the Connecticut General Statutes.

54. Summary of State Ethics Laws. Pursuant to the requirements of section 1-101qq of the Connecticut General Statutes, the summary of State ethics laws developed by the State Ethics Commission pursuant to section 1-81b of the Connecticut General Statutes is incorporated by reference into and made a part of the Contract as if the summary had been fully set forth in the Contract.

55. Sovereign Immunity. The parties acknowledge and agree that nothing in the Solicitation or the Contract shall be construed as a modification, compromise or waiver by the State of any rights or defenses of any immunities provided by Federal law or the laws of the State of Connecticut to the State or any of its officers and employees, which they may have had, now have or will have with

Contract #16DOT7002

Contract Document

DOT-50 Rev. 7/16

respect to all matters arising out of the Contract. To the extent that this section conflicts with any other section, this section shall govern.

56. Time of the Essence. Time is of the essence with respect to all provisions of this Contract that specify a time for performance; provided, however, that this provision shall not be construed to limit or deprive a party of the benefits of any grace or use period allowed in this Contract.
57. Certification as Small Contractor or Minority Business Enterprise. The Contractor shall be in breach of this Contract if the Contractor is certified as a "small contractor" or a "minority business enterprise" under Conn. Gen. Stat. § 4a-60g and that certification lapses during the term of this Contract.
58. Campaign Contribution Restriction. For all State contracts as defined in Conn. Gen. Stat. § 9-612(g)(1) having a value in a calendar year of \$50,000 or more or a combination or series of such agreements or contracts having a value of \$100,000 or more, the authorized signatory to this Contract expressly acknowledges receipt of the State Elections Enforcement Commission's notice advising state contractors of state campaign contribution and solicitation prohibitions, and will inform its principals of the contents of the notice, as set forth in "Notice to Executive Branch State Contractors and Prospective State Contractors of Campaign Contribution and Solicitation Limitations," attached as Exhibit C.
59. Health Insurance Portability and Accountability Act.
  - (a) If the Contractor is a Business Associate under the requirements of the Health Insurance Portability and Accountability Act of 1996 ("HIPAA"), as noted in this Contract, the Contractor must comply with all terms and conditions of this Section of the Contract. If the Contractor is not a Business Associate under HIPAA, this Section of the Contract does not apply to the Contractor for this Contract.
  - (b) The Contractor is required to safeguard the use, publication and disclosure of information on all applicants for, and all clients who receive, services under the Contract in accordance with all applicable federal and state law regarding confidentiality, which includes but is not limited to HIPAA, more specifically with the Privacy and Security Rules at 45 C.F.R. Part 160 and Part 164, subparts A, C, and E; and
  - (c) The Client Agency is a "covered entity" as that term is defined in 45 C.F.R. § 160.103; and
  - (d) The Contractor is a "business associate" of the Agency, as that term is defined in 45 C.F.R. § 160.103; and
  - (e) The Contractor and the Client Agency agree to the following in order to secure compliance with HIPAA, the requirements of Subtitle D of the Health Information Technology for Economic and Clinical Health Act ("HITECH Act"), (Pub. L. 111-5, §§ 13400 to 13423), and more specifically with the Privacy and Security Rules at 45 C.F.R. Part 160 and Part 164, subparts A, C, D and E (collectively referred to herein as the "HIPAA Standards").
  - (f) Definitions

- (1) "Breach" shall have the same meaning as the term is defined in section 45 C.F.R. 164.402 and shall also include any use or disclosure of PHI that violates the HIPAA Standards.
- (2) "Business Associate" shall mean the Contractor.
- (3) "Covered Entity" shall mean the Client Agency.
- (4) "Designated Record Set" shall have the same meaning as the term "designated record set" in 45 C.F.R. § 164.501.
- (5) "Electronic Health Record" shall have the same meaning as the term is defined in section 13400 of the HITECH Act (42 U.S.C. §17921(5)).
- (6) "Individual" shall have the same meaning as the term "individual" in 45 C.F.R. § 160.103 and shall include a person who qualifies as a personal representative as defined in 45 C.F.R. § 164.502(g).
- (7) "Privacy Rule" shall mean the Standards for Privacy of Individually Identifiable Health Information at 45 C.F.R. part 160 and part 164, subparts A and E.
- (8) "Protected Health Information" or "PHI" shall have the same meaning as the term "protected health information" in 45 C.F.R. § 160.103, and includes electronic PHI, as defined in 45 C.F.R. 160.103, limited to information created, maintained, transmitted or received by the Business Associate from or on behalf of the Covered Entity or from another Business Associate of the Covered Entity.
- (9) "Required by Law" shall have the same meaning as the term "required by law" in 45 C.F.R. § 164.103.
- (10) "Secretary" shall mean the Secretary of the Department of Health and Human Services or his or her designee.
- (11) "More stringent" shall have the same meaning as the term "more stringent" in 45 C.F.R. § 160.202.
- (12) "This Section of the Contract" refers to the HIPAA provisions stated herein, in their entirety.
- (13) "Security Incident" shall have the same meaning as the term "security incident" in 45 C.F.R. § 164.304.
- (14) "Security Rule" shall mean the Security Standards for the Protection of Electronic Protected Health Information at 45 C.F.R. part 160 and part 164, subpart A and C.
- (15) "Unsecured protected health information" shall have the same meaning as the term as defined in 45 C.F.R. 164.402.

- (g) Obligations and Activities of Business Associates.
- (1) Business Associate agrees not to use or disclose PHI other than as permitted or required by this Section of the Contract or as Required by Law.
  - (2) Business Associate agrees to use and maintain appropriate safeguards and comply with applicable HIPAA Standards with respect to all PHI and to prevent use or disclosure of PHI other than as provided for in this Section of the Contract and in accordance with HIPAA Standards.
  - (3) Business Associate agrees to use administrative, physical and technical safeguards that reasonably and appropriately protect the confidentiality, integrity, and availability of electronic Protected Health Information that it creates, receives, maintains, or transmits on behalf of the Covered Entity.
  - (4) Business Associate agrees to mitigate, to the extent practicable, any harmful effect that is known to the Business Associate of a use or disclosure of PHI by Business Associate in violation of this Section of the Contract.
  - (5) Business Associate agrees to report to Covered Entity any use or disclosure of PHI not provided for by this Section of the Contract or any Security Incident of which it becomes aware.
  - (6) Business Associate agrees, in accordance with 45 C.F.R. 502(e)(1)(ii) and 164.308(d)(2), if applicable, to ensure that any subcontractors that create, receive, maintain or transmit PHI on behalf of the Business Associate, agree to the same restrictions, conditions, and requirements that apply to the business associate with respect to such information;
  - (7) Business Associate agrees to provide access (including inspection, obtaining a copy or both), at the request of the Covered Entity, and in the time and manner designated by the Covered Entity, to PHI in a Designated Record Set, to Covered Entity or, as directed by Covered Entity, to an Individual in order to meet the requirements under 45 C.F.R. § 164.524. Business Associate shall not charge any fees greater than the lesser of the amount charged by the Covered Entity to an Individual for such records; the amount permitted by state law; or the Business Associate's actual cost of postage, labor and supplies for complying with the request.
  - (8) Business Associate agrees to make any amendments to PHI in a Designated Record Set that the Covered Entity directs or agrees to pursuant to 45 C.F.R. § 164.526 at the request of the Covered Entity, and in the time and manner designated by the Covered Entity.
  - (9) Business Associate agrees to make internal practices, books, and records, including policies and procedures and PHI, relating to the use and disclosure of PHI received from, or created, maintained, transmitted or received by, Business Associate on behalf

of Covered Entity, available to Covered Entity or to the Secretary in a time and manner agreed to by the parties or designated by the Secretary, for purposes of the Secretary investigating or determining Covered Entity's compliance with the HIPAA Standards.

- (10) Business Associate agrees to document such disclosures of PHI and information related to such disclosures as would be required for Covered Entity to respond to a request by an Individual for an accounting of disclosures of PHI in accordance with 45 C.F.R. § 164.528 and section 13405 of the HITECH Act (42 U.S.C. § 17935) and any regulations promulgated thereunder.
- (11) Business Associate agrees to provide to Covered Entity, in a time and manner designated by the Covered Entity, information collected in accordance with subsection (g)(10) of this Section of the Contract, to permit Covered Entity to respond to a request by an Individual for an accounting of disclosures of PHI in accordance with 45 C.F.R. § 164.528 and section 13405 of the HITECH Act (42 U.S.C. § 17935) and any regulations promulgated thereunder. Business Associate agrees at the Covered Entity's direction to provide an accounting of disclosures of PHI directly to an individual in accordance with 45 C.F.R. § 164.528 and section 13405 of the HITECH Act (42 U.S.C. § 17935) and any regulations promulgated thereunder.
- (12) Business Associate agrees to comply with any State or federal law that is more stringent than the Privacy Rule.
- (13) Business Associate agrees to comply with the requirements of the HITECH Act relating to privacy and security that are applicable to the Covered Entity and with the requirements of 45 C.F.R. §§ 164.504(e), 164.308, 164.310, 164.312, and 164.316.
- (14) In the event that an Individual requests that the Business Associate
  - (A) restrict disclosures of PHI;
  - (B) provide an accounting of disclosures of the Individual's PHI;
  - (C) provide a copy of the Individual's PHI in an Electronic Health Record; or
  - (D) amend PHI in the Individual's Designated Record Setthe Business Associate agrees to notify the Covered Entity, in writing, within five Days of the request.
- (15) Business Associate agrees that it shall not, and shall ensure that its subcontractors do not, directly or indirectly, receive any remuneration in exchange for PHI of an Individual without
  - (A) the written approval of the Covered Entity, unless receipt of remuneration in exchange for PHI is expressly authorized by this Contract and

- (B) the valid authorization of the Individual, except for the purposes provided under section 13405(d)(2) of the HITECH Act, (42 U.S.C. § 17935(d)(2)) and in any accompanying regulations

(16) Obligations in the Event of a Breach.

- (A) The Business Associate agrees that, following the discovery by the Business Associate or by a subcontractor of the Business Associate of any use or disclosure not provided for by this section of the Contract, any breach of Unsecured protected health information, or any Security Incident, it shall notify the Covered Entity of such Breach in accordance with Subpart D of Part 164 of Title 45 of the Code of Federal Regulations and this Section of the Contract.
- (B) Such notification shall be provided by the Business Associate to the Covered Entity without unreasonable delay, and in no case later than 30 days after the Breach is discovered by the Business Associate, or a subcontractor of the Business Associate, except as otherwise instructed in writing by a law enforcement official pursuant to 45 C.F.R. 164.412. A Breach is considered discovered as of the first day on which it is, or reasonably should have been, known to the Business Associate or its subcontractor. The notification shall include the identification and last known address, phone number and email address of each Individual (or the next of kin of the individual if the Individual is deceased) whose Unsecured protected health information has been, or is reasonably believed by the Business Associate to have been, accessed, acquired, or disclosed during such Breach.
- (C) The Business Associate agrees to include in the notification to the Covered Entity at least the following information:
  1. A description of what happened, including the date of the Breach; the date of the discovery of the Breach; the unauthorized person, if known, who used the PHI or to whom it was disclosed; and whether the PHI was actually acquired or viewed.
  2. A description of the types of Unsecured protected health information that were involved in the Breach (such as full name, Social Security number, date of birth, home address, account number, or disability code).
  3. The steps the Business Associate recommends that Individual(s) take to protect themselves from potential harm resulting from the Breach.
  4. A detailed description of what the Business Associate is doing or has done to investigate the Breach, to mitigate losses, and to protect against any further Breaches.
  5. Whether a law enforcement official has advised the Business Associate, either verbally or in writing, that he or she has determined that notification or notice to Individuals or the posting required under 45 C.F.R. 164.412 would impede a

criminal investigation or cause damage to national security and; if so, contact information for said official.

- (D) If directed by the Covered Entity, the Business Associate agrees to conduct a risk assessment using at least the information in subparagraphs 1 to 4, inclusive of (g) (16) (C) of this Section and determine whether, in its opinion, there is a low probability that the PHI has been compromised. Such recommendation shall be transmitted to the Covered Entity within 20 business days of the Business Associate's notification to the Covered Entity.
- (E) If the Covered Entity determines that there has been a Breach, as defined in 45 C.F.R. 164.402, by the Business Associate or a subcontractor of the Business Associate, the Business Associate, if directed by the Covered Entity, shall provide all notifications required by 45 C.F.R. 164.404 and 45 C.F.R. 164.406.
- (F) Business Associate agrees to provide appropriate staffing and have established procedures to ensure that Individuals informed of a Breach have the opportunity to ask questions and contact the Business Associate for additional information regarding the breach. Such procedures shall include a toll-free telephone number, an e-mail address, a posting on its website and a postal address. Business Associate agrees to include in the notification of a Breach by the Business Associate to the Covered Entity, a written description of the procedures that have been established to meet these requirements. Costs of such contact procedures will be borne by the Business Associate.
- (G) Business Associate agrees that, in the event of a Breach, it has the burden to demonstrate that it has complied with all notifications requirements set forth above, including evidence demonstrating the necessity of a delay in notification to the Covered Entity.
- (H) Permitted Uses and Disclosure by Business Associate.
- (1) General Use and Disclosure Provisions Except as otherwise limited in this Section of the Contract, Business Associate may use or disclose PHI to perform functions, activities, or services for, or on behalf of, Covered Entity as specified in this Contract, provided that such use or disclosure would not violate the HIPAA Standards if done by Covered Entity or the minimum necessary policies and procedures of the Covered Entity.
- (2) Specific Use and Disclosure Provisions
- (A) Except as otherwise limited in this Section of the Contract, Business Associate may use PHI for the proper management and administration of Business Associate or to carry out the legal responsibilities of Business Associate.



(B) Except as otherwise limited in this Section of the Contract, Business Associate may disclose PHI for the proper management and administration of Business Associate, provided that disclosures are Required by Law, or Business Associate obtains reasonable assurances from the person to whom the information is disclosed that it will remain confidential and used or further disclosed only as Required by Law or for the purpose for which it was disclosed to the person, and the person notifies Business Associate of any instances of which it is aware in which the confidentiality of the information has been breached.

(C) Except as otherwise limited in this Section of the Contract, Business Associate may use PHI to provide data aggregation services to Covered Entity as permitted by 45 C.F.R. § 164.504(e)(2)(i)(B).

(i) Obligations of Covered Entity.

(1) Covered Entity shall notify Business Associate of any limitations in its notice of privacy practices of Covered Entity, in accordance with 45 C.F.R. § 164.520, or to the extent that such limitation may affect Business Associate's use or disclosure of PHI.

(2) Covered Entity shall notify Business Associate of any changes in, or revocation of, permission by Individual(s) to use or disclose PHI, to the extent that such changes may affect Business Associate's use or disclosure of PHI.

(3) Covered Entity shall notify Business Associate of any restriction to the use or disclosure of PHI that Covered Entity has agreed to in accordance with 45 C.F.R. § 164.522, to the extent that such restriction may affect Business Associate's use or disclosure of PHI.

(j) Permissible Requests by Covered Entity. Covered Entity shall not request Business Associate to use or disclose PHI in any manner that would not be permissible under the HIPAA Standards if done by the Covered Entity, except that Business Associate may use and disclose PHI for data aggregation, and management and administrative activities of Business Associate, as permitted under this Section of the Contract.

(k) Term and Termination.

(1) Term. The term of this Section of the Contract shall be effective as of the date the Contract is effective and shall terminate when the information collected in accordance with provision (g)(10) of this Section of the Contract is provided to the Covered Entity and all of the PHI provided by Covered Entity to Business Associate, or created or received by Business Associate on behalf of Covered Entity, is

destroyed or returned to Covered Entity, or, if it is infeasible to return or destroy PHI, protections are extended to such information, in accordance with the termination provisions in this Section.

(2) Termination for Cause Upon Covered Entity's knowledge of a material Breach by Business Associate, Covered Entity shall either:

(A) Provide an opportunity for Business Associate to cure the Breach or end the violation and terminate the Contract if Business Associate does not cure the breach or end the violation within the time specified by the Covered Entity in accordance with Section 11 of the Contract; or

(B) Immediately terminate the Contract if Business Associate has breached a material term of this Section of the Contract and cure is not possible; or

(C) If neither termination nor cure is feasible, Covered Entity shall report the violation to the Secretary.

(3) Effect of Termination.

(A) Except as provided in (k)(2) of this Section of the Contract, upon termination of this Contract, for any reason, Business Associate shall return or destroy all PHI received from Covered Entity, or created, maintained, or received by Business Associate on behalf of Covered Entity. Business Associate shall also provide the information collected in accordance with section (g)(10) of this Section of the Contract to the Covered Entity within ten Days of the notice of termination. This section shall apply to PHI that is in the possession of subcontractors or agents of Business Associate. Business Associate shall retain no copies of the PHI.

(B) In the event that Business Associate determines that returning or destroying the PHI is infeasible, Business Associate shall provide to Covered Entity notification of the conditions that make return or destruction infeasible. Upon documentation by Business Associate that return or destruction of PHI is infeasible, Business Associate shall extend the protections of this Section of the Contract to such PHI and limit further uses and disclosures of PHI to those purposes that make return or destruction infeasible, for as long as Business Associate maintains such PHI. Infeasibility of the return or destruction of PHI includes, but is not limited to, requirements under State or federal law that the Business Associate maintains or preserves the PHI or copies thereof.

(I) Miscellaneous Sections.

- (1) Regulatory References. A reference in this Section of the Contract to a section in the HIPAA Standards means the section as in effect or as amended.
- (2) Amendment. The parties agree to take such action as is necessary to amend this Section of the Contract from time to time as is necessary for Covered Entity to comply with requirements of HIPAA, the HITECH Act and the HIPAA Standards (all as amended).
- (3) Survival. The respective rights and obligations of Business Associate shall survive the termination of this Contract.
- (4) Effect on Contract. Except as specifically required to implement the purposes of this Section of the Contract, all other terms of the Contract shall remain in force and effect.
- (5) Construction. This Section of the Contract shall be construed as broadly as necessary to implement and comply with HIPAA, the HITECH Act and the HIPAA Standards (all as amended). Any ambiguity in this Section of the Contract shall be resolved in favor of a meaning that complies, and is consistent with, HIPAA, the HITECH Act and the HIPAA Standards. (all as amended)
- (6) Disclaimer. Covered Entity makes no warranty or representation that compliance with this Section of the Contract will be adequate or satisfactory for Business Associate's own purposes. Covered Entity shall not be liable to Business Associate for any claim, civil or criminal penalty, loss or damage related to or arising from the unauthorized use or disclosure of PHI by Business Associate or any of its officers, directors, employees, contractors or agents, or any third party to whom Business Associate has disclosed PHI contrary to the sections of this Contract or applicable law. Business Associate is solely responsible for all decisions made, and actions taken, by Business Associate regarding the safeguarding, use and disclosure of PHI within its possession, custody or control.
- (7) Indemnification. The Business Associate shall indemnify and hold the Covered Entity harmless from and against any and all claims, liabilities, judgments, fines, assessments, penalties, awards and any statutory damages that may be imposed or assessed pursuant to HIPAA, the HIPAA Standards, or the HITECH Act (all as amended), including, without limitation,

attorney's fees, expert witness fees, costs of investigation, litigation or dispute resolution, and costs awarded thereunder, relating to or arising out of any violation by the Business Associate and its agents, including subcontractors, of any obligation of Business Associate and its agents, including subcontractors, under this Section of the Contract, under HIPAA, the HITECH Act, and the HIPAA Standards.

60. Protection of Confidential Information.

- (a) Contractor and Contractor Parties, at their own expense, have a duty to and shall protect from a Confidential Information Breach any and all Confidential Information which they come to possess or control, wherever and however stored or maintained, in a commercially reasonable manner in accordance with current industry standards.
- (b) Each Contractor or Contractor Party shall develop, implement and maintain a comprehensive data - security program for the protection of Confidential Information. The safeguards contained in such program shall be consistent with and comply with the safeguards for protection of Confidential Information, and information of a similar character, as set forth in all applicable federal and state law and written policy of the Agency or State concerning the confidentiality of Confidential Information. Such data-security program shall include, but not be limited to, the following:
  - (1) A security policy for employees related to the storage, access and transportation of data containing Confidential Information;
  - (2) Reasonable restrictions on access to records containing Confidential Information, including access to any locked storage where such records are kept;
  - (3) A process for reviewing policies and security measures at least annually;
  - (4) Creating secure access controls to Confidential Information, including but not limited to passwords; and
  - (5) Encrypting of Confidential Information that is stored on laptops, portable devices or being transmitted electronically.
- (c) The Contractor and Contractor Parties shall notify the Agency and the Connecticut Office of the Attorney General as soon as practical, but no later than twenty-four (24) hours, after they become aware of or suspect that any Confidential Information which Contractor or Contractor Parties have come to possess or control has been subject to a Confidential Information Breach. If a Confidential Information Breach has occurred, the Contractor shall, within three (3) business days after the notification, present a credit monitoring and protection plan to the Commissioner of Administrative Services, the Agency and the Connecticut Office of the Attorney General, for review and approval. Such credit monitoring or protection plan shall be made available by the

Contract #16DOT7002

Contract Document

DOT-50 Rev. 7/16

Contractor at its own cost and expense to all individuals affected by the Confidential Information Breach. Such credit monitoring or protection plan shall include, but is not limited to reimbursement for the cost of placing and lifting one (1) security freeze per credit file pursuant to Connecticut General Statutes § 36a-701a. Such credit monitoring or protection plans shall be approved by the State in accordance with this Section and shall cover a length of time commensurate with the circumstances of the Confidential Information Breach. The Contractors' costs and expenses for the credit monitoring and protection plan shall not be recoverable from the Agency, any State of Connecticut entity or any affected individuals.

(d) The Contractor shall incorporate the requirements of this Section in all subcontracts requiring each Contractor Party to safeguard Confidential Information in the same manner as provided for in this Section.

(e) Nothing in this Section shall supersede in any manner Contractor's or Contractor Party's obligations pursuant to HIPAA or the provisions of this Contract concerning the obligations of the Contractor as a Business Associate of Covered Entity.

61. Audit Requirements for Recipients of State Financial Assistance. For purposes of this paragraph, the word "contractor" shall be deemed to mean "nonstate entity," as that term is defined in Section 4-230 of the Connecticut General Statutes. The contractor shall provide for an annual financial audit acceptable to the Agency for any expenditure of state-awarded funds made by the contractor. Such audit shall include management letters and audit recommendations. The State Auditors of Public Accounts shall have access to all records and accounts for the fiscal year(s) in which the award was made. The contractor will comply with federal and state single audit standards as applicable.

62. Antitrust Claims. Contractor hereby irrevocably assigns to the State of Connecticut all rights, title and interest in and to all Claims associated with this Contract that Contractor now has or may or will have and that arise under the antitrust laws of the United States, 15 USC Section 1, *et seq.* and the antitrust laws of the State of Connecticut, Connecticut General Statute § 35-24, *et seq.*, including but not limited to any and all Claims for overcharges. This assignment shall become valid and effective immediately upon the accrual of a Claim without any further action or acknowledgment by the parties.

Contract #16DOT7002

Contract Document

DOT-50 Rev. 7/16

IN WITNESS WHEREOF, the parties have executed this Contract by their duly authorized representatives with full knowledge of and agreement with its terms and conditions.

Motor Coach Industries Inc.

STATE OF CONNECTICUT

Department Of Transportation

By: 

By: 

Patrick J. Scully  
Print or Type Name

RICHARD W. ANDRESKI  
Print or Type Name

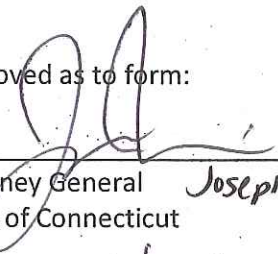
Title: Executive VP, Sales + Marketing

Title: BUREAU CHIEF,  
PUBLIC TRANSPORTATION

Date: DECEMBER 8, 2016

Date: DECEMBER 12, 2016

Approved as to form:

  
ASSOC Attorney General Joseph Rubin  
State of Connecticut

Date: 12/30/16

**EXHIBIT A**

**DESCRIPTION OF GOODS AND SERVICES**

## **1. DESCRIPTION OF GOODS AND SERVICES:**

**1.1. See Exhibit A.1, "Technical Specifications"**

### **1.2. INTERCHANGEABILITY**

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

### **1.3 QUALITY ASSURANCE PROVISIONS**

The Contractor, the Contractor's manufacturing plant and organization shall be certified to the appropriate QS-9000/ISO 9000 series of standards.

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

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

CTDOT shall be represented at the Contractor's plant by resident inspectors. They shall monitor, in the Contractor's plant, the manufacture of transit buses built under the procurement. The presence of these resident inspectors in the plant shall not relieve the Contractor of its responsibility to meet all of the requirements of this procurement.

No less than thirty (30) days prior to the beginning of bus manufacture, the primary resident inspector shall meet with the Contractor's quality assurance manager and shall conduct a pre-production audit meeting. They shall review the inspection procedures and finalize inspection checklists which shall be in a format agreeable to both CTDOT and the Contractor. The resident inspectors may begin monitoring bus construction activities two (2) weeks prior to the start of bus fabrication.

Records and data maintained by the quality assurance organization shall be available for review by the resident inspectors. Inspection and test records for this procurement shall be available for a minimum of one (1) year after final inspections and tests are completed.

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

Discrepancies noted by the resident inspector during assembly shall be entered by the Contractor's inspection personnel on a record that accompanies the major component, subassembly, assembly, or bus from start of assembly through final inspection. Actions shall be taken to correct discrepancies or deficiencies in the manufacturing processes, procedures, or other conditions that cause articles to be in nonconformity with the requirements of the contract specifications. The inspection personnel shall verify the corrective actions and mark the discrepancy record. If discrepancies cannot be corrected by replacing the nonconforming materials, CTDOT shall approve the modification, repair, or method of correction to the extent that the contract specifications are affected.



The primary resident inspector shall remain in the Contractor's plant for the duration of bus assembly work under this contract. The Contractor shall provide office space for the resident inspectors in close proximity to the final assembly area. This office space shall be equipped with desks, outside and interplant telephones, file cabinets, chairs, and clothing lockers sufficient to accommodate the resident staff. Only the primary resident inspector or designee shall be authorized to release the buses for delivery. The resident inspectors shall be authorized to approve the pre-delivery acceptance tests. Upon request to the quality assurance supervisors, the resident inspectors shall have access to the Contractor's quality assurance files related to this procurement. These files shall include drawings, assembly procedures, material standards, parts lists, inspection processing and reports, and records of defects.

Fully-documented tests shall be conducted on each production bus following manufacture to determine its acceptance to CTDOT. These acceptance tests shall include pre-delivery inspections and testing by the Contractor and inspections and testing by CTDOT after the buses have been delivered.

The Contractor shall conduct acceptance tests at its plant on each bus following completion of manufacture and before delivery to CTDOT. These pre-delivery tests shall include visual and measured inspections, as well as testing the total bus operation. The tests shall be conducted and documented in accordance with written test plans, approved by CTDOT.

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

The pre-delivery tests shall be scheduled and conducted with thirty (30) days' notice so that they may be witnessed by the resident inspectors, who may accept or reject the results of the tests. The results of pre-delivery tests, and any other tests, shall be filed with the assembly inspection records for each bus. The under floor equipment shall be available for inspection by the resident inspectors, using a pit or bus hoist provided by the Contractor. A hoist, scaffold, or elevated platform shall be provided by the Contractor to easily and safely inspect bus roofs.

Delivery of each bus shall require written authorization of the primary resident inspector. Authorization forms for the release of each bus for delivery shall be provided by the Contractor. An executed copy of the authorization shall accompany the delivery of each bus.

Visual and measured inspections shall be conducted with the bus in a static condition. The purpose of the inspection testing is to verify overall dimensional and weight requirements, to verify that required components are included and are ready for operation, and to verify that components and subsystems that are designed to operate with the bus in a static condition do function as designed.

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

Each bus shall be driven for a minimum of fifteen (15) miles during the road tests. Observed defects shall be recorded on the test forms. The bus shall be retested when defects are corrected and adjustments are made. This process shall continue until defects or required adjustments are no longer detected. Results shall be pass/fail for these bus operation tests.

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

Buses that fail to pass the post-delivery tests are subject to non-acceptance. CTDOT shall record details of all defects on the appropriate test forms and shall notify the Contractor of acceptance, conditional acceptance, or non-acceptance of each bus within five (5) days after completion of the tests. The defects detected during these tests shall be repaired according to procedures defined previously in this document.

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

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

#### 1.4 TRAINING, MANUALS AND PARTS AVAILABILITY

The Contractor shall deliver the following training videos to participants on CD or DVD with periodic updates and changes to all manuals prior to the delivery of the first coach:

Front Suspension	Rear Suspension	Entrance Door Operation
Air Brake System	Electric System	HVAC Diagnostic Reader
Multiplex System	Engine Troubleshooting	Transmission Troubleshooting
Pneumatic System	AC Maintenance	Driver's Orientation
Alternator	Warranty	

The Contractor shall provide online webinars and web-based Learning Management System (LMS) for operator training and mechanics training for vehicle maintenance.

The Contractor shall also provide eighty (80) hours of maintenance training to CTDOT within 180 calendar days of delivery of the first bus at a time and location specified by CTDOT. The training program should cover (but not be limited to) the following:

##### A. Orientation Module

1. History of Contractor
2. Advantages and strong points of the bus
3. Visuals of production system of the bus
4. Compartment by compartment tour of the bus
5. Special components or features of the bus

##### B. Electrical and Electronics

1. Location of all key electrical components on the bus.
2. Explanation of the wiring diagram and wiring codes.
3. Explanation of the charging system and basic troubleshooting of the system.
4. Explanation of the exterior and interior lighting system along with basic troubleshooting of the system.
5. Explanation of the safety shutdown system, including the warning indicators and basic troubleshooting of the system.
6. Operation of the multiplex system
7. Alternator
8. Electric cooling fan system

9. Multiplex system
10. Decals of electrical schematics on all electric panels

C. Engine and Accessories

1. Explanation of the engine and location of key components.
2. Explanation of the engine driven accessories.
3. Explanation of the fuel, air and water system.
4. Explanation of engine tune-up procedures.
5. Basic troubleshooting procedures for the engine.
6. Engine overhaul/rebuilding

D. Transmission and Controls

1. Explanation of the transmission.
2. Explanation of the electronic control system.
3. Basic troubleshooting of the transmission.
4. Transmission overhaul/rebuilding

E. Air Conditioning

1. Explanation of the air conditioning system and the location of all key air conditioning components.
2. Explanation of the air conditioning electrical system.
3. Explanation of the air conditioning compressor along with basic troubleshooting and preventative maintenance of the air conditioning compressor.
4. Basic troubleshooting of the air conditioning system.
5. Preventive maintenance of the air conditioning system.

F. Wheelchair Ramp/Lift System

1. Explanation of the Ramp/Lift system and the location of all Ramp/Lift components.
2. Explanation of the Ramp/Lift electrical system.
3. Proper Ramp/Lift adjustment procedures.
4. Basic troubleshooting of the Ramp/Lift system.

G. Brakes

1. Explanation of the brake system.
2. Basic brake system repair including brake adjustment.
3. ABS & traction control.

H. Air System

1. Explanation of the air system with the location of all system components.
2. Basic troubleshooting of the air system.
3. Preventive maintenance of the air system.

I. Suspension, Steering and Axles

1. Explanation of the suspension system.
2. Basic repairs to the suspension system.
3. Basic troubleshooting of the suspension system.
4. Explanation of the steering system.
5. Basic troubleshooting of the steering system.
6. Explanation of the axles.
7. Ride height adjustment procedures

J. Body

1. Explanation of the body & attachment method of exterior body panels to vehicle structure.

2. Basic repair of the exterior panels.

K. Door System

1. Explanation of door system and location of components.
2. Explanation of the door electrical system.
3. Proper door adjustment procedures.
4. Rebuilding of door motors.
5. Basic troubleshooting of the door systems.

L. Parts

1. Explanation of the parts manual and how it is organized.
2. Explanation of the parts numbering system.
3. Orientation to the bus and components on the bus.
4. Practice in finding parts in the parts manual.
5. Explanation & training on warranty program.

M. Driving Instruction (For Maintenance Employees)

1. Operator Compartment
  - a. Controls and switches
  - b. Warning indicators and gauges
  - c. Seat adjustment
  - d. Door control
2. Walk Around Inspection
  - a. Compartment-by-compartment explanation
  - b. Mirror adjustment
  - c. Climate control system
3. Driving Instruction
  - a. Turns
  - b. Braking
  - c. Transmission shifting patterns and driving with the retarder
  - d. Backing

The Contractor will provide formal training at the operating transit's facility on the Contractor's procedures for identifying, documenting and submitting claims for warranty reimbursement. The training shall include a description of the warranty provided on the buses, components and sub-components and warranty processing.

The Contractor will provide with the delivery of the first coach to CTDOT a training session for the designated Train the Trainer Supervisors who will in turn orient Bus Operators on how to inspect, safely drive the coach, and operate all the subsystems found on the coach. The training session for the operators will include classroom and driving sessions as necessary. The program shall include, but not be limited to the following:

1. Operator Compartment
  - a. Controls and Switches
  - b. Warning Indicators and Gauges
  - c. Seat Adjustment
  - d. Door Control
2. Walk Around Inspection
  - a. Compartment-by-compartment explanation
  - b. Mirror adjustments
  - c. Climate control systems

3. Driving Instruction
  - a. Turns
  - b. Braking
  - c. Transmission shifting patterns
  - d. Backing

The driver Train the Trainer program shall consist of a four (4) hour module on the bus. Each trainee shall be given the opportunity to operate the bus with the Contractor's instructor on board.

The Contractor shall, at its own expense, have a competent engineering service representative(s) available on request to assist CTDOT's staff in the solution of engineering or design problems within the scope of the specifications that may arise during the warranty period.

The Contractor shall provide current maintenance manuals, parts manuals and parts price list, standard operator's manuals, OEM major equipment manuals and electrical and pneumatic system schematics as part of this Contract as specified in the table below.

Item	Quantity per Property
Maintenance Manuals	3
Operators Manuals	5 for every bus
Parts Manuals	3
Parts Price List	3
OEM Destination Sign Manuals	3
OEM Video System Manuals	3
OEM Engine Manuals	4
OEM Transmission Manuals	4
Bus Electrical Schematics	5
Bus Pneumatic Schematics	5

Detailed and well organized maintenance, parts, and operator manuals covering all items as built on the coach shall be supplied by the Contractor prior to acceptance of first coach. Manuals shall be delivered in three-ring binders and with the sections separated with sturdy plastic divider pages with tabs, and on CD or DVD. Manuals shall contain data required for preventive and corrective maintenance of all parts of the buses including but not limited to the following:

- Operating and Repair Publications
- General vehicle information and specifications.
- A complete, well-developed troubleshooting guide covering all mechanical, electrical and electronic components, including engine, transmission, and HVAC units.
- All preventive maintenance, lubrication and adjustment requirements.
- Complete wiring and schematic diagrams and schedules for wire and cable sizes and ratings including actual cable lay-out, plus locations in the coach of all electric and electronic components.
- All CAN wiring diagrams.
- All ground points control area network.
- Complete air and hydraulic diagrams showing locations in the coach of all air and hydraulic components. The air system diagram shall be 11 in. x 17 in. CAD drawing with color coding, using actual printed colors to match systems.
- Illustrative drawings, such as isometrics, exploded views or photographs identifying components in relationship to each other as mounted in the buses.
- Components shown in exploded views with all parts clearly identified including Contractor part number.
- Rebuilding procedures for all rebuildable components.

- Detailed, well-illustrated procedures for component change-out plus servicing, adjusting, testing, and run-in information as required.
- Body and structural information and material specifications for major accident repair.
- Seating and stanchion layouts and window diagrams.
- 11 in. x 17 in. scale drawing of driver's compartment, detailing all driver switches, controls, control panels and equipment locations (to be approved by CTDOT).
- Repair and calibration instructions and values.
- List of special test equipment and tools required to maintain and repair systems down to the component level including part number and supplier source.
- Three-dimensional drawings of bus and graphics and part number for all graphics.

### **Serial Numbers**

Upon delivery of each bus, the Contractor shall provide a complete electronic list of serialized units installed on each bus to facilitate warranty tracking. The list shall include, but is not limited to the following:

- engine
- transmission
- alternator
- starter
- A/C compressor and condenser / evaporator unit
- drive axle
- power steering unit
- fuel cylinders (if applicable)
- air compressor
- mobility device/wheelchair ramp
- engine electronic control module
- transmission electronic control unit
- radiator
- muffler
- hydraulic pump
- steering box
- front/rear axle
- axle bunk right/left
- tires
- overhead driver keyboard
- driver's seat
- roof panel front/rear

The Contractor shall provide updated serial numbers resulting from warranty campaigns. The format of the list shall be approved by the CTDOT prior to delivery of the first production bus. Illustrated parts manuals shall contain exploded views that show all parts used on buses as built under this contract, and no other parts. The exploded views will show all fasteners and miscellaneous hardware. The manuals shall contain data arranged so that part numbers can be readily found and identified in the illustration for each system and subsystem component, assembly, subassembly or piece part from an orderly breakdown of the complete coach. It shall contain a ready reference part number index and part name index and be sufficiently well illustrated to identify items requiring repair, replacement, and storage for use in the maintenance of the buses. All subassemblies (such as wiper motors, starter motors, etc.) shall have the original manufacturer's part number displayed at the beginning of the appropriate parts listing section. Lists shall include at least the following information for all parts as built:

- Generic description and specifications

- Contractor part number
- Brand name, where applicable
- Original manufacturers part number (provide in separate cross reference binder)
- Indication if the part is custom manufactured only on request
- Standard hardware described by size, type, material and grade
- All original manufacturer names and addresses, all special tools, test and diagnostic equipment and their original manufacturer names and addresses.

All manuals shall be provided in three-ring binders and on CD or DVD. Format and features shall include index and search by name, part number, assembly and subassembly. CTDOT reserves the right to copy all information for future use.

The parts pricing list shall list all parts by alpha order starting with "A" and ending with "Z" and then in numerically ascending order starting with "A0" and ending with "Z9". The parts list shall supply the purchase price (including freight), and a description of the part. Updated price lists will note all part number supersede since last general issue at the price list. Unit of sale will be noted. e.g. each, minimum 5, per foot, etc.

Maintenance and parts manuals must be updated to include all changes made to the coach during production and post-delivery retrofits authorized or requested by the Contractor and to correct all errors and omissions found by CTDOT. Changes required to the parts and maintenance manuals due to warranty and/or post-delivery retrofits shall be completed within ninety (90) days from the date of modification approval. Manuals shall be available from the Contractor for fifteen (15) years following acceptance of the last coach. Revised parts price lists will also be supplied as price changes. Parts shall be interchangeable with the original equipment and be manufactured in accordance with the quality assurance provisions of this contract. Prices shall not exceed the Contractor's then current published catalog prices. Software updates to maintenance and parts manuals shall be available for fifteen (15) years following acceptance of the last coach.

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

**1.5 ACCEPTANCE OF BUS**

Within fifteen (15) working (weekend & holidays not included) days after arrival at the designated point of delivery, the bus will undergo CTDOT tests as specified. If the bus passes these tests or if CTDOT does not notify Contractor of non-acceptance within fifteen (15) working days after delivery, acceptance of the bus by CTDOT occurs on the fifteenth day after delivery. Acceptance may occur earlier if CTDOT notifies the Contractor of early acceptance or places the bus in revenue service. If the bus fails these tests, it will not be accepted until the repair procedures defined in "Repairs After Non-Acceptance" have been carried out and the bus retested until it passes.

**1.6 REPAIRS AFTER NONACCEPTANCE**

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

**1.7 REPAIRS BY CONTRACTOR**

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

The Contractor will provide, at its own expense, all spare parts, tools, and space required to complete the repairs. At CTDOT's option, the Contractor may be required to remove the bus from CTDOT's property while repairs are being

affected. If the bus is removed from CTDOT's property, repair procedures must be diligently pursued by the Contractor's representatives, and the Contractor will assume risk of loss while the bus is under its control.

### Quality Assurance

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

1. Control. The quality assurance organization shall exercise quality control over all phases of production, from initiation of design through manufacture and preparation for delivery. The organization shall also control the quality of supplied articles.
2. Authority and Responsibility. The quality assurance organization shall have the authority and responsibility for reliability, quality controls inspection planning, establishment of the quality control system, and acceptance / rejection of materials and manufactured articles in the production of the transit buses.
3. Quality Assurance Organization Functions and Minimum Functions. The quality assurance organization shall include the following minimum functions:
  - Work instructions: The quality assurance organization shall verify inspection operation instructions to ascertain that the manufactured product meets all prescribed requirements.
  - Records maintenance: The quality assurance organization shall maintain and use records and data essential to the effective operation of its program. These records and data shall be available for review by the resident inspectors. Inspection and test records for this procurement shall be available for a minimum of three years after inspections and tests are completed.
  - Corrective action: The quality assurance organization shall detect and promptly ensure correction of any conditions that may result in the production of defective transit buses. These conditions may occur in designs, purchases, manufacture, tests or operations that culminate in defective supplies, services, facilities, technical data or standards.

Based on the outcome of thorough root cause investigations, the QAO is responsible to develop and implement appropriate Corrective Action(s). Potential Corrective Actions include but are not limited to: addressing vendor quality issues, employee training / retraining, revision / clarification of workshop procedures, development of improved tooling / fixtures, etc.

Root cause investigation and Corrective Actions shall be appropriately documented and shall be reported to the Authority in a timely manner.

4. Basic Standards and Facilities. The following standards and facilities shall be basic in the quality assurance process:
  - Configuration control: The Contractor shall maintain drawings, assembly procedures and other documentation that completely describe a qualified bus that meets all of the options and special requirements of this procurement. The quality assurance organization shall verify that each transit bus is manufactured in accordance with these controlled drawings, procedures and documentation.
  - Measuring and testing facilities: The Contractor shall provide and maintain the necessary gauges and other measuring and testing devices for use by the quality assurance organization to verify that the buses conform to all specification requirements. These devices shall be calibrated at established periods against certified measurement standards that have known, valid relationships to national standards.
  - Production tooling as media of inspection: When production jigs, fixtures, tooling masters, templates, patterns and other devices are used as media of inspection, they shall be proved for accuracy at formally established intervals and adjusted, replaced or repaired as required to



maintain quality.

- **Equipment use by resident inspectors:** The Contractor's gauges and other measuring and testing devices shall be made available for use by the resident inspectors to verify that the buses conform to all specification requirements. If necessary, the Contractor's personnel shall be made available to operate the devices and to verify their condition and accuracy.
- **Safety Practices and General Workshop Procedures:** The Contractor shall provide the Authority with all appropriate Safety Practices and General Workshop Procedures which will be in effect throughout this program. Examples include but are not limited to: rooftop equipment hoisting, fall restraints, vehicle jacking and securement, high voltage safety, etc.

5. Maintenance of Control. The Contractor shall maintain quality control of purchases:

- **Supplier control:** The Contractor shall require each Supplier to maintain a quality control program for the services and supplies that it provides. The Contractor's quality assurance organization shall inspect and test materials provided by Suppliers for conformance to specification requirements. Materials that have been inspected, tested and approved shall be identified as acceptable to the point of use in the manufacturing or assembly processes. Controls shall be established to prevent inadvertent use of nonconforming materials. At the Authority's request, the Contractor shall coordinate communications, conference calls, or meetings between the Authority, the Contractor, and any sub-suppliers. The Contractor shall coordinate and/or participate in source inspection(s) of sub-supplier parts, processes, and facilities as appropriate and at any time requested by the Authority.
- **Purchasing data:** The Contractor shall verify that all applicable specification requirements are properly included or referenced in purchase orders of articles to be used on transit buses.

6. Manufacturing Control.

- **Controlled conditions:** The Contractor shall ensure that all basic production operations, as well as all other processing and fabricating, are performed under controlled conditions. Establishment of these controlled conditions shall be based on the documented Work instructions, adequate production equipment and special working environments if necessary.
- **Completed items:** A system for final inspection and test of completed transit buses shall be provided by the quality assurance organization. It shall measure the overall quality of each completed bus.
- **Nonconforming materials:** The quality assurance organization shall monitor the Contractor's system for controlling nonconforming materials. The system shall include procedures for identification, segregation and disposition.
- **Statistical techniques:** Statistical analysis, tests and other quality control procedures may be used when appropriate in the quality assurance processes.
- **Inspection status:** A system shall be maintained by the quality assurance organization for identifying the inspection status of components and completed transit buses. Identification may include cards, tags or other normal quality control devices.

7. Inspection System. The quality assurance organization shall establish, maintain and periodically audit a fully documented inspection system. The system shall prescribe inspection and test of materials, Work in process and completed articles. As a minimum, it shall include the following controls:

- **Inspection personnel:** Sufficient trained inspectors shall be used to ensure that all materials, components and assemblies are inspected for conformance with the qualified bus design.
- **Inspection records:** Acceptance, rework or rejection identification shall be attached to inspected articles. Articles that have been accepted as a result of approved materials review actions shall be

Identified. Articles that have been reworked to specified drawing configurations shall not require special identification. Articles rejected as unsuitable or scrap shall be plainly marked and controlled to prevent installation on the bus. Articles that become obsolete as a result of engineering changes or other actions shall be controlled to prevent unauthorized assembly or installation. Unusable articles shall be isolated and then scrapped. Discrepancies noted by the Contractor or resident inspectors during assembly shall be entered by the inspection personnel on a record that accompanies the major component, subassembly, assembly or bus from start of assembly through final inspection. Actions shall be taken to correct discrepancies or deficiencies in the manufacturing processes, procedures or other conditions that cause articles to be in nonconformity with the requirements of the Contract specifications. The inspection personnel shall verify the corrective actions and mark the discrepancy record. If discrepancies cannot be corrected by replacing the nonconforming materials, then the Authority shall approve the modification, repair or method of correction to the extent that the Contract specifications are affected.

- Quality assurance audits: The quality assurance organization shall establish and maintain a quality control audit program. Records of this program shall be subject to review by the Authority.

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

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

9. Resident Inspectors and Resident Inspector's Role. The Authority shall be represented at the Contractor's plant by resident inspectors, as required by FTA. Resident inspectors may be Authority employees or outside contractors. The Authority shall provide the identity of each inspector and shall also identify his or her level of authority in writing. They shall monitor, in the Contractor's plant, the manufacture of transit buses built under the procurement. The presence of these resident inspectors in the plant shall not relieve the Contractor of its responsibility to meet all the requirements of this procurement. The Authority shall designate a primary resident inspector, whose duties and responsibilities are delineated in "Pre-Production Meetings," "Authority" and "Pre-Delivery Tests," below. ~~Contractor and resident inspector relations shall be governed by the guidelines included as Attachment A to this section.~~

10. Pre-Production and Design Review Meetings. The primary resident inspector shall participate in Pre-Production and Design Review Meetings with the Authority. At these meetings, quality assurance procedures shall be addressed, the configuration of the buses and the manufacturing processes shall be finalized, and all Contract documentation provided to the inspector.

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

11. Authority. During the project kickoff meeting the Contractor shall present and provide a copy of the manufacturers' formal quality assurance program. The Authority reserves the right to perform a quality assurance audit of the Contractor's quality assurance system to achieve a better understanding of these processes and confirm compliance to these processes. Records and data

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

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

Discrepancies noted by the resident inspector during assembly shall be entered by the Contractor's inspection personnel on a record that accompanies the major component, subassembly, assembly or bus from start of assembly through final inspection. Actions shall be taken to correct discrepancies or deficiencies in the manufacturing processes, procedures or other conditions that cause articles to be in nonconformity with the requirements of the Contract specifications. The inspection personnel shall verify the corrective actions and mark the discrepancy record. If discrepancies cannot be corrected by replacing the nonconforming materials, then the Contractor shall submit for Authority review and approval the modification, repair or method of correction.

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

12. Support Provisions. The Contractor shall provide office space for the resident inspectors in close proximity to the final assembly area. This office space shall be equipped with desks, outside and interplant telephones, internet access, file cabinet and chairs. Specific MBTA facility requirements are outlined in the contract documents.
13. Compliance with Safety Requirements. At the time of the Pre-Production Meeting, the Contractor shall provide all safety and other operational restrictions that govern the Contractor's facilities. These issues will be discussed and the parties will agree which rules / restrictions will govern the Authority's inspector(s) and any other Authority representatives during the course of the Contract.
14. Acceptance Tests and Responsibility. Fully documented tests shall be conducted on each production bus following manufacture to determine its acceptance to the Authority. These acceptance tests shall include pre-delivery inspections and testing by the Contractor and inspections and testing by the Authority after the buses have been delivered.
15. Pre-Delivery Tests. The Contractor shall conduct acceptance tests at its plant on each bus following completion of manufacture and before delivery to the Authority. These pre-delivery tests shall include visual and measured inspections, as well as testing the total bus operation. The tests shall be conducted and documented in accordance with written test plans approved by the Authority.

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

The pre-delivery tests shall be scheduled and conducted with thirty (30) days' notice so that they may

be witnessed by the resident inspectors, who may accept or reject the results of the tests. The results of pre-delivery tests, and any other tests, shall be filed with the assembly inspection records for each bus. The underfloor equipment shall be available for inspection by the resident inspectors, using a pit or bus hoist provided by the Contractor. A hoist, scaffold or elevated platform shall be provided by the Contractor to easily and safely inspect bus roofs. Delivery of each bus shall require written authorization of the primary resident inspector. Authorization forms for the release of each bus for delivery shall be provided by the Contractor. An executed copy of the authorization shall accompany the delivery of each bus.

16. Water Test Inspection. The pre-delivery tests shall include a water test inspection. The water test inspection checks the integrity of the vehicle's body seams, window frame seals and other exterior component closeouts for their ability to keep rainwater, road splash, melting snow and slush, and other exterior water from entering the inside of the vehicle. The vehicle's interior is inspected for signs of moisture and water leaks. To perform the leak inspection, interior ceiling and side panels are removed, and access doors are opened. If any moisture or water is detected, then the source of the leak will be located and repaired by the manufacturer, and the vehicle will be tested again.
17. Visual and Measured Inspections. Visual and measured inspections shall be conducted with the bus in a static condition. The purpose of the inspection testing includes verification of overall dimension and weight requirements, that required components are included and are ready for operation, and that components and subsystems designed to operate with the bus in a static condition do function as designed.
18. Total Bus Operation. Total bus operation shall be evaluated during road tests. The purpose of the road tests is to observe and verify the operation of the bus as a system and to verify the functional operation of the subsystems that can be operated only while the bus is in motion.  
  
Each bus shall be driven for a minimum of fifteen (15) miles during the road tests. If requested, computerized diagnostic printouts showing the performance of each bus shall be produced and provided to the Authority. Observed Defects shall be recorded on the test forms. The bus shall be retested when Defects are corrected and adjustments are made. This process shall continue until Defects or required adjustments are no longer detected.
19. Post Delivery Tests. The Authority may conduct acceptance tests on each delivered coach. These tests shall be completed within 15 (fifteen) days after coach delivery and shall be conducted in accordance with written test plans. The purpose of these tests is to identify Defects that have become apparent between the time of coach release and delivery to the Authority. The post-delivery tests shall include visual inspection and coach operations.  
  
Coaches that fail to pass the post-delivery tests are subject to non-acceptance. The Authority shall record details of all Defects on the appropriate test forms and shall notify the Contractor of non-acceptance of each coach within five days after completion of the tests. The Defects detected during these tests shall be repaired according to procedures defined in the Warranty Requirements Section: WR.
20. Visual Inspection. The post-delivery inspection is similar to the inspection at the Contractor's plant and shall be conducted with the coach in a static condition. Any visual delivery damage shall be identified and recorded during the visual inspection of each coach.
21. Coach Operation. Road tests will be used for total coach operation similar to those conducted at the Contractor's plant. In addition, the Authority may elect to perform chassis dynamometer tests. Operational deficiencies of each coach shall be identified and recorded.
22. Coach History Book. The Contractor shall provide a Coach History Book for each bus at time of delivery. Each Coach History Book shall contain the following information at a minimum:

- List of defects noted and the disposition of each
- Listing of all serial-numbered components
- Shipping documents
- Shipping exceptions and unresolved / open issues
- Summary detail of each test performed on the coach or any part of the coach
- Complete record of inspection findings

During the pre-production meeting the Contractor shall provide a proposed Coach History Book for the Authority's review and approval.

At the Authority's discretion, additional documentation may be added to the requirements of the Coach History Book.

### **1.8 REPAIRS BY CTDOT OR OTHER AGENCY**

1. Parts Used. If CTDOT performs the repairs after non-acceptance of the bus, it will correct or repair the defect and any related defects using Contractor-specified parts available from its own stock or those supplied by the Contractor specifically for this repair. Monthly, or at a period to be mutually agreed upon, reports of all repairs covered by this procedure will be submitted by CTDOT to the Contractor for reimbursement or replacement of parts. The Contractor will provide forms for these reports.
2. Contractor Supplied Parts. If the Contractor supplies parts for repairs being performed by CTDOT after non-acceptance of the bus, these parts will be shipped prepaid to CTDOT from any source selected by the Contractor within ten (10) working days after receipt of the request for said parts.
3. Return of Defective Components. The Contractor may request that parts covered by this provision be returned to the manufacturing plant. The total costs for this action will be paid by the Contractor.
4. Reimbursement for Labor. CTDOT will be reimbursed by the Contractor for labor. The amount will be determined by multiplying the number of person-hours actually required to correct the defect by a per hour technician, straight wage rate, plus 40 percent fringe benefits, plus the cost of towing in the bus if such action was necessary. These wage and fringe benefit rates will not exceed the rates in effect in CTDOT's service garage at the time the defect correction is made.
5. Reimbursement for Parts. CTDOT will be reimbursed by the Contractor for defective parts that must be replaced to correct the defect. The reimbursement will include taxes where applicable and 22.5 percent handling costs.

### **1.9 PARTS AVAILABILITY GUARANTY**

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

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

Where the Contractor fails to honor this parts guaranty or parts ordered by CTDOT are not received within thirty (30) days of the agreed upon delivery date, then the Contractor will provide to CTDOT, within seven (7) days of CTDOT's verbal or written request, the design and manufacturing documentation for those parts

manufactured by the Contractor and the original suppliers' and/or manufacturers' parts numbers, company names, addresses, telephone numbers and contact persons' names for all of the specific parts not received by CTDOT. Contractor's design and manufacturing documentation provided to CTDOT will be for its sole use in regard to the buses procured under this Contract and for no other purpose. If parts are not received warranty on bus will be extended.

#### 1.10 OPTIONAL SPARE PARTS PURCHASE

The Contractor shall provide pricing of major parts and components that may be purchased during the contract period. See attached Exhibit B, Price Schedule.

#### 1.11 CONSUMABLE SPARE PARTS

The Contractor shall submit a list of recommended Consumable Spare Parts within six (6) months after NTP. This list must detail parts required to maintain the fleet, identifying the vendor's name and address, vendor part number, full part description, unit cost, anticipated lead time, and estimated annual usage and include both inventory and non-inventory items.

#### 1.12 RENEWAL PARTS INVENTORY LIST AND PARTS SEMINAR

The Contractor shall provide a Renewal Parts Inventory List and a Renewal Parts Inventory Seminar to familiarize material management personnel with the coach components. The Contractor shall submit a complete suggested parts inventory list, required to support this fleet with price detail to determine the total cost required. This list must include parts that are not in inventory, as well as parts needed to support this fleet. The required parts inventory information must be provided no later than thirty (30) days prior to delivery of each Pilot Bus.

The seminar shall be for one class not to exceed twenty-five (25) people held during daylight hours at a location to be designated by the Authority. The course shall not exceed thirty (30) hours but be no less than twelve (12), and shall include both classroom and field instruction. The seminar shall be conducted within one month of delivery of the each Pilot Bus. The Contractor's materials documentation shall include a Renewal Parts Inventory List, a parts number index, and pricing. The Contractor shall provide current parts pricing within ninety (90) days after the Authority's written approval of the draft parts manual.

#### 1.13 WARRANTY PROVISIONS

*RWA* The complete bus, propulsion system, components, major subsystems and body and chassis structure are to be warranted free from defects and related defects for ~~eighteen (18) months or 50,000 miles, whichever comes first, two~~ (2) years or unlimited miles, beginning on the date of revenue service. The warranty is based on regular operation of the bus under the operating conditions prevailing in CTDOT's locale.

Body, body structure, structural elements of the suspension and engine cradle are warranted to be free from defects and related defects for three (3) years or 150,000 miles, whichever comes first.

Primary load-carrying members of the bus structure, including structural elements of the suspension, are warranted against corrosion failure and/or fatigue failure sufficient to cause a Class 1 or Class 2 failure for a period of twelve (12) years or 500,000 miles, whichever comes first.

Propulsion system components, specifically the engine, transmission and drive and non-drive axles shall be warranted to be free from defects and related defects for the standard two (2) years or 100,000 miles, whichever comes first. An extended warranty to a maximum of five (5) years or 300,000 miles, whichever comes first, may be purchased at an additional cost.

The warranty shall include towing, travel, and all related expenses.

Contractor warrants the ECS for five (5) years or 150,000 miles, whichever comes first. The ECS shall include, but is not limited to, the following components:

- Complete exhaust system, including catalytic converter (if required)
- After-treatment device
- Components identified as emission control devices

Major subsystems shall be warranted to be free from defects and related defects for two (2) years or 100,000 miles, whichever comes first. Items included as major subsystems are listed below:

- Brake system
- Destination signs
- Heating, ventilating
- AC unit and compressor
- Door systems
- Air compressor
- Air dryer
- Wheelchair lift and ramp system
- Starter
- Alternator
- Charge air cooler
- Fire suppression
- Power plant driven or mounted fan drive and power steering hydraulic or electric systems
- Cooling systems
  - Radiator
  - Transmission cooler
- Passenger seating (excluding fabric)
- Fuel system and delivery system
- Surveillance system including cameras and video recorders.
- Communications Equipment
- Battery storage and controls
- Paint and decal provisions
- Corrosion protection
- Electric fan system
- Multiplex system

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

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

The warranties shall not apply to the following items: scheduled maintenance items, normal wear-out items and items furnished by CTDOT.


The Contractor shall pass on to CTDOT any warranty, offered by a component supplier, that is superior to that required herein. The Contractor shall provide a list to CTDOT noting the conditions and limitations of the superior warranty not later than start of production. The superior warranty shall not be administered by the Contractor.

A fleet defect is defined as cumulative failures of 20 percent (20%) in the same components in the same or similar application where such items are covered by warranty. A fleet defect shall only apply to the warranty period.

For the purpose of fleet defects, each option order shall be treated as a separate bus fleet. In addition, should there be a change in a major component within either the base order or an option order, the buses containing the new major component shall become a separate bus fleet for the purposes of fleet defect.

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

The fleet defect warranty provisions shall not apply to CTDOT-supplied items, such as radios, fare collection equipment, communication systems and tires. In addition, fleet defects shall not apply to interior and exterior finishes, hoses, fittings and fabric.

RWA  If the fleet defect specified percentage is reached on a major component, the Contractor is responsible to support and shall assist CTDOT with obtaining a remedy from the major component manufacturer. If a remedy to a fleet defect proposed by the manufacturer is not acceptable to CTDOT acting reasonably, the Contractor shall use commercially reasonable efforts to work with the major component manufacturer to develop an alternative remedy that is acceptable to CTDOT.

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

If CTDOT detects a defect within the warranty period, it shall, within twenty (20) working days, notify the Contractor's representative. The Contractor or its designated representative shall, if requested, begin work on warranty-covered repairs within five (5) working days after receiving notification of a defect from CTDOT. CTDOT shall make the bus available to complete repairs timely with the Contractor's repair schedule.

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

If CTDOT performs the warranty-covered repairs, it shall correct or repair the defect and any related defects utilizing parts supplied by the Contractor specifically for this repair. At its discretion, CTDOT may use Contractor-specified parts available from its own stock if deemed in its best interests.

CTDOT may require that the Contractor supply parts for warranty-covered repairs being performed by the CTDOT. Those parts may be remanufactured but shall have the same form, fit and function and warranty. The parts shall be



shipped prepaid to CTDOT from any source selected by the Contractor within ten (10) working days of receipt of the request for said parts and shall not be subject to a CTDOT handling charge.

The Contractor may request that parts covered by the warranty be returned to the manufacturing plant. The freight costs for this action shall be paid by the Contractor.

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

CTDOT shall be reimbursed by the Contractor for labor. The amount shall be determined by CTDOT for a technician at a straight time wage rate plus fringe benefits and overhead adjusted for CTDOT's most recently published rate in effect at the time the work is performed, plus the cost of towing the bus if such action was necessary and if the bus was in the normal service area. These wage and fringe benefit rates shall not exceed the rates in effect in CTDOT's service garage at the time the defect correction is made.

CTDOT shall be reimbursed by the Contractor for defective parts and for parts that must be replaced to correct the defect. The reimbursement shall be at the current price at the time of repair and shall include taxes where applicable, plus 22.5 percent handling costs. Handling costs shall not be paid if the part is supplied by Contractor and shipped to CTDOT.

The Contractor shall reimburse/respond to the warranty claim with an accept/reject decision including necessary failure analysis no later than sixty (60) days after CTDOT submits the claim and defective part(s), when requested. The parties should reconcile all outstanding warranty claims at least once per quarter throughout the entire warranty period.

If any component, unit or subsystem is repaired, rebuilt or replaced by the Contractor or by CTDOT with the concurrence of the Contractor, the component, unit or subsystem shall have the unexpired warranty period of the original. Repairs shall not be warranted if Contractor-provided or authorized parts are not used for the repair, unless the Contractor has failed to respond within five (5) working days.

If an item is declared to be a fleet defect, the warranty stops with the declaration of the fleet defect. Once the fleet defect is corrected, the item(s) shall have remaining time and/or miles of the original warranty. This remaining warranty period shall begin on the repair/replacement date for corrected items on each bus if the repairs are completed by the Contractor or on the date the Contractor provides all parts to CTDOT.

The following list represents requirements by CTDOT to the Contractor for processing warranty claims. One (1) failure per bus per claim is allowed.

1. Bus number and VIN
2. Total vehicle life mileage at time of repair
3. Date of failure/repair
4. Acceptance/in-service date
5. Contractor part number and description
6. Component serial number
7. Description of failure
8. All costs associated with each failure/repair (invoices may be required for third party costs)
  - a. Towing
  - b. Road calls
  - c. Labor
  - d. Materials
  - e. Parts

- f. Handling
- g. Troubleshooting time

CTDOT's standardized forms will be accepted if all of the above information is included. Electronic submittal may be used if available between the Contractor and CTDOT.

CTDOT must include the following when returning defective parts to the Contractor.

1. Part needs to be tagged with
  - a. Bus number and VIN
  - b. Claim number
  - c. Part number
  - d. Serial number (if available)

Each claim must be submitted no more than thirty (30) days from the date of failure and/or repair, whichever is later. All defective parts must be returned to the Contractor, when requested, no more than forty-five (45) days from date of repair.

## **2. ADDITIONAL TERMS AND CONDITIONS:**

### **2.1. TVM CERTIFICATION**

The Contractor agrees to comply with all the requirements of 49 CFR 23.67, as they apply to the procurement of transit vehicles under this contract, including be not limited to, furnishing the vehicle purchaser with a certification that it is in full compliance with all the regulatory requirements of 49 CFR 23.67.

### **2.2. DBE CERTIFICATION**

Pursuant to Title 49, Code of Federal Regulations, part 23.67, a Proposer, as a condition of being authorized to bid this procurement, must certify by completing "DBE APPROVAL CERTIFICATION", that it has on file with the FTA an approved or not disapproved annual DBE subcontracting participation goal

### **2.3 COMPLIANCE WITH CONN. GEN. STATUTES SECTIONS 33-922, 33-636 AND 33-953:**

Prior to the award of any contract, corporations which are incorporated in states other than Connecticut (foreign corporations) must have on file with the Connecticut Secretary of State's Office, an approved Certificate of Authority and corporations incorporated in Connecticut (domestic corporations) must have on file an approved Certificate of Incorporation. All required annual reports for both types of corporations, including the organizational report for domestic corporations must also be on file with the Connecticut Secretary of State's Office. See Conn. General Statutes Sections 33-922, 33-636 and 33-953. Any questions regarding these filing requirements may be directed to the Connecticut Secretary of State's Office at (860) 509-6002.

### **2.4 INTEREST OF MEMBERS OF, OR DELEGATES TO, CONGRESS**

No member of, or delegate to, the Congress of the United States will be admitted to any share or part of this Contract or to any benefit arising there from. (41U.S.C.§ 22.)

### **2.5 PROHIBITED INTEREST**

No member officer or employee of CTDOT or of a local public body during his tenure or one (1) year thereafter will have any interest, direct or indirect, in this Contract or the proceeds thereof.

### **2.6 SUBCONTRACTORS**

CTDOT must approve any and all subcontractors utilized by the Contractor prior to any such subcontractor commencing any work. Contractor acknowledges that any work provided under the Contract to any state entity is work conducted on behalf of the State and that the Commissioner of CTDOT or his/her designee may communicate directly with any subcontractor as the State deems to be necessary or appropriate. Contractor shall be responsible for all payment of fees charged by the subcontractor(s). A performance evaluation of any subcontractor shall be provided promptly by the Contractor to CTDOT upon request.

Contractor must provide the majority of services described in the specifications.

### **2.7 SINGLE PROPOSAL RESPONSE**

If only one (1) proposal is received in response to this RFP, a detailed cost proposal may be requested of the single Proposer. A cost/price analysis and evaluation and/or audit may be performed of the cost proposal in order to determine if the price is fair and reasonable.

### **2.8 PURCHASE ORDERS:**

Purchase Orders will be issued by CTDOT's Division of Purchasing and Materials Management. Contractors are cautioned not to perform services without receiving a purchase order number. Questions regarding Purchase Orders should be directed to CTDOT's Division of Purchasing & Materials Management; Processing Unit at telephone number (860) 594-2070.

Before a Contractor is used, a Certificate of Insurance, as detailed elsewhere in this document, must be on file at CTDOT's Division of Purchasing & Materials Management.

## 2.9 SECURITY AND/OR PROPERTY ENTRANCE POLICIES AND PROCEDURES

Contractor shall adhere to established security and/or property entrance policies and procedures. It is the responsibility of each Contractor to understand and adhere to those policies and procedures prior to any attempt to enter any premises for the purpose of carrying out the scope of work described in this Contract.

## 2.10 DELIVERY

Unless otherwise specified, the buses shall be delivered to the Hartford division of CTTransit at 100 Leibert Road, Hartford CT 02141, washed and with a full tank of fuel at a rate not to exceed ten (10) buses per week. Delivery shall be completed within time frame specified in the executed contract documents. Hours of delivery shall be 8:00 am through 4:00 pm, Monday through Friday.

Delivery of buses shall be determined by signed receipt of CTDOT's designated agent at the point of delivery and may be preceded by a cursory inspection of the bus.

## 2.11 CERTIFICATE OF ORIGIN

The awarded vendor must furnish a certificate of origin to the State of Connecticut unless otherwise specified. The certificate of origin must be mailed or delivered to the State of Connecticut, Department of Transportation, 2800 Berlin Turnpike, Room 2442, Newington, CT, Attention: Asset Management/Inventory Section, along with the invoice number. All information on the certificate must be completed accurately and serial numbers and odometer reading must match the bus that was delivered. **Failure to provide the proper certificate of origin will result in the delay of payment.**

The Certificate of Origin will be completed as follows:

Name of Purchaser:	State of Connecticut, Department of Transportation
Address:	2800 Berlin Turnpike, Newington, CT 06131-7546
Odometer Reading:	To be completed by the Contractor
Signature:	Of authorized representative transferring ownership to the State

## 2.12 PURCHASE ORDER PAYMENTS

Payments will be processed by the Accounts Payable Unit through the State Comptroller's Office. Payments will be made in arrears and after receipt of a properly completed invoice. All billing must reference the State Purchase Order number, vendor invoice number and vendor's Federal Identification Number.

Invoices are to be mailed to:

State of Connecticut, Department of Transportation  
Attn: Philip T. Scarrozzo, Transit Manager  
Bureau of Public Transportation  
2800 Berlin Turnpike  
P.O. Box 317546  
Newington, CT 06131-7546

State of Connecticut payment terms are net forty-five (45) days.

Note: State of Connecticut General Statutes prohibits any state agency from making prepayments for repair or maintenance service. All payments will be made in arrears.

## 2.13 LIQUIDATED DAMAGES

It is mutually understood and agreed by and between the parties to the Contract that time is of the essence with respect to the completion of the Work and that in case of any failure on the part of the Contractor to complete the Work within the time specified in the contract or any extension thereof, CTDOT will be damaged thereby. The amount of said damages, being difficult if not impossible of definite ascertainment and proof, it is hereby agreed that

the amount of such damages due CTDOT shall be fixed at \$150.00 per calendar day per bus not delivered in substantially as good condition as inspected by CTDOT at the time released for shipment.

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

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

CTDOT specifically reserves the right, without limitation of any other rights, to terminate the Contract in accordance with SP-50; Contract Document (10.) "Termination".

#### **2.14 PRICE ESCALATION/ECONOMIC PRICE ADJUSTMENT**

CTDOT reserves the right to order buses and equipment over the five (5) year period beginning upon the day of contract award. The base price for buses furnished shall be the price agreed upon by the parties on that award date. The prices shall remain firm/fixed for any orders issued by CTDOT within a period of 365 days of contract award. The price(s) of any buses/equipment ordered by CTDOT after the initial 365 days firm/fixed price period shall be, the agreed upon base price adjusted to reflect any change which will be calculated based on the percentage change in the PPI category WPU1413 "Transportation Equipment", "Trucks, over 14,000 lbs. GVW". The percentage change in this price index shall be used to adjust the Base Order Prices. However, in no event will the price(s) for any purchase order be adjusted by more or less than five percent (5%) of the price(s) that would have been in effect twelve (12) months prior to the date of the release, in accordance with the terms and conditions set forth above. If non-cardinal modifications are made to the technical specifications, the parties will enter into negotiations to determine the final unit price for subsequent orders.

#### **2.15 ASSIGNMENT OF CONTRACT BY STATE**

At any time during the continuance of the contract, CTDOT shall have the right to sell, assign and transfer the contract or all or part of the specified deliverables under the contract both the base and/or the option quantities with all its right, title, and interest therein, to any person, firm, or corporation, and the assignee thereof shall acquire all the rights granted to the State and shall be subject to any obligations that CTDOT may have under the contract.

It is expected that other Connecticut entities will purchase from this procurement. The equipment needs of the Greater Bridgeport Transit Authority, the Housatonic Area Regional Transit District, the Norwalk Transit District, the Southeast Area Transit District, the Greater Hartford Transit, the Estuary Transit District, the Windham Region Transit District, Middletown Area Transit District, the Milford Transit District, Northwestern Connecticut Transit District, and the University of Connecticut have been included in this procurement.

#### **2.16 BUSINESS OPERATIONAL CHANGES**

In the event that the awarded Contractor moves or updates telephone numbers, it is the responsibility of the Contractor to advise CTDOT's Division of Purchasing & Materials Management of such changes in writing. The State will not be held responsible for payments or Purchase Orders that are delayed due to additional routing caused by the lack of notification on the Contractor's part. Change of address or telephone updates must be forwarded to:

State of Connecticut, Department of Transportation  
Division of Purchasing & Materials Management  
2800 Berlin Turnpike  
P.O Box 317546  
Newington, CT 06131-7546

Attn: Mary Matuszak, Fiscal Administrative Supervisor  
[mary.matuszak@ct.gov](mailto:mary.matuszak@ct.gov)

**EXHIBIT A.1**

**TECHNICAL SPECIFICATIONS**

# Connecticut Department of Transportation 45' DIESEL BUS TECHNICAL SPECIFICATIONS

## EXHIBIT A.1

### TABLE OF CONTENTS

<b>CONNECTICUT DEPARTMENT OF TRANSPORTATION .....</b>	<b>1</b>
<b>1.0 GENERAL REQUIREMENTS .....</b>	<b>1</b>
<b>1.1 DEFINITIONS.....</b>	<b>3</b>
<b>1.2 ABBREVIATIONS.....</b>	<b>4</b>
<b>1.3 OVERALL REQUIREMENTS.....</b>	<b>5</b>
1.3.1 DIMENSIONS .....	5
1.3.1.1 PHYSICAL SIZE .....	5
1.3.1.2 UNDERBODY CLEARANCES .....	5
1.3.2 WEIGHT AND AXLE LOADING.....	5
1.3.3 CAPACITY .....	5
1.3.4 SERVICE LIFE AND MAINTENANCE .....	6
1.3.4.1 SERVICE LIFE .....	6
1.3.4.2 MAINTENANCE AND INSPECTION .....	6
1.3.4.3 MEAN MILEAGE BETWEEN FAILURES.....	6
1.3.4.4 ACCESSIBILITY .....	6
1.3.4.5 INTERCHANGEABILITY .....	7
1.3.5 OPERATING ENVIRONMENT .....	7
1.3.6 MATERIALS AND CONSTRUCTION.....	7
1.3.7 PROTOTYPE VEHICLE.....	8
1.3.8 NEW COMPONENTS.....	9
<b>2.0 BODY .....</b>	<b>10</b>
<b>2.1 DESIGN.....</b>	<b>10</b>
<b>2.2 MATERIALS .....</b>	<b>10</b>
<b>2.3 FINISH AND COLOR .....</b>	<b>10</b>
<b>2.4 DECALS .....</b>	<b>11</b>
<b>2.5 NUMBERING AND SIGNING .....</b>	<b>11</b>
2.5.1 EXTERIOR.....	12
2.5.2 INTERIOR .....	13



<b>2.6</b>	<b>PEDESTRIAN SAFETY .....</b>	<b>13</b>
<b>2.7</b>	<b>STRUCTURE .....</b>	<b>13</b>
2.7.1	STRENGTH AND FATIGUE LIFE .....	13
2.7.2	DISTORTION .....	14
2.7.3	RESONANCE .....	14
2.7.4	MATERIAL .....	14
2.7.5	CORROSION .....	14
2.7.6	TOWING .....	16
2.7.7	JACKING & HOISTING .....	17
2.7.8	FIRE PROTECTION .....	17
2.7.9	FIRE SUPPRESSION SYSTEM .....	18
2.7.10	EXTERIOR AND APPLIED PANELS .....	21
2.7.10.1	STRENGTH AND INSTALLATION .....	21
2.7.10.2	REPAIR AND REPLACEMENT .....	21
2.7.10.3	RAIN GUTTERS .....	21
2.7.10.4	LICENSE PLATES .....	21
2.7.10.5	RUBRAILS .....	21
2.7.10.6	PACKAGE RACKS .....	22
2.7.10.7	UNDERFLOOR BAGGAGE COMPARTMENTS .....	22
<b>2.8</b>	<b>INTERIOR .....</b>	<b>23</b>
2.8.1	HEADROOM .....	23
2.8.2	DRIVER BARRIER .....	23
2.8.3	MODESTY PANELS .....	23
2.8.4	REAR BULKHEAD .....	24
2.8.5	CONSTRUCTION .....	24
2.8.6	FASTENING .....	24
2.8.7	FLOOR .....	24
2.8.7.1	STRENGTH .....	24
2.8.7.2	EDGES .....	24
2.8.7.3	FLOOR PROTECTION .....	25
2.8.8	STEPS AND STEPWELL .....	25
2.8.8.1	STEPS .....	25
2.8.8.2	STEPWELL CONSTRUCTION .....	25
2.8.9	WHEEL HOUSING .....	26
2.8.9.1	CONSTRUCTION .....	26
2.8.9.2	CLEARANCE .....	26
2.8.9.3	FENDER SKIRTS .....	26
2.8.10	SPLASH APRONS .....	26
2.8.11	PASSENGER DOORS .....	26
2.8.12	SERVICE COMPARTMENTS AND ACCESS DOORS .....	27
2.8.12.1	INTERIOR .....	27
2.8.12.2	EXTERIOR .....	27
<b>2.9</b>	<b>OPERATING COMPONENTS .....</b>	<b>28</b>
2.9.1	DOORS .....	28
2.9.1.1	CONTROL .....	28
2.9.1.2	ACTUATORS .....	28
2.9.1.3	MANUAL OPERATION .....	28
2.9.2	WINDSHIELD WIPERS AND WASHERS .....	28
2.9.2.1	WINDSHIELD WIPERS .....	28
2.9.2.2	WINDSHIELD WASHERS .....	29
2.9.3	LIGHTING, CONTROLS, INSTRUMENTS .....	29
2.9.3.1	EXTERIOR LIGHTING .....	29
2.9.3.2	SERVICE AREA LIGHTING .....	31
2.9.3.3	PASSENGER INTERIOR LIGHTING .....	31

2.9.3.4	DRIVER'S LIGHTING.....	32
2.9.3.5	DRIVER CONTROLS.....	32
2.9.3.6	INSTRUMENTATION .....	33
2.9.3.7	VISUAL AND AUDIBLE WARNING DISPLAY .....	34
<b>2.10</b>	<b>INTERIOR TRIM.....</b>	<b>36</b>
2.10.1	GENERAL REQUIREMENTS .....	36
2.10.1.1	TRIM PANELS .....	36
2.10.1.2	HEADLINING.....	36
2.10.1.3	FRONT END .....	37
2.10.1.4	REAR END.....	37
2.10.1.5	PASSENGER INFORMATION.....	37
2.10.2	PASSENGER SEATS .....	37
2.10.2.1	ARRANGEMENTS.....	37
2.10.2.2	STRUCTURE AND DESIGN .....	38
2.10.3	DRIVER'S SEAT.....	39
2.10.3.1	DIMENSIONS.....	39
2.10.3.2	STRUCTURE AND DESIGN .....	40
2.10.4	FLOOR COVERING .....	40
2.10.4.1	VESTIBULE.....	40
2.10.4.2	DRIVER'S COMPARTMENT .....	41
2.10.4.3	PASSENGER AREA.....	41
<b>2.11</b>	<b>WINDOWS.....</b>	<b>41</b>
2.11.1	WINDSHIELD .....	41
2.11.2	DRIVER'S SIDE WINDOW .....	42
2.11.3	SIDE WINDOWS.....	42
<b>2.12</b>	<b>INSULATION .....</b>	<b>42</b>
2.12.1	MATERIAL .....	42
2.12.1.1	PROPERTIES.....	42
2.12.1.2	THERMAL INSULATION .....	43
2.12.1.3	SOUND INSULATION.....	43
2.12.1.4	REAR SEAT INSULATION.....	43
<b>2.13</b>	<b>ANCILLARY FEATURES .....</b>	<b>43</b>
2.13.1	DRIVER'S AREA.....	44
2.13.1.1	VISORS .....	44
2.13.1.2	STOP REQUEST SIGN .....	44
2.13.1.3	DRIVER'S STORAGE.....	44
2.13.2	MIRRORS .....	44
2.13.2.1	OUTSIDE MIRRORS .....	44
2.13.2.2	INSIDE MIRRORS .....	45
2.13.3	PASSENGER ASSISTS.....	45
2.13.3.1	GENERAL REQUIREMENTS .....	45
2.13.3.2	FRONT DOORWAY.....	46
2.13.3.3	VESTIBULE.....	46
2.13.4	PASSENGER INFORMATION SYSTEMS.....	46
2.13.4.1	DESTINATION SIGNS .....	46
2.13.4.2	RUN NUMBERS.....	48
2.13.5	FARE COLLECTION .....	49
2.13.6	LIFT.....	49
2.13.6.1	LIFT DOOR.....	51
2.13.6.2	LIFT INSTALLATION .....	51
2.13.6.3	LIGHTING REQUIREMENTS.....	52
2.13.6.4	SECUREMENT SYSTEM .....	52

**2.14 ROOF VENTILATORS/ESCAPE HATCH.....52**

**3.0 CHASSIS..... 52**

**3.1 PROPULSION SYSTEM.....52**

3.1.1 VEHICLE PERFORMANCE .....52

3.1.1.1 POWER REQUIREMENTS.....52

3.1.1.2 TOP SPEED.....53

3.1.1.3 GRADABILITY .....53

3.1.1.4 ACCELERATION.....53

3.1.1.5 JERK.....53

3.1.1.6 OPERATING RANGE.....53

3.1.1.7 OPERATING PERFORMANCE .....53

3.1.2 POWERPLANT MOUNTING AND ACCESSORIES .....53

3.1.2.1 MOUNTING.....53

3.1.2.2 SERVICE.....54

3.1.2.3 AIR CLEANER.....55

3.1.2.4 ACCESSORIES.....55

3.1.2.5 HYDRAULIC DRIVE.....55

3.1.3 POWERPLANT .....56

3.1.3.1 ENGINE .....56

3.1.3.2 COOLING SYSTEM.....57

3.1.3.3 TRANSMISSION.....59

3.1.3.4 ELECTRIC STARTER.....61

**3.1.3.4.1 SUPER CAPACITOR START AID .....61**

3.1.4 EMISSIONS.....61

3.1.4.1 MOTOR VEHICLE POLLUTION REQUIREMENTS .....61

3.1.4.2 EXHAUST LOCATION .....61

3.1.4.3 AUXILIARY HEATER.....62

**3.2 FINAL DRIVE .....63**

3.2.1 GENERAL REQUIREMENTS.....63

3.2.1.1 DRIVE AXLE.....63

3.2.1.2 TRAILING AXLE.....63

3.2.1.3 DRIVE SHAFT.....63

**3.3 SUSPENSION .....63**

3.3.1 GENERAL REQUIREMENTS.....63

3.3.2 SPRINGS AND SHOCK ABSORBERS .....64

3.3.3 TRAVEL .....64

3.3.4 KNEELING.....64

3.3.5 DAMPING .....64

3.3.6 LUBRICATION.....65

3.3.7 UNDERCOATING .....65

**3.4 STEERING.....65**

3.4.1 STRENGTH.....65

3.4.2 TURNING EFFORT .....65

**3.5 BRAKES.....66**

3.5.1 SERVICE & PARK/EMERGENCY BRAKE SYSTEMS .....66

3.5.1.1 ACTUATION .....66

3.5.1.2 FRICTION MATERIAL .....66

3.5.1.3 HUBS, ROTORS and CALIPERS.....66

3.5.1.4 ANTILOCK BRAKE SYSTEM.....67

3.5.1.5 ELECTRONIC STABILITY CONTROL (ESC) .....68

3.5.1.6	AIR SYSTEM.....	69
<b>3.6</b>	<b>GENERAL CHASSIS.....</b>	<b>70</b>
3.6.1	WHEELS AND TIRES .....	70
3.6.1.1	WHEELS .....	71
3.6.1.2	TIRES .....	71
3.6.2	FUEL SYSTEM .....	71
3.6.2.1	FUEL TANK .....	71
3.6.2.2	FUEL FILLER.....	72
3.6.2.3	FUEL MANAGEMENT .....	72
3.6.3	BUMPER SYSTEM.....	72
3.6.3.1	LOCATION.....	72
3.6.3.2	FRONT AND REAR BUMPER.....	73
3.6.4	ELECTRICAL SYSTEM.....	73
3.6.4.1	GENERAL REQUIREMENTS .....	73
3.6.4.2	MODULAR DESIGN.....	74
3.6.4.3	JUNCTION BOXES.....	75
3.6.4.4	WIRING AND TERMINALS .....	75
3.6.5	ELECTRICAL COMPONENTS.....	76
3.6.5.1	GENERAL REQUIREMENTS .....	76
3.6.5.2	BATTERIES.....	77
3.6.5.3	BATTERY EQUALIZER.....	78
3.6.5.4	MASTER BATTERY SWITCHES .....	78
3.6.5.5	FIRE DETECTORS.....	78
3.6.5.6	RADIO NOISE SUPPRESSION.....	78
<b>3.7</b>	<b>INTERIOR CLIMATE CONTROL .....</b>	<b>79</b>
3.7.1	CAPACITY AND PERFORMANCE .....	79
3.7.2	CONTROLS .....	81
3.7.3	AIR FLOW.....	81
3.7.3.1	PASSENGER AREA.....	81
3.7.3.2	DRIVER'S AREA.....	81
3.7.3.3	AIR INTAKE.....	81
<b>3.8</b>	<b>RADIOS AND PUBLIC ADDRESS .....</b>	<b>82</b>
3.8.1	MOBILE RADIO SYSTEM .....	82
3.8.2	RADIO COMPARTMENT and COMPARTMENT COMPONENTS .....	82
3.8.3	RADIO UNIT.....	83
3.8.4	RADIO SYSTEM ANTENNAS AND COAXIAL CABLES.....	83
3.8.5	D.C. POWER AND WIRING .....	83
3.8.6	MOBILE RADIO SYSTEM PERIPHERAL DEVICES.....	84
3.8.6.1	EMERGENCY ALARM .....	84
3.8.6.2	HANDSET/CRADLE ASSEMBLY.....	84
3.8.7	DIAGRAMS.....	85
3.8.8	RADIO SYSTEM INSTALLATION SCHEMATIC.....	85
<b>3.9</b>	<b>WIRELESS LOCAL AREA NETWORK (WLAN) for Passenger Wi-Fi Usage.....</b>	<b>87</b>
3.9.1.	REMOTE MANAGEMENT SOFTWARE.....	87
3.9.1.1	GENERAL REQUIREMENTS .....	87
3.9.1.2	USER SESSION MANAGEMENT .....	88
3.9.1.3	CONTENT CONTROL AND FILTERING .....	88
3.9.1.4	CUSTOMER SURVEYS.....	88
3.9.1.5	ADVERTISING CAMPAIGNS .....	89
3.9.2.	WLAN HARDWARE .....	89
3.9.2.1	GENERAL REQUIREMENTS.....	89
3.9.2.2	CELLULAR AND WLAN CONNECTIVITY .....	89
3.9.2.3	ELECTRICAL SPECIFICATIONS .....	90

3.9.2.4	ANTENNA CONNECTORS AND INTERFACE PORTS .....	90
3.9.2.5	WLAN SECURITY .....	90
3.9.2.6	REGULATORY REQUIREMENTS.....	90
<b>3.10</b>	<b>SAFETY EQUIPMENT .....</b>	<b>90</b>
<b>4.0</b>	<b>SMART BUS FEATURES .....</b>	<b>90</b>
<b>4.1</b>	<b>INTELLIGENT TRANSPORTATION SYSTEMS COMPUTER-AIDED PROVIS....</b>	<b>90</b>
<b>4.2</b>	<b>IN VEHICLE DATA NETWORK .....</b>	<b>92</b>
<b>4.3</b>	<b>PASSENGER COUNTING.....</b>	<b>93</b>
<b>4.4</b>	<b>MOBILE ACCESS ROUTER / CELLULAR DATA MODEM.....</b>	<b>93</b>
<b>4.5</b>	<b>ITS VEHICLE CONTROL UNIT.....</b>	<b>93</b>
<b>4.6</b>	<b>CAMERA SYSTEM and BACKUP CAMERA SYSTEMS.....</b>	<b>94</b>
<b>4.7</b>	<b>DATA LOGGER.....</b>	<b>102</b>
<b>4.8</b>	<b>AUTOMATIC VEHICLE MONITORING (AVM) - Optional .....</b>	<b>103</b>
<b>4.9</b>	<b>TURN WARNING SYSTEM (TWS).....</b>	<b>104</b>
<b>5.0</b>	<b>TRAINING .....</b>	<b>104</b>
<b>5.1</b>	<b>GENERAL REQUIREMENTS.....</b>	<b>104</b>
5.1.1	RESPONSIBILITY .....	104
5.1.2	SCOPE OF TRAINING .....	104
5.1.2.1	FORMAL CLASSROOM TRAINING .....	104
5.1.2.2	WEB-BASED TRAINING .....	104
5.1.3	OBJECTIVE BASED TRAINING .....	105
5.1.4	COURSE CONTENT.....	105
5.1.5	TRAINING COSTS .....	105
5.1.6	SUBMISSION AND APPROVAL OF TRAINING PLANS .....	105
5.1.7	INSTRUCTORS.....	106
5.1.8	TRAINING AIDS AND EQUIPMENT .....	106
5.1.9	TRAINING MATERIALS .....	107
5.1.10	TRAINING FACILITIES AND LOCATION .....	107
5.1.11	TRAINING HOURS .....	107
5.1.12	TRAINING DAYS .....	107
5.1.13	PILOT SESSIONS .....	108
5.1.14	SCHEDULE .....	108
5.1.15	SAFETY .....	108
<b>5.2</b>	<b>OPERATIONAL INSTRUCTOR TRAINING .....</b>	<b>108</b>
5.2.1	OBJECTIVES .....	108
5.2.2	STRUCTURE/TOPICS.....	108
5.2.3	Day One (1).....	108
5.2.4	Day Two (2) .....	108
5.2.5	Day Three (3) .....	109
5.2.6	SCHEDULE FOR TRAINING .....	109
5.2.7	NUMBER TO BE TRAINED .....	109

<b>5.3</b>	<b>MAINTENANCE MANAGEMENT TRAINING.....</b>	<b>109</b>
5.3.1	OBJECTIVES .....	109
5.3.2	SCHEDULE FOR TRAINING .....	109
5.3.3	TOPICS .....	109
5.3.4	NUMBER TO BE TRAINED .....	109
<b>5.4</b>	<b>MECHANICS TRAINING .....</b>	<b>110</b>
5.4.1	OBJECTIVES .....	110
5.4.2	TOPICS/STRUCTURE.....	110
5.4.3	SCHEDULE .....	110
5.4.4	NUMBER TO BE TRAINED .....	110
<b>6.0</b>	<b>DOCUMENTATION.....</b>	<b>111</b>
<b>6.1</b>	<b>HARD COPY DOCUMENTATION.....</b>	<b>111</b>
<b>6.2</b>	<b>WALL SIZE CHARTS.....</b>	<b>112</b>
<b>6.3</b>	<b>ELECTRONIC CATALOG DOCUMENTATION (ECD).....</b>	<b>112</b>
<b>7.0</b>	<b>SERVICE AND SPARE PARTS.....</b>	<b>113</b>
<b>8.0</b>	<b>OPTIONAL EQUIPMENT.....</b>	<b>114</b>
<b>8.1</b>	<b>TIRE COST PRICING.....</b>	<b>114</b>
<b>8.2</b>	<b>ROUTER AND MODEM (WLAN) - COST CREDIT .....</b>	<b>114</b>
<b>8.3</b>	<b>TRAPEZE SYSTEM TRANSIT CONTROL HEAD (TCH) COST CREDIT.....</b>	<b>114</b>

**ABBREVIATIONS AND COMMONLY USED TERMS**

Wherever the following abbreviations are used in these Specifications or on the Plans, they are to be construed the same as the respective expressions represented:

AC	Alternating Current
A/C	Air Conditioning
ABC	Class of Fires - Ash, Barrel, Current
ABS	Anti-Lock Braking System
ADA	Americans with Disabilities Act of 1990 as amended
ADPCM	Adaptive Differential Pulse Code Modulation
AES	Advanced Encryption Standard
AGM	Absorbed Glass Mat
a.m.	Ante Meridiem
AMP	Amperes
AMT	Automated Maintenance Test
ANSI	American National Standards Institute
APC	Automatic Passenger Counter
APTA	American Public Transportation Association
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASTM	American Society of Testing and Materials
ATA	Advanced Technology Attachment
ATI	Array Technology Inc.
AVI	Audio Video Interleave
AVL	Automatic Vehicle Location
AVM	Automatic Vehicle Monitoring
AWG	American Wire Gage
BIST	Built-in Self-Test
BMCS	Bureau of Motor Carrier Safety
BMP	BitMap
BTU	British Thermal Unit
C	Celsius
C.A.C. or CAC	Charge Air Cooler
CAD	Computer Aided Dispatch
CAN	Controller Area Network
CCA	Cold Cranking Amp
CD	Compact Disc
CFR	Code of Federal Regulations
CL	Centralized List
.csv	Comma Separated Values
CTDMV	State of Connecticut, Department of Motor Vehicles

CTDOT	Connecticut Department of Transportation and designated agents
dB	Decibel
dBA	Decibel, A-Weighted Scale
DBE	Disadvantaged Business Enterprise
dBm	Decibel milliwatts
DC	Direct Current
DC/DC	A Type of Converter - Direct Current to Direct Current
DDR2 SDRAM	Double Data Rate Synchronous Dynamic Random Access Memory
DEF	Diesel Exhaust Fluid
DIMMs	Dual Inline Memory Module
DOT	U.S. Department of Transportation
DVD	Digital Video Disc
ECD	Electronic Catalog Documentation
ECDC	Electronically Commutated Direct Current
ECM	Engine Control Module
ECS	Emission Control System
ECU	Electronic Control Unit
EEPROM	Electrically Erasable Programmable Read-only Memory
EGR	Exhaust Gas Recirculation
EMI	Electromagnetic Interference
EPA	U. S. Environmental Protection Agency
ESC	Electronic Stability Control
eSATA	External Serial Advanced Technology Attachment
etc.	Etcetera
EV-DO	Evolution-Data Optimized
F	Fahrenheit
FCC	Federal Communications Commission
FHWA	Federal Highway Administration
FM	Factory Mutual Research Corporation
FMSCR	Federal Motor Carrier Safety Regulations (US)
fps	Frames Per Second
FRP	Fiberglass Reinforced Plastic
ft.	Foot/Feet
FTA	U.S. Federal Transit Administration
FVMSS	Federal Motor Vehicle Safety Standards (US)
GAAP	Generally Accepted Accounting Principles
GAWR	Gross Axle Weight Rated
GB	Gigabyte



GHZ	Gigahertz
GPS	Global Positioning System
GSM/EDGE	Global System Mobil/Enhanced Data Global Evolution
GVWR	Gross Vehicle Weight Rated
GXL	A type of Automotive wire
HCL	Hydrogen Chloride
HCM	Heater Control Module
HD	High Definition
HDS	Hybrid Drive System
Hg	A unit to measure pressure-Hg = 1" of Mercury
HIC	Head Injury Criteria
HR	Hour
HSC	Hybrid System Controller
HSLA	High Strength Low Alloy
HVAC	Heating, Ventilation, and Air Conditioning
Hz	Hertz
ID	Identification
I/O	Input/Output
IEEE	Institute of Electrical and Electronic Engineers
IO	Input/Output
IP	Ingress Protection
in.	Inch/Inches
ISO	International Standards Organization
ITS	Intelligent Transportation Systems
IVLU	Intelligent Vehicle Logic Unit
IVN	Intelligent Vehicle Network
JIC	Joint Industrial Council
JPEG	Joint Photographic Experts Group
kg.	Kilogram
kHz	Kilohertz
kJ	Kilojoules
kw.	Kilowatt
lb.	Pound
lbs.	Pounds
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LEL	Lower Explosive Limit
MAC	Media Access Control

Mbps	Megabit Per Second
MDT	Mobile Data Terminal
MDVR	Mobile Digital Video Recording
MFD	Multifunction Display
MHz	Megahertz
M.I.D.	Message Identification
MIL	Military Specification
MILSPEC	Military Specification
MOV	A type of multimedia format
MPEG	Moving Picture Experts Group
Mph	Miles per hour
ms	Millisecond
N/A	Not Applicable
NAOH	Sodium Hydroxide
NFPA	National Fire Protection Association
NHTSA	National Highway Traffic Safety Administration
NTSC	National Television System Committee
NIC	Network Interface Card
NTP	Notice to Proceed
OEM	Original Equipment Manufacturer
ohm	SI unit for electrical resistant
OKD	Operator's Display Keypad
OSHA	Occupational Safety and Health Administration
OSI	Open Systems Interconnect
P2P	Peer to Peer
PC	Personal Computer
PEI	Peripheral Equipment Interface
PHD	Programmable Heat Detectors
P.I.D.	Parameter Identifications
PM	Preventive Maintenance
p.m.	Post Meridiem
P/N	Part Number
VPP	Voltage Peak to Peak
PPI	Producer Price Index
PR	Poly/Rubber
PRD	Pressure Relief Device
PROM	Programmable read-only memory
psi	Pounds per square inch

psig	Pounds per square inch, Gauge
RFI	Radio Frequency Interference
RFP	Request For Proposals
RP-SMA	Subminiature Version A
RPM	Revolutions per Minute
RTM	Real Time
RW	Rewritable Media
SAE	Society Automotive Engineers
SDRAM	Synchronous Dynamic Random Access Memory
SGR	Starter or Ground Rubber
SGT	Starter or Ground Thermoplastic
SGX	Starter or Ground Cross-link Polyethylene
SLW	Seated Load Weight
SMA	Subminiature Version A
SOC	State of Charge
SPB	System Processor Board
SPI	Society of the Plastics Industry
SXL	Type of wiring
TBD	To be Determined
TCH	Transit Control Head
TCRB	Transportation Cooperative Research Board
TEC	Training Evaluation Committee
TIFF	Tagged Image File Format
TKIP	Temporal Key Integrity Protocol
TRB	Transportation Research Board
TVM	Transit Vehicle Manufacturer
TXL	Type of wiring
uhf	Ultra High Frequency
UL	Underwriters Laboratories
UMTS/HSPA/HSPA+	High Speed Packet Access
URL	Uniform Resource Locator
U.S.	United States
USB	Universal Serial Bus
UWE	Unitized Wheel Ends
V	Volt
VDC	Volts, Direct Current
VDO	The Company which manufactures the unit
VFD	Vacuum Florescent Display

VSWR	Voltage Standing Wave Ratio
W	Watt
WAN	Wide Area Network
WCL	Wheelchair Lift
WEP	Wired Equivalent Privacy
WLAN	Wireless Local Area Network
WPA	Wi-Fi Protected Access

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

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

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

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

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

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

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

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

**Cells:** Individual components i.e. battery or capacitor cells.

**Code:** A legal requirement.

**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.

**DC to DC Converter:** A module which converts a source of direct current (DC) from one voltage level to another.

**Destroyed:** Physically made permanently unusable.

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

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

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

**Energy Storage System:** A component or system of components that stores energy and for which its supply of energy is re-chargeable by a PPU and/or an off-vehicle energy source.

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

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

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

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

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

**Gross Load:** One hundred fifty pounds for every designed passenger seating position, for the driver and for each 1.5 square feet of free floor space.

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

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

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

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

where:

a = the resultant acceleration at the center of gravity of the head form expressed as a multiple of g, the acceleration of gravity.  $t_1$  and  $t_2$  = any two points in time during the impact.

**Hoses:** Flexible lines.

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

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

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

**Inverter:** Module that converts direct current (DC) to/from alternating current (AC).

**Labeled:** 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.

**Leakage:** Release of contents through a defect or crack.

**Line:** All tubes, flexible and hard, which carry fluids.

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

**Local Regulations:** Regulations below the state level.

**Low Floor Bus:** A bus 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.

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

**Module:** Assembly of individual components.

**Motor (Electric):** Device that converts electrical energy into mechanical energy.

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

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

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

**Power:** Work or energy divided by time.

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

**Propulsion System:** System that provides propulsion for the vehicle proportional to operator commands. Includes, as applicable, the HDS system, Energy Storage System, and the HSC.

**Regenerative Braking:** Deceleration of the bus by switching motors to act as generators which return vehicle kinetic energy to the Energy Storage System.

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

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

**Seated Load:** 150 pounds for every designed passenger seating position and for the driver.

**Seated Load Weight:** Curb weight plus seated load.

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

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

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

**Standard:** A firm guideline from a consensus group.

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

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

**Stress Loops:** The "pig-tails" commonly used to absorb flexing in piping.

**Structure:** The structure shall be defined as the basic body, including floor deck material and installation, load bearing external panels, structural components, axle mounting provisions and suspension beams and attachment points.

**Wheelchair:** A mobility aid belonging to any class of three (3) or four (4) 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 2 inches above the ground, and does not weigh more than 600 pounds when occupied.



# CONNECTICUT DEPARTMENT OF TRANSPORTATION

## POLICY STATEMENT

POLICY NO. EX.O.-26  
September 11, 2013.

SUBJECT: Employment of Relatives

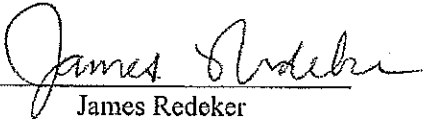
The purpose of this policy is to avoid hiring, transferring, or promoting relatives of employees into situations where the possibility of, or appearance of, favoritism or conflicts of interest might exist. These goals reflect the basic tenets of our management philosophy and serve to reinforce a positive value system for the Department.

There are certain situations where the employment of close relatives (husband, wife, son, daughter, etc.) can create the appearance of impropriety or have the potential for significant abuse. Each candidate for employment will be asked by a representative of the Department through a supplement to the application for employment if he/she is related to any current or former Department employee. The application for employment and supplement for individuals indicating a relationship to a current or former Department employee will be reviewed by the Agency Personnel Administrator, prior to any employment offer being made. Failure to respond to this question accurately and truthfully will subject the candidate to refusal of employment. If the response to the question and/or the supplement to the application for employment is found to be inaccurate after a candidate is employed by the Department, that individual will be subject to dismissal.

Relatives of current employees may, therefore, be *considered* for employment with the Department provided that the relative would not be placed under direct supervision of the employed relative, or in any position where the employed relative would be in a position to influence the salary, benefits, working conditions, or other personnel transactions such as performance reviews or disciplinary actions.

It is the purpose of this policy to avoid creating any "new" situations where relatives are employed in "sphere of influence" relationships. Accordingly, this policy shall not be interpreted to require the automatic transfer, reassignment, or other personnel change when such employment relationship exists upon implementation of this policy. The Department reserves the right, however, to take appropriate corrective action to remediate problems that may be created by such relationships.

(This Policy Statement supersedes Policy Statement No. EX.O.-26 dated July 27, 2007)

  
James Redeker  
Commissioner

Are you related to any current or former Department of Transportation employee? Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, provide the name, job title, and unit \_\_\_\_\_

Applicant Signature: \_\_\_\_\_ Print Name: \_\_\_\_\_



**EXHIBIT A.1**

**TECHNICAL SPECIFICATIONS**

**1.0 GENERAL REQUIREMENTS**

This procurement is for 45' heavy duty high floor suburban commuter clean diesel buses. They all are required to have a minimum expected life of fifteen (15) years or 500,000 miles whichever comes first and are intended for the widest possible spectrum of passengers, including children, adults, the elderly, and persons with disabilities. Options are also requested for hybrid drive design versions of each of these different size buses.

RWA  
B  
~~These buses shall be designed to operate the "Transit Bus Duty Cycle" as described in the American Public Transportation Association "Standard Bus Procurement Guidelines". All Definitions and abbreviations listed in the APTA "Standard Bus Procurement Guidelines" shall also apply to this procurement.~~

The bus shall meet all applicable FMVSS as established by the U.S. Department of Transportation and shall accommodate all applicable FMCSR regulations and all requirements of the Americans with Disabilities Act of 1990 (ADA) reference 49 CFR Section 38.39 in effect at the date of manufacture.

The contractor(s) shall comply with all applicable Federal, State and local regulations. In event of any conflict between the requirements of this Specification and any applicable legal requirement, then the legal requirement shall prevail.

The contractor(s) shall ensure that the application and installation of major bus sub-components and systems are compliant with all such sub-component vendors' requirements and recommendations. Components used in the vehicle shall be of heavy-duty design and proven in transit service. Each contractor is required to provide information necessary for the evaluation committee to access the equivalency of components or systems.

RWA  
B  
Each bus facility which procures vehicles through this procurement shall receive a complete set of separate severe duty notebook computer, ~~preloaded with software~~ will be shipped separately for each of the applications listed below:

- Engine programming and diagnostics
- Transmission programming and diagnostics
- Multiplex system programming and diagnostics
- HVAC system programming and diagnostics
- Anti-Lock Brake / Electronic Stability Control diagnostics
- Electronic Destination Sign programming and diagnostics
- Video Security System programming and diagnostics
- Electronic Fan System and Beltless Alternator System
- Electronic Communication, Radio System, Passenger Counter and ITS

RWA  
A  
Towing adapters, ~~jacking adapters, wheel alignment tools,~~ compartment access door keys

and any other special tools required to maintain the bus shall be listed in the proposal and supplied to each transit facility receiving buses in this procurement. The number of each item to be provided is listed in the following table:

Item	1-20 Buses	21 - 40 Buses	41+ Buses
Towing Adapters	1	2	3
Compartment Keys	5	8	10
Other Required Tools	# as appropriate based upon # buses received		

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.

The Contractor(s) shall provide a manual listing the times required for typical repair and service items on the bus.

All systems or components subject to periodic maintenance or that are subject to periodic failures shall be readily accessible for service and inspection. To the extent practicable, removal or physical movement of components unrelated to the specific maintenance and/or repair tasks involved shall be unnecessary.

Components with identical functions shall be interchangeable to the extent practicable. These components shall include, but not limited to, passenger window hardware, interior trim, lamps, lamp lenses, and seat assemblies. Components with non-identical functions shall not be, or appear to be, interchangeable. A component shall not be used in an application for which it was neither designed nor intended.

The bus shall achieve normal operation in ambient temperature ranges of -10° F to +115° F, at relative humidity between 5 percent (5%) and 100 percent (100%), and at altitudes up to 3,000 ft. 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 3,000 ft.

All the Connecticut bus transit systems in this procurement operate in a high corrosion environment due to the winter sand and salt and due to the close proximity to the Long Island Sound. The CTTransit Waterbury operation is also extremely hilly with high road crowns. The buses proposed should address these issues.

In the design and manufacture of the bus the Contractor(s) shall make every effort to reduce the amount of potentially hazardous waste generated by the Procuring Agency when maintaining the bus in accordance with the procedures contained in the manufacturer's maintenance manuals. The manufacturer shall use, whenever possible, all LED lighting, cleanable filters, and non-asbestos brake blocks and gaskets. In accordance with Section 6002 of the Resource Conservation and Recovery Act the Contractor(s) shall use, whenever possible and allowed by the specifications, recycled materials in the manufacture of the bus.

## 1.1 DEFINITIONS

The following are definitions of special terms used in Part II.

- (1) dBA. Decibels with reference to 0.0002 microbar as measured on the "A" scale.
- (2) Audible Discrete Frequency. An audible discrete frequency is determined to exist if the sound power level in any 1/3-octave band exceeds the average of the sound power levels of the two adjacent 1/3-octave bands by four (4) dB or more.
- (3) Standee Line. A line marked across the coach aisle in line with the driver's barrier to designate the forward area which passengers may not occupy when the coach is moving.
- (4) Free Floor Space. Floor area available to standees, excluding ingress/egress areas, area under seats, area occupied by feet of seated passengers, and the vestibule area.
- (5) 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.
- (6) Seated Load. One hundred fifty (150) lb. for every designed passenger seating position and for the driver.
- (7) Gross Load. Total of curb weight, seated load and standees at One Hundred Fifty (150) lb. per individual passenger.
- (8) SLW (Seated Load Weight). Curb weight plus seated load.
- (9) GVWR (Gross Vehicle Weight Rated). Curb weight plus the maximum vehicle weight that the bus can be safely loaded to.
- (10) 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.
- (11) Fireproof. Materials that will not burn or melt at temperatures less than 2,000 degrees F
- (12) 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 One Hundred Fifty (150) as measured in a radiant panel flame test per ASTM-E162-75.
- (13) Human Dimensions. The human dimensions used in Part 1: Technical specifications are defined in SAE Recommended Practice J833.

(14) Classes of Failures. Classes of failures are listed below:

- (a) Class 1: Physical Safety. A failure that could lead directly to passenger or driver injury and represents a severe crash situation.
- (b) Class 2: Road Call. A failure resulting in an enroute interruption of revenue service. Service is discontinued until the coach is replaced or repaired at the point of failure.
- (c) 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.
- (d) 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.

## 1.2 ABBREVIATIONS

The following is a list of abbreviations used in these specifications.

- (1) ASTM: American Society of Testing and Materials.
- (2) SAE: Society of Automotive Engineers
- (3) ANSI: American National Standards Institute.
- (4) ASHRAE: American Society of Heating, Refrigerating, and Air Conditioning.
- (5) SPI: Society of the Plastics Industry.
- (6) JIC: Joint Industrial Council.
- (7) BMCS: Bureau of Motor Carrier Safety.
- (8) FMCSR: Federal Motor Carrier Safety Regulations
- (9) FMVSS: Federal Motor Vehicle Safety Standards
- (10) ABS: Antilock Braking System
- (11) NFPA: National Fire Prevention Association
- (12) LEL: Lower Explosive Limit

- (13) PRD: Pressure Relief Device
- (14) NHTSA: National Highway Traffic Safety Administration
- (15) HSLA High Strength Low Alloy Steel.
- (16) FRP Fiber-Reinforced Plastic.

### 1.3 OVERALL REQUIREMENTS

#### 1.3.1 DIMENSIONS

##### 1.3.1.1 PHYSICAL SIZE

With the exceptions of exterior mirrors, marker and signal lights, bumpers, flexible portions of the bumper, fender skirts, and rubrail, the coach shall have the following overall dimensions.

- (1) Length: 45 feet, 0 inches (+0, -1 inch)
- (2) Width: 8 feet, 6 inches (+0, -1 inch)
- (3) Height: 138" maximum loaded or unloaded.
- (4) First Step Height: 15.5" Maximum

##### 1.3.1.2 UNDERBODY CLEARANCES

The coach provided shall meet the following underbody clearances.

Approach angle	8.0°
Breakover angle	7.2° <i>(measured per SAE J689)</i>
Departure angle	6.2°
Ground clearance	9.125"
Axle clearance, as measured	6.50"

##### 1.3.2 WEIGHT AND AXLE LOADING

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 22,400 lb. 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 safety, performance, appearance, comfort and reliability. Total vehicle weight shall not exceed the gross vehicle weight rating nor axle weight at ground as specified. GVWR shall not exceed 52,000 lb. for a 45' bus.

##### 1.3.3 CAPACITY

Rated passenger capacity of the coach shall be as outlined below. Standee capacity shall



#### **1.3.4.5 INTERCHANGEABILITY**

Components with identical functions shall be interchangeable from coach to coach. These components shall include passenger window sash and hardware, baggage compartment doors and lamps. Components with non-identical functions shall not be, or appear to be, interchangeable.

#### **1.3.5 OPERATING ENVIRONMENT**

The coach shall achieve normal operation in temperature ranges of -10 degrees to 115 degrees F, at relative humidity between five percent (5%) and One Hundred percent (100%) and at altitudes up to 5,000 ft. above sea level. Degradation of performance due to atmospheric conditions shall be minimized at temperatures below -10 degrees F and above 115 degrees F or at altitudes above 5,000 ft. It is probable that coaches will be stored outdoors year round therefore special equipment or procedures may be required to start the coach after a twelve (12 hour or more exposure to temperatures below +30 degrees F. without the engine in operation. Speed, gradability, and acceleration performance requirements shall be met at, or corrected to, 85 degrees F, 29.00 inches Hg, dry air. Performance degradation at conditions other than the test standard shall not exceed 1% for each 3 degrees F and four percent (4%) for 1,000 ft. of altitude above the standard.

#### **1.3.6 MATERIALS AND CONSTRUCTION**

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 SAE, 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.

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.

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 do 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 operated without flexible hose connections while the vehicle is being serviced on either a lift or a pit.

### **1.3.7 PROTOTYPE VEHICLE**

CTDOT may, at its sole discretion, request a prototype bus. Upon issuance of the Notice to Proceed, the Contractor shall produce and deliver one (1) forty-five foot (45') bus in accordance with these specifications to permit the specified inspections and testing to be conducted by the Contractor and CTDOT.

The Contractor shall be prepared to demonstrate by appropriate tests that the prototype bus meets the performance requirements of these specifications. The Contractor shall submit a test plan to CTDOT for approval with CTDOT reserving the right to reject the test plan and/or to prepare its own test plan. The test plan shall conform to the quality assurance tests and technical specifications.

CTDOT may, at its sole discretion, utilize the prototype bus in revenue service to satisfy all testing and operational concerns made and alteration that may be made as a result of testing. The prototype vehicles are to be complete in all details at the time of the revenue service test. The prototype buses are required to pass the electrical system audit performed by CTDOT. Any and all issues identified in the electrical audit shall be addressed by the Contractor prior to the commencement of production. **THE CONTRACTOR SHALL NOT PROCEED WITH MANUFACTURING OF THE OTHER VEHICLES WHICH ARE PART OF THIS ORDER, UNTIL CTDOT HAS APPROVED, IN WRITING, THE PROTOTYPE BUS.**

CTDOT shall indicate all required changes for the production buses as a result of the tests. Changes to the buses that are within the specifications, as a result of this review shall be at no cost to CTDOT. After testing, all prototype buses shall be brought up to the final production standards at the Contractor's expense, and then shall become part of the CTDOT order and payment made in accordance with the Contract.

The Contractor shall provide draft copies of the following manuals in paper and electronic (CD or flash drive) formats to CTDOT for review within ninety (90) days after first bus goes into revenue service, which would allow for information and any required changes from the test, to be incorporated for final review.

- Maintenance Manual
- Parts Manual
- Electrical Manual
- Operators Manual
- Dimensional Drawings

These manuals are to reflect the bus configuration defined in these specifications. CTDOT shall review these manuals with the prototype buses and shall provide written comments with the return of the prototype buses. CTDOT and the Contractor shall review these comments for inclusion in the final manuals. All comments provided by CTDOT on all



manuals shall be addressed and incorporated in the final manuals delivered under this contract.

**Maintenance Training Bus:** If a prototype bus is not required the first bus delivered will be the training bus. CTDOT and the successful bidder will meet prior to production to determine specific interior panels that will be left off to facilitate training on certain systems and components. At a minimum, the bus should have any seat removed which may obstruct a handhole or access panel for normal service which would be included for training. Upon completion of the final inspection process, this bus will then be delivered to CTTransit's Maintenance Training Facility as part of the bus order.

(Note: If Altoona testing is NOT required, then the prototype bus will be utilized for Maintenance Training purposes. CTDOT and the successful bidder will meet prior to production to determine what preparations will need to be made to facilitate training on certain systems and components. This bus will be placed in service by CTDOT at the conclusion of formal Contractor training).

### **1.3.8 NEW COMPONENTS**

All new components and product innovations not manufactured by the Contractor and required or selected by CTDOT shall have a representative from the component manufacturer at the bus manufacturing plant to ensure proper installation of the unit, to the bus, to the satisfaction of CTDOT's inspectors and the component manufacturer and where applicable, existing approvals shall be provided. Certifications shall be provided to CTDOT and the Contractor, prior to presentation of the prototype buses, that are approved by the component/sub-component representative that clearly indicate that the representative approves of the installation and application of the component/sub component. At a minimum, certifications shall be provided on the following components:

1. Engine assembly and all related components, including:
  - a. Engine cradle and chassis mounting
  - b. Cooling system—electric fans and radiator
  - c. Air induction system, including charge air cooler
  - d. Wiring harness and development
  - e. Hydraulic pumps and hose routing
2. Engine fuel system:
  - a. Diesel fuel tank installation
  - b. Fuel line routing
3. Transmission assembly and all related components
4. Drive, tag and front axles
5. HVAC system
6. Wheelchair lift assembly
7. Entrance door
8. Multiplexing system and components
9. Auxiliary heating system
10. Destination sign system
11. Fire suppression system
12. Wheelchair restraint system

13. ABS brake system and components
14. Operator's seat
15. Exterior mirrors and controls
16. Engine starting system
17. Floor covering material
18. Charging system
18. Passenger Seating
19. Overhead Parcel Racks
20. Smart Bus and Intelligent vehicle network

## **2.0 BODY**

### **2.1 DESIGN**

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 coach shall be painted down to the street surface.

Optional pricing shall be provided as a separate line item for utilizing 304 series fluted and flat stainless steel satin blend panels for the paneling below the belt rail and rear of the A-pillars

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 body feature 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. Corners, especially at windows, shall be rounded. The undercarriage of the coach shall be sealed off to the maximum extent practicable to significantly reduce the intrusion of road spray.

### **2.2 MATERIALS**

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.

### **2.3 FINISH AND COLOR**

The CTTransit buses shall be painted in metallic blue (DUHS 16429) and metallic silver (DUHS 36352). 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. Paint utilized shall be Axalta Imron Elite SS 3.5 VOC, two part polyurethane enamel that exhibits excellent

color and gloss retention, chip, abrasion, stain and mar resistance, chemical and solvent resistance and excellent cleanability per industrial standards. Paint shall be applied smoothly and evenly with the finished surface free of dirt, runs, orange peel, and other imperfections. All exterior finished surfaces shall be impervious to diesel fuel, coolant, urea and commercial cleaning agents. Finished surfaces shall not be damaged by controlled applications of commonly used graffiti-removing chemicals. For pricing purposes, all buses will have the CTTransit decal package installed with an option price provided that credits the deletion of the CTTransit logos only. All other decals specified shall be provided on every bus.

## **2.4 DECALS**

Except where CTDOT instructs otherwise in advance, CTTransit exterior logos shall be provided and installed on each bus by the Contractor. CTTransit custom colors shall be completely pigmented throughout the logos and striping. No silk-screening shall be accepted. All colors shall be submitted to and approved by CTDOT within One Hundred Fifty (150) days of award. All colors shall not exceed .5 Delta E units of variance from the control master, on non-metallic, opaque films.

Decal material shall be comprised of 3M 180 Plus Marking Systems. Material shall be a 2 mil hi-performance, premium grade flexible cast vinyl film with a permanent acrylic pressure sensitive adhesive with an outdoor durability of 5-7 years. Adhesive shall have a low initial tack with repositionable properties that will establish a permanent bond within seventy-two (72) hours. All materials shall be pre-masked. Material characteristics shall exhibit a minimum of 2000 lbs./sq. in. tensile strength and an elongation of 135% minimum. All material shall be resistant to commonly used chemicals such as: Anti-freeze (24 hr. exposure), Unleaded Gasoline (1 hr. exposure), 10% HCL (10 mm. exposure), 10% NAOH (10 mm. exposure), SAE 20 Motor Oil (24 hr. exposure), Detergent (24 hr. exposure). Material shall pass 500 cycles for the Taber Abrasion Test, set at 500 g. with CS 517 abrader wheels.

All materials (markings, stripes, logos) shall be certified to meet CTTransit Design and Material Specifications. Materials not in compliance will be replaced or repaired without cost to CTDOT. All decal materials shall be installed according to manufacturers' specifications. CTTransit's custom colors decals are installed on both sides and at the front and the rear of the bus. CTTransit shall provide assistance with the layout of all decals on the prototype bus with the Contractor.

A 4" x 102" reflective rear safety stripe shall be provided and installed on the rear engine compartment door of the bus and shall wrap around the rear radius of the coach body. Termination point of the reflective decal to be determined by CTDOT. The stripe shall have a minimum of 600 candlepower brightness: 800 candlepower typical, wide angularity reflects to near 90 degree angles and have a seven (7) year performance life. This is performance goal and not an implied warranty.

## **2.5 NUMBERING AND SIGNING**

Monograms, numbers and other special signing specified by CTDOT 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 appliqués. Signs relating safety information shall be aluminum riveted in place. CTDOT requires various decals to be sealed with clear, waterproof sealant around the edges. CTDOT shall specify which decals, if any, are required to be edge sealed. The exact wording, size, color, and location for these and other special signs are found below. Pictorial representations, graphics layout or drawings of all signs, decals, and pressure sensitive appliqués shall be provided to and approved by CTDOT prior to production. Pictorial depictions and or to scale drawings are acceptable.

### **2.5.1 EXTERIOR**

Lettering, color black, Frutiger font style shall be as follows:

1. Numbers: 4 in. number, all the same located on front, rear, and both sides. Bus numbers will consist of up to four (4) characters. Numbering will be provided to the Contractor prior to production of the buses.
2. Electric Terminal Compartment - indicate correct voltages for all terminals.
3. Rear of front door - "Kneeling Bus"
4. WARNING - DO NOT PASS ON RIGHT – black and red lettering on yellow background, installed on right rear corners of the bus.

Owned By: Connecticut Department of Transportation

Operated By: HNS Management Company

5. The fleet number assigned to each bus shall be shown on the bus roof. Numbers shall not interfere with roof ventilators or CTTransit graphics. Numbers shall be 24 in. high.
6. The location of the battery disconnect switch shall be identified on the bus exterior.
7. A standee capacity decal shall be located near the front door and shall be applicable to the type of coach. Yellow and black warning strip above WCL door.
8. Decal on side of fuel door to read: "Diesel Fuel Only."
9. Connecticut State Seal (9 in. diameter) mounted under the operator's window.
10. GVWR: XX,XXX lbs. - shall be applied in 3 in. letters on both sides of the buses.
11. Orange (4 in. x 3 in.) rectangle decal(s), - shall be applied; one (1) at the left-hand rear corner and one (1) at the right-hand front corner of the bus exterior; to indicate that the bus is 102 in. wide.
12. The letters "Yield to Bus" shall be applied, in 3 in. black letters in the right rear corner of the bus.

## **2.5.2**

### **INTERIOR**

1. Emergency exit instructions as necessary.
2. Stop request switches have a button marked "STOP" as part of each passenger service module which is mounted above each two-passenger seat location. The wheelchair tie-down positions are also each equipped with a sign saying, "Push here to request stop".
3. "No Standing Forward of The Yellow Line" and "Remain Seated and Do Not Talk To The Driver".
4. "Fire Extinguisher."
5. "Upon request of the operator or other authorized person, please vacate these seats to make room for senior citizens or people with disabilities" to be provided in compliance with all ADA requirements.
6. Install a pressure sensitive "no no" decal or approved equal with the following heading and three statements - "Please - No Smoking - No eating or drinking - radios silent" (English & Spanish). The decal is 13½ in. long, 6 in. wide, white background with the appropriate 3½ in. diameter red, black and white visual symbol under each statement.
7. "Watch Your Step" sign shall be incorporated in the same nameplate permanently mounted to the third step riser.
8. "No Solicitation" decal. Additional decals and signs shall be applied as necessary to comply with all Federal and State laws governing same.
9. "Please Do Not Cross In Front Of Bus".
10. Install 4 in. fleet numbers on destination sign access cover to right of "no smoking ..." decal.
11. Install 4 in. fleet numbers on front top of drivers' barrier for camera system recognition.

## **2.6 PEDESTRIAN SAFETY**

Exterior protrusions greater than ½ in. and within 80 in. of the ground shall have a radius no less than the amount of the protrusion. The 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 toeholds or handholds.

## **2.7 STRUCTURE**

### **2.7.1**

#### **STRENGTH AND FATIGUE LIFE**

The structure shall be of a sufficiently strong and efficient design to withstand the conditions of transit service throughout the service life of the coach. The design shall incorporate all severe service, heavy-duty features available from the contractor.

If applicable, as part of the bid package a report shall be submit to CTDOT concerning any

manufacturer whose bus is or has been involved in a structurally related fleet failure (number of failures exceeding ten percent (10%) of the fleet) in any transit property in the U.S. in the last six (6) years or who has been directed by the National Highway Transportation Safety Administration to make repairs of any bus and has completed a detailed investigation of the failure, shall provide a detailed structural analysis of the complete bus structure to rule out related defects on any part of the structure, and shall supply a complete copy of the corrective actions to be undertaken. All failures involving basic body, structure, axles, and suspension are considered structural related failures for the purposes of this specification.

The investigation of a failure and structural analysis shall be carried out by a reputed independent transit industry consultant (subject to the approval of CTDOT) and shall not be limited to finite element analysis or other appropriate test but shall be confirmed by an actual test track evaluation with suitable time concentration to demonstrate the ability of the modified structure to perform for the specified 500,000 miles in CTDOT's operating conditions. Altoona testing and twenty (20) year life cycle testing (shaker test) will be accepted for the requirement.

The engineering report submitted to CTDOT shall be detailed and shall include proof of the similarity of the test to CTDOT operating conditions.

### **2.7.2 DISTORTION**

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 in. curb or in a 6 in. deep hole.

### **2.7.3 RESONANCE**

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.

### **2.7.4 MATERIAL**

Reinforced fiberglass and plastic materials shall be excluded from structural body construction, except for replaceable panels or doors, the roof skin 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.

### **2.7.5 CORROSION**

The coach shall resist corrosion from atmospheric conditions and road salts for a period of fifteen (15) years or 500,000 miles whichever comes first. 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.

However, the front end both upper and lower panels, the rear end upper panels and the upper sidewall panels shall be made of fiberglass, or fiberglass reinforced plastic (FRP), 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. Bidders proposing steel tubing for frame construction are required to use stainless steel tubing of comparable cross section. Proposals shall contain the manufacturer's complete corrosion protection plan including a specific identification and illustration of structural and exterior material and their relative corrosion resistance. Floor supports in the passenger and operator's area shall be High Strength Low Alloy (HSLA) steel.

The vehicle shall be constructed using only stainless steel or other approved inherently corrosion-resistant materials and fasteners of sufficient type and quality to minimize deterioration over the specified period. The structure shall not require corrosion-preventive coatings or after-treatments to be applied either during construction or throughout the service life of the vehicle.

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 (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 one percent (1%).

All frame members below the passenger floor that are subject to road splash and are less than 0.1 in. shall be stainless steel for maximum corrosion protection. All other frame members exposed to splash shall be HSLA steel and are to be 0.1 in. thick minimum and shall be coated with Tectyl 127CG or PPG Corashield (gray) on all surfaces exposed to road splash for maximum corrosion protection. All hollow tubular sections shall be made of stainless steel.

Floor supports in the passenger and driver's area shall be stainless steel and the sidewall structures and roof structures that are not exposed to road spray shall be inherently corrosion-resistant HSLA and primed prior to incorporation into the coach assembly.

RWA  
All steel material that is not stainless steel shall be thoroughly cleaned, primed and prepared to ~~grit-blasted to an SSPC-10 "near-white" surface finish, unless a stricter standard is required by the paint manufacturer's specification.~~ All ~~spent grit, oils and other contamination shall be removed after blasting and allowed to dry thoroughly prior to painting.~~ The floor supports and sidewall components shall be painted with a suitable adhesive primer and compatible finish coat.

The manufacturer shall utilize stainless steel for all exterior paneling below the passenger floor line except baggage compartment floors and the front lower panel.

Outer sidewall panels above the passenger floor and below the windows shall be galvanized steel, pre-primed. Aluminum outer sidewall panels between the window and floor line are acceptable if the aluminum is integral to the coaches' structure. The roof

panels shall be pre-primed aluminum both sides and the front and rear roof caps fiberglass. A single piece fiberglass or FRP roof panel design is acceptable in lieu of pre-primed aluminum roof panels.

Stainless steel panels and aluminum door frames shall be used on all service doors. The rear engine door may be made of fiberglass or FRP.

The wheelchair lift door may be made of an aluminum frame or other acceptable lightweight material and aluminum exterior panel.

Non-structural underbody panels used for baggage bay floors and to retain insulation in other areas, shall be Tectyl or PPG Corashield coated aluminum, stainless steel or composite flooring for maximum corrosion protection. In the wheelwell areas, non-structural closeout panels shall be aluminum or stainless steel.

Before assembling, all metal body parts shall 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. The use of ECK Corrosion preventive coating liquid in lieu of a barrier tape system is acceptable. All nuts, bolts, clips, washers, clamps, and like parts shall be zinc- or cadmium-plated, phosphate coated, black oxide coated, stainless steel, or nylon to prevent corrosion. All exterior joints and seams shall be sealed.

Dissimilar metals shall be separated by a non-conductive barrier.

Barriers may consist of one of the following:

- a) a black elastic compound tape
- b) a Mylar tape
- c) a double sided structural adhesive tape

Where tape barriers are not feasible an appropriate sealant shall be used to provide a protective barrier and a water tight seal. This sealer shall be used on all panels and assemblies that are susceptible to water leaks.

## **2.7.6 TOWING**

Towing devices shall be provided and be permanently mounted on the front and rear of the coach. The front towing devices shall allow attachment of adapters for a rigid tow bar and shall permit lifting and towing of the bus, at curb weight, until the front wheels are clear off the ground. The rear towing devices shall permit recovery, 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.

Each towing device shall withstand, without permanent deformation, tension loads up to 1.2 times the curb weight of the coach within the 20 degrees of the longitudinal axis of the coach. Each towing device shall accommodate a crane hook with a 1 in. throat for towing and recovery. A minimum of two steel rear skid plates measuring approximately 15.2 in. x 3.3 in. 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. The coach shall be manufactured without ferry skids and shall provide an approach angle of 9.5 degrees. The rear towing device(s) shall not provide a toehold for unauthorized riders

Provisions to supply compressed air from the tow truck to the coach for operation of the coach service brakes from the tow truck and to supply the coach air system shall be installed at the front of the coach near the tow eyes. Gladhands color coded BLUE for service brakes and RED for system supply shall be installed to accommodate the connection of service brake and supply lines from the tow truck. Additionally, an electrical receptacle connected to the coach exterior lighting system, excluding the headlight circuit, for towing purposes shall also be provided. The receptacle shall be a Cole-Hersee #12063 seven pin connector or equal. The wiring schematic for this receptacle will be provided to the coach manufacturer by the procuring agency prior to the start of coach manufacture. This receptacle shall be stalled in close proximity to the air supply glad-hands. The air and electrical connectors shall be concealed from view when the coach is in normal operation. The method of attaching the tow bar shall be provided to the procuring agency with the RFA's and shall require the specific approval of the procuring agency and shall specifically and safely accommodate the procuring agency's universal tow bar.

#### **2.7.7 JACKING & HOISTING**

It shall be possible to safely jack up the bus, at curb weight, with an 8.5 in. high hydraulic hand jack or a common 10-ton floor jack 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 enough to remove and reinstall any wheel and tire assembly. The bus shall be fitted with jacking pads for each tire/wheel location and shall permit easy and safe jacking with the flat tire or dual set on a 3.5 in. high run-up block not wider than a single tire. Jacking and changing any one tire shall be completed by a mechanic in less than thirty (30) minutes from the time the bus is approached. The bus will withstand such jacking at any one or any combination of wheel locations without permanent deformation or damage. Jacking pads shall be painted safety yellow or orange for ease of identification primary and secondary jack points. The bus axles or jacking plates shall accommodate the lifting pads of a post hoisting system. Jacking plates shall be approximately 6.00 in. square and 1 in. deep to prevent the bus from falling off the hoist. Other pads shall be provided to support the bus on jack stands independent of the hoist.

#### **2.7.8 FIRE PROTECTION**

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 prevent the spread 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 bulkhead shall be copper, steel, 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 impede

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 would 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. A smoke test shall be conducted on each coach as part of vehicle acceptance.

## **2.7.9 FIRE SUPPRESSION SYSTEM**

The vehicle shall be equipped with an Amerex ABC dry chemical or wet pre-engineered fire suppression system. The system shall be approved and listed by Factory Mutual Research Corporation (FM) for use at -65° F to 150° F. The automatic actuation system shall provide 24-hour fire detection and actuation within the engine compartment, whether or not the engine is running and the batteries are electrically isolated from engine components.

A minimum twenty-five (25) lb. capacity ABC agent cylinder of the stored pressure type shall be furnished and shall conform to DOT specification 4BW and be rated for twelve (12) year minimum hydrostatic retest. The cylinder shall be equipped with a visual pressure gauge that may be located in the baggage department and protected by a guard. Each discharge nozzle shall provide at least 240 cubic ft. of flooding coverage with application coverage of at least 900 square in. The system shall use forged brass valve assemblies. Cast iron fittings may not be used. Hoses shall comply with SAE 100 R5 or SAE R1. All hoses shall be secured to prevent rubbing/contact with suspension/chassis components.

The fire suppression system shall be provided with a minimum of four (4) Programmable Heat Detectors (PHD) in the engine compartment. The PHDs shall be approved by Factory Mutual Research Corporation as heat actuated fire detectors and are programmable for temperatures between -65° F to 650° F. The detectors shall be self-resetting after an alarm has signaled and shall be capable of delivering a pre-alarm test signal, when required. Detectors shall operate without false alarm.

Manual actuation of the agent shall be accomplished by depressing an electric switch (button with pull pin labeled "FIRE") shall be mounted in the operator's dash area. The actuator shall require no more than forty (40) lbs. of force, nor shall it have to travel more than 90 degrees to actuate the valve. The lever shall lock in only the fully open or fully closed position.

The presence of fire shall be detected by devices approved by Factory Mutual Research Corporation as heat actuated fire detectors. A circuit monitor shall provide electrical supervision of the power, heat detection and system actuation. The enclosure shall be watertight. The control shall indicate Normal, Fire and Fault conditions. A red LED shall clearly be labeled fire. The circuit monitor shall also be equipped with an audible alarm that is activated in either the Fire or Fault situation. A method to silence the alarm shall be provided. Contractor installation of the suppression system shall be reviewed on the

prototype bus and approved by representatives of the system supplier with complete system installation procedures approved in writing by the supplier and provided to CTDOT with the prototype bus. If installation deficiencies are found by the system supplier, the Contractor is required to revise manufacturing and installation procedures to meet the approval of the supplier. All electrical harnesses utilized with the installation of the fire suppression system shall be supplied by the system supplier and shall be watertight.

A circuit supervision and control capability shall be provided for the fire suppression system shall be visible to a seated operator. The control shall provide a display indicating Normal, Fire or Fault conditions and the control shall shut the engine down within Thirty (30) seconds (adjustable) of detecting a fire. An engine shutdown override/reset button shall also be provided on the panel. The control shall supervise the automatic fire suppression system electrical circuits, facilitate the connection for these various circuits and provide auxiliary contacts that control external vehicle shutdown or safety devices in the event of activation of the fire suppression system. A battery backup shall be provided. An internal test circuit and internal diagnostic capability shall be supplied.

A dry chemical fire suppression agent distribution system with four (4) nozzles shall be installed in the engine compartment; one directed at the rear electrical control box (if supplied). The entire system shall be approved by the Factory Mutual Research Corporation for mobile equipment operating between -65 degrees F and +150 degrees F. Nozzles shall be brass and equipped with dust caps that are displaced by the chemical flow and fall in an area so that they do not add fuel for a fire. The final installation of the system shall be approved and certified by the system supplier, with any warranty or insurance coverage being assigned to CTDOT or the procuring agency.

The operational state (ready, bypassed, alarm) of the fire suppression system shall be electronically monitored and reported to the Intelligent vehicle network (if fitted to the coach).

The Fire Suppression System shall include the following features:

- An Operator display shall be provided. The Operator Interface Display panel will provide a simple means of indicating system status to the vehicle operator or maintenance personnel. Basic system status is indicated via easy to read LEDs and Buzzer indications. The Operator Interface Panel functions as the "brain". Basic programming can be performed via the front panel keypad by trained maintenance staff (only). More detailed programming is performed off line, via a personal computer.
- Key Interface Panel features include :
  - Event Recording
    - Data Logging
    - Internal Audible Alarm with manually operated Silence feature
    - Relay Override

- System Self-Test Function
  - Keyboard programming capability
  - Built in Battery back-up in the event of vehicle power failure
  - Remote programming to laptop computer via RS-485 interface
  - Environmentally Sealed Enclosure
  - Easy to read Vacuum Florescent Display (VFD)
  - System Status via LED indication
  - Event indication provided via VFD display
  - Automatic vehicle Shutdown feature (within fifteen (15) seconds or less of actuation)
- 
- The System shall be capable of performing a full system functional test of all electronic components of the fire suppression system with a push of a button. This Automated Maintenance Test (AMT) shall meet the NFPA-17 required six (6) month inspection procedures. The functional test shall include all PHD sensors, as well as, all system actuators, cylinder pressure and annual switch functions. The control panel shall keep a time date stamped detailed AMT test report stored in the event log.
  
  - An integrated, quick connect, one-way air valve will be supplied. The valve will be installed on the cylinder hose to blow out the ABC powder distribution network that meets NFPA-17 six (6) month stated PM requirements. No other tools will be needed to perform this NFPA-17 hose network blow-out test.
  
  - The bus OEM shall provide a written sign off - 1st ARTICLE Report (from the fire suppression manufacturer) that all installation requirements have been met on the pilot bus system.
  
  - An inspection door(s) will be provided by the OEM on the bus body or interior compartment allowing for visual site inspection of the ABC agent cylinder/gauge. A low pressure switch at each cylinder will be provided to signal the operator display panel that there is a low pressure situation.
  
  - The operational state (ready, bypassed, alarm) of the fire suppression system shall be electronically monitored and reported to the Intelligent vehicle network.

The Contractor shall provide to each bus facility that receives the production buses; one (1) complete set of any and all specialty tools, software and equipment that may be required by the end user to properly diagnose, maintain and repair the fire suppression system. These tools and equipment shall be provided to each location prior to them receiving their first production bus. All software and software licenses for all systems and subsystems necessary to diagnose the fire suppression system as well as necessary communication links and cables are to be provided to each bus facility that receives the

production buses. Ten (10) additional complete sets as described above shall be provided for CTDOT's support groups. At a minimum, the following "Service Tools" to be provided at time of pilot bus delivery shall include:

- Program Software and Interface Modules.
- Fire Test Module Simulators.
- Discharge Hose Blow-out Adapters.

(Note: CTDOT will provide a listing of operating locations prior to award of contract.

The bus OEM (Contractor) shall provide written certification (from the fire suppression system manufacturer) that all factory-recommended installation requirements have been met.

## **2.7.10 EXTERIOR AND APPLIED PANELS**

### **2.7.10.1 STRENGTH AND INSTALLATION**

Exterior panels above and below the rubrail may be structural components. Panels shall be secured to structural members and shall have a smooth finish with no sharp edges.

### **2.7.10.2 REPAIR AND REPLACEMENT**

Exterior panels below the rubrail shall be divided into sections that are repairable or replaceable by a mechanic.

### **2.7.10.3 RAIN GUTTERS**

Gutters shall be provided to minimize water flowing from the roof onto the side windows and passenger doors. When the coach is decelerated, the water shall not drain onto the windshield, driver's side window, the passenger boarding area or into the lift door area. Also, when the coach leans to the right side due to an incline, water shall not drain on passengers boarding or disembarking the coach through the installation of a roof rain guard. The roof rain guard shall be a one inch high roof mounted extrusion that extends from the curbside window rain gutter, across the coach roof to the streetside window rain gutter.

### **2.7.10.4 LICENSE PLATES**

*RWA* Provisions shall be made to mount standard size U.S. license plates on the front and rear of the coach. These provisions shall recess the rear license plate so that it they can be cleaned by automatic coach washing equipment without being caught by the brushes. Four fasteners shall be utilized to retain each license plate. License plates shall be mounted on, or to the left of, the coach center. Provision shall be made to illuminate the surface of the rear license plate only per FMVSS requirements.

### **2.7.10.5 RUBRAILS**

Rubrails shall have a minimum height dimension of 2.5 in. and shall be composed of flexible, resilient material, and shall be provided to protect both sides of the coach body

from damage caused by minor sideswipe accidents. The rubrail may be discontinued at doorways and any intake grilles. A damaged portion of the rubrail shall be replaceable without requiring removal or replacement of the entire rubrail.

#### 2.7.10.6 PACKAGE RACKS

A minimum of ten (10) module package racks without compartment doors shall be furnished over all two-passenger seating positions except in the wheelchair door area. The rack end facing the aisle shall incorporate a concealed handhold, running full length, for use by standees. Passenger headroom measured from the rack end to the top of the seat headrest, shall be a minimum 17 in. 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, ABS or composite to complement the interior. Racks shall be supported by polycarbonate glass filled composite or aluminum hangers spaced approximately 40 in. apart. Total capacity shall be a minimum 88 ft.<sup>3</sup> to allow for ample storage space for carry-on items. The portion of the parcel rack behind the driver shall include a separate enclosed driver's compartment. The compartment door shall include a keyed alike lock to secure the driver's personal belongings. Key shall have key code # FA0040, for the CTTransit buses. Contractor may substitute a PS200 key code, common across the vehicle, (with the exception of the radio box).

RWA  
A cluster panel mounted on the underside of the package rack shall include individually controlled ~~and adjustable~~ LED passenger reading lights, exit signal push buttons that are color coded indelibly labeled "Stop" and individual air distribution outlets receiving air from the coach HVAC system. These outlets shall be adjustable from fully closed to full open position. A minimum of fourteen (14) 5 in., 35 watt, 4-ohm speakers shall also be provided in the cluster panels above the side window sashes 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.

#### 2.7.10.7 UNDERFLOOR BAGGAGE COMPARTMENTS

Full width underfloor baggage compartments shall be provided between the front and rear axles. The design of the bus shall maximize the number of compartments that are suitable for carrying luggage. Each compartment shall be separated by an aluminum panel but the front and rear bulkheads shall be stainless steel. The compartment doors shall be fully sealed vertical lift pantograph type. Each door skin shall be aluminum. Contractor shall provide option pricing for stainless steel fluted panels installed on the baggage bay doors. Doors shall be spring counter balanced for ease of operation. Each door shall be equipped with a minimum dimension of 4 in. x 10 in. flush mounted breakaway type latch handle located with a center point approximately 37 in. off the ground. All components shall be secured with a keyed lock, key code #FA0040, for the CTTransit buses. (With the exception of the radio box, the contractor may substitute a PS200 key code, common across the vehicle).

The floor of the baggage compartments shall be flat composite flooring, or flat aluminum panels, or aluminum honeycomb panels. The floors of the compartments shall be designed to be skid resistant.

Detailed drawings are to be provided with the bidder submittals which outline the lift, baggage bays, and which show in detail the location of all junction boxes and electrical components located in the baggage bays. In addition, locations of radio box, batteries, Wilmore power converter, kneeling valves and equalizer are to be provided. Provisions to mount mobile radio equipment shall be included in the forward-most streetside compartment. One full baggage compartment shall be utilized for carrying luggage and/or bicycles.

## **2.8 INTERIOR**

### **2.8.1 HEADROOM**

Headroom above the aisle shall be no less than 75 in.

### **2.8.2 DRIVER BARRIER**

A barrier or bulkhead between the driver and street side front passenger seat shall be provided. The barrier shall eliminate glare and reflections in the windshield directly in front of the barrier from interior lighting during night operation. 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 drivers head and shall fit within 1.5 in. from the coach side window/wall to prevent passengers from reaching the driver or his/her personal effects. The right-hand side of the barrier shall encompass the areas where the emergency/park valve is located, so that it may be protected from inadvertent passenger intrusion. Relocation of the transmission shift controls to the driver's left-hand side control panel is approved. The barrier design shall accommodate a minimum of 9.05 in. fore and aft travel of the specified operator's seat.

The driver's barrier shall be constructed of an opaque Lucite glazing or fiberglass reinforced plastic at a thickness suitable for the application. Driver's barrier panels made of matte textured non-reflective aluminum in upper sections with a laminate in the lower section is approved in lieu of the opaque Lucite glazing or fiberglass reinforced plastic panels. 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.

### **2.8.3 MODESTY PANELS**

Sturdy modesty panels constructed of durable, unpainted, corrosion-resistant material complementing the interior trim shall be provided at the rear of the stepwell. The modesty panel and its mounting shall withstand normal kicking, pushing, and pulling loads of 200 lb. passengers without permanent visible deformation.

## **2.8.4 REAR BULKHEAD**

The rear bulkhead paneling shall 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 coach is on a level surface.

## **2.8.5 CONSTRUCTION**

Interior panels may be integral with, or applied to, the basic coach structure. They shall be decorated in accordance with and to complement the interior appearance 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 above the seat track shall be fabric to match the background color of the seat fabric. (Morbern vinyl BS 362 Bayfield navy: 053-I-5335).

## **2.8.6 FASTENING**

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 or cross-recessed head screws. Removal of all interior fasteners, except for rivets, shall only require the use of two tool types to remove.

## **2.8.7 FLOOR**

### **2.8.7.1 STRENGTH**

The floor deck may be integral with the basic structure or mounted on the structure securely to prevent chafing or horizontal movement. Sheet metal screws shall not be used to retain the floor. Tapping plates used for 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 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 in. from the normal plane. The floor shall withstand the application of three times gross load weight without permanent detrimental deformation.

### **2.8.7.2 EDGES**

The floor shall be essentially a continuous flat plane, through the wheel chair area and down the center aisle. The transverse seats may be set on a raised platform (not more than 6 in.) where the floor meets the walls of the coach, the surface edges shall be blended with a circular section of radius not less than 1 in. and a molding or cover shall prevent debris accumulation between the floor and wall. Coving the flooring material meets this requirement.

Interior flooring shall be flat throughout except for an 8 ft. (maximum) long welded ramp in the aisle section at the front which shall be sloped between 4.6 and 5.35 degrees and have a 3 in. riser under the #1 roadside and curbside seats that are forward of the sliding seats



in the wheelchair securement area. A 7-5/8 in. step in the passenger aisle aft of the entrance vestibule area is acceptable in lieu of the ramp. Wheel housings may not extend above floor line.

Rubber flooring adhesion procedure includes butt cut type edges that are securely bonded to the plywood floor with a waterproof adhesive. Flooring areas that are edge-bound with stainless steel shall be permitted.

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 or covered up the sidewall to the seat track 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.

### **2.8.7.3 FLOOR PROTECTION**

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. The floor shall be 0.197 in. (5 mm) aluminum sheet with soundproofing between the aluminum and bus structure or plywood no less than 1/2 in. (12 mm) 5 ply thick, marine grade pressure treated installed with the "A" side up and with all edges sealed or Space-age Synthetics Thermo-Lite or equal composite flooring material.

### **2.8.8 STEPS AND STEPWELL**

#### **2.8.8.1 STEPS**

There shall be no more than four (4) steps. A step or a ramp may be provided between the vestibule and the passenger compartment.

All step treads shall be of uniform depth no less than 10.5 in. and a uniform height of no more than 9.5 in. The plane of the step treads shall be parallel to the plane of the floor except for the first step. Treads shall be covered with Altro Transflor Chroma "Windmill" 2.7 slip resistant flooring (color Pluto - TFCR-27404) 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 in. wide, the width of the step. This band shall be uniform in width across the entire step and vestibule edge.

#### **2.8.8.2 STEPWELL CONSTRUCTION**

Stepwell shall be constructed of stainless steel. The steps shall simultaneously support 300 lb. loads evenly distributed over the center half of each step-tread without permanent deformation and with elastic deflection of no more than 0.0625 in. Each step tread shall support a load of 500 lbs. evenly distributed over the center half of the tread without permanent deformation. A minimum 1 in. (25.4 mm) thick Tuf-Coat or approved equal, self-adhesive insulation shall be provided behind the stepwell area for added control of

## **2.8.9 WHEEL HOUSING**

### **2.8.9.1 CONSTRUCTION**

Wheel housings shall be constructed of stainless steel. Wheel housing, as installed and trimmed, shall withstand impacts of a 2 in. steel ball with at least 200 foot-pounds of energy without penetration.

### **2.8.9.2 CLEARANCE**

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.

### **2.8.9.3 FENDER SKIRTS**

Front and rear wheelwells shall be fully skirted 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.

## **2.8.10 SPLASH APRONS**

Splash aprons, composed of ¼ in. minimum composition or rubberized fabric or 3/16 in. nylon reinforced rubber, shall be installed behind each front wheel, between the drive and tag axles and the rearmost wheels and shall extend downward. Apron widths shall be no less than tire widths. Splash aprons shall be bolted to tapping plates which are welded to the coach understructure. The tapping 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.

## **2.8.11 PASSENGER DOORS**

The passenger door shall be an air power operated transit type two section bi-part door or a single panel plug door with a switch convenient to the operator. Door projection shall not exceed 8 in. out from the side of the coach while in the fully open position and shall not exceed 12 in. while going through the opening and closing cycle. The forward front door leaf leading edge shall rest within one inch of the front bumper when fully opened. All door glazing shall be ¼ in. laminated safety-glass tinted the same as the windshield and indelibly marked AS-2. Door glazing shall make up sixty-five percent (65%) of the surface area of the door. Provisions shall be made to permit all glass in the passenger door to be defrosted with activation of the coach defroster system or main passenger heating/air conditioning system. An entrance door key lock shall be provided on each coach along

with two spare keys. Key code shall be 040; Contractor may substitute a PS200 key code, common across the vehicle, (with the exception of the radio box).

## **2.8.12 SERVICE COMPARTMENTS AND ACCESS DOORS**

### **2.8.12.1 INTERIOR**

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 may be hinged down and can be 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 shall be designed to preclude accidental closure when the panels are opened.

### **2.8.12.2 EXTERIOR**

Vertically or horizontally 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/CAC compartment door may be horizontally hinged. 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 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 safety 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. 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.

A counter-balanced or spring system should operate large doors but, if not practicable, a powered assist device may be used, provided it is equipped with a manual system to open the doors manually in less than thirty (30) seconds. The manual system shall be easily accessible and quickly operable by one person in the event of a power or air system failure or engine compartment fire.

## **2.9 OPERATING COMPONENTS**

### **2.9.1 DOORS**

#### **2.9.1.1 CONTROL**

Operation of, and power to, the passenger door shall be completely controlled by a switch located in close proximity to the driver and near 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 located aft of the passenger door shall permit opening of the front door. The switch shall be concealed behind an unmarked door. The door switch cover shall be spring loaded so as to be held in the closed position.

#### **2.9.1.2 ACTUATORS**

The passenger door assembly shall be operated with a single pneumatic differential actuator and air cylinder(s) with one cylinder cushioned in the door opening mode. 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 air line 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. All elements of the door actuator system shall operate without a class 3 failure for 50,000 miles.

#### **2.9.1.3 MANUAL OPERATION**

In the event of an emergency, it shall be possible to open the doors manually from inside the coach using a force of no more than 35 lbs. after actuating an unlocking device. Any signage detailing the method of operation of door in an emergency shall not reference the "emergency operation" of the door. All references shall detail the "manual" operation of the door.

### **2.9.2 WINDSHIELD WIPERS AND WASHERS**

#### **2.9.2.1 WINDSHIELD WIPERS**

The coach shall be equipped with variable speed electric windshield wipers for each half of the windshield with separate controls for each side. 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 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.

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

## **2.9.2.2 WINDSHIELD WASHERS**

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. Stationary spray nozzles shall be provided; wet arm wipers shall not be permitted.

The windshield washer system shall have a minimum 3.75 gallon 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.

## **2.9.3 LIGHTING, CONTROLS, INSTRUMENTS**

### **2.9.3.1 EXTERIOR LIGHTING**

Each coach shall be equipped with lamps, signaling devices, and reflectors that shall conform to all Federal standards, including 49 CFR § Section 393.11 and Federal Motor Vehicle Safety Standard No. 108 (49 CFR § 571.108), as amended, supplemented and in effect at time of vehicle production. Except as noted herein, all exterior lighting shall be LED. All exterior lighting systems shall be nominal 12 or 24 VDC. The use of Dialight or Truck-Lite 12-year LED lamp assemblies shall be used for all exterior lighting, except headlights. Headlights shall be I-O Controls all LED system that changes direction with the steering of the bus. Daytime running lights are to be provided. 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 five (5) minutes by a mechanic. Lights if mounted on the engine compartment doors, shall be protected from the impact shock of door opening and closing. Lamps, lenses and fixtures shall be interchangeable to the extent practicable, 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.

Visual and audible warnings shall inform following vehicles or pedestrians of reverse operation and shall be activated only when the coach is in reverse. 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.

Coach hazard warning lights shall be automatically activated upon opening of the passenger door or selection of the reverse gear function of the transmission. When viewed at a distance of 50 ft. from the center of the rear of an autobus, rear hazard warning lights shall not be obstructed from view when the engine door(s) is open.

A lamp above the entrance door inside the coach shall illuminate only when the door is

open and shall illuminate the street surface to a level of no less than 1 ft. candle for a distance of 3 ft. outward from the lowest step tread edge. The lamp shall be shielded to protect passenger's eyes from glare.

Two flush mounted curb lights shall be provided on the curb side of the coach in close proximity of the front and drive wheels. The LED curb lights shall project lighting to the street surface around the front and drive wheels and shall be activated in conjunction with the opening of the passenger door. These lights shall extinguish within fifteen (15) seconds after closing of the passenger door and shall operate with the master switch in the ON position and the door circuit energized. The timer used to extinguish the curb lights shall be adjustable between zero (0) and thirty (30) seconds.

Amber colored LED turn signal lamps shall be provided on both the front and rear of the coach. Side LED lamps shall be provided, two per side. The front right lamp shall be near the front wheelwell, above the rubrail line and no higher than the wheelwell. The front left side lamp shall be located at the same height and forwardness 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 wheelwell and shall have amber lens.

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 lens shall be provided on each side at the center of coach.

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. Reflectors shall be no lower than 15 in. measured from the road surface to the center of the reflector at curb weight.

Stoptlights shall be separate and independent of all other rear lights. One stoplight shall be provided at each side of the vertical centerline of the autobus at the same height and as far apart as practicable. Center stoplights are permissible but shall not be considered as meeting the requirement for separate and independent stoplights. Stoptlights shall be no lower than 15 in. nor higher than 72 in. measured from the road surface to the center of the lamp at curb weight. The stop lamps shall have a projected luminous area of at least 4 square in.

Two LED high mount stop lights shall be mounted on the upper rear corners of the coach or mounted at the upper rear vertical centerline of the coach. The additional high mount stop lamps shall be activated upon application of the service brakes, and shall operate in conjunction with the standard coach stop lamps. The high mount stop lights shall also be stand-alone lights and cannot function with tail lamps or turn signal lamps.

Two (2) red colored LED deceleration lamps shall be installed. These lights shall be located equal distance from the coach centerline and shall be flush mounted. The deceleration lights shall be activated any time the master switch is in the ON position and the accelerator is in the idle position. The deceleration lights shall be steady burn when

One (1) clear colored strobe light shall be mounted on the front cap of the bus above the destination sign in the area of the marker lights. One (1) clear colored strobe light shall be mounted on the rear of the bus in the area of the rear marker lights. The lights shall be activated by the emergency alarm switch mounted at the base of the steering column.

### 2.9.3.2 SERVICE AREA LIGHTING

Four LED 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. Any work area in other service compartments with access doors shall be provided with sealed light fixtures, with either a toggle switch on or near the LED lamp.

### 2.9.3.3 PASSENGER INTERIOR LIGHTING

Interior illumination of the coach shall be provided by an LED interior light system controlled by a three (3) position switch on the driver's left hand control panel. LED interior lighting shall be located under the package rack by the side windows and along each side of the central ceiling. Lighting intensity, measured at a vertical plane 24 in. (610 mm) above the seat cushion, shall be a minimum 15 ft. candles. A Blue LED light mounted in the ceiling at the rear of the coach shall be provided.

All passenger seats except for center seat of rear cross seat shall have a flush mounted, adjustable LED light made up of multiple clear LED lights. A minimum of six (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 located on the driver's side console 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. A separate dimmer for the operator shall be provided for the front two rows of reading lights on both sides of the bus. ***CTDOT will conditionally approve a request to delete the requirement for the dimmer switch for the first two rows of reading lights. The Conditions for Approval are as follows: 1.) CTDOT will monitor the two (2) front row reading light assemblies during the "Testing" period. If during the testing period CTDOT receives any complaints of reflection on the windshield from the two (2) front row reading light assemblies, the contractor shall be responsible to make any/all necessary changes, modifications, etc. required to resolve any windshield reflection complaints to the satisfaction of CTDOT. 2.) Any/all necessary changes, modifications, etc. required to resolve windshield reflection complaints from the reading lights during the testing period shall be performed by contractor on all buses built under this contract at no additional cost to CTDOT.***

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

Additional general indirect lighting shall be provided to illuminate the interior for passenger ingress and egress and shall be controlled by the operator for the following functions; 1) interlocked to activate only when the passenger door is opened, or 2) always "On" or 3) always "Off" regardless of the entrance door position.

An LED stepwell lighting system shall be wired to illuminate when the front door is opened. The system shall provide no less than 2 ft. 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. Stepwell lamps shall be protected from damage caused by passengers kicking lenses or fixtures and shall not be a hazard to passengers. Three lamps shall be provided; a dome at the top of the stepwell, one on each side of the stepwell, with the bottom one to also provide illumination of the ground area located inside and above the entrance door.

#### **2.9.3.4 DRIVER'S LIGHTING**

The driver's area shall have an LED lamp to provide general illumination of the driver's area and shall illuminate the half of the steering wheel nearest the driver to a level of 15 foot-candles. This LED lamp shall be controlled by a switch that is convenient to the driver. An additional lamp shall provide general illumination of the fare collection equipment to a level of 15 ft. candles. The farebox lamp shall be activated when the door is open with step light and chime switch in the ON position. The light shall extinguish when the door is closed.

#### **2.9.3.5 DRIVER CONTROLS**

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. These switches shall be water resistant stainless steel toggle-style to match existing coaches and shall be of quality design suitably selected for signal switching power or loads with a design life of over 100,000 cycles. Engine Run/Stop/Headlights and Clearance Lights will be combined into one rotary switch. 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. Door control switch shall also be of toggle type design. The following controls shall have unique color or longer lengths to provide easy access for the operation of passenger door, hazard warning lamps and fast idle.

Accelerator and brake pedals 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 on. Pedal travel shall be limited by stops under the pedals. At least 6 in. of slack shall be provided in the brake pedal air lines to provide ease of component replacement.

Controls for engine operation shall be closely grouped within the driver's compartment. A



silent, foot operated double pole switch shall be located near the driver's left foot. When activated, the "Emergency Call Police" sign posting shall be displayed on the front and side destination signs as well as provide a signal to the mobile radio system, Camera system, and Intelligent vehicle network.

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. Door shall be operated by a single toggle or push button control, conveniently located for easy reach by the operator. The location of this control shall be easily determined by position and touch. The turn signal and high beam switches shall be floor-mounted, foot-controlled, waterproof, heavy-duty, on-off contact switches. The Park/emergency brake control shall be provided to the immediate right of the operator's seat, located on the side console panel convenient to the driver and adequately protected by the driver's barrier.

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.

A momentary engine overrule switch shall be provided on the driver control panel to permit the driver to move the coach off the road. The overrule switch shall be a spring loaded switch with a guarded cover. All labeling of controls shall be permanent.

A beverage holder will also be provided in the driver's area.

A guard for the high rise switch shall be provided.

### 2.9.3.6 INSTRUMENTATION

The speedometer, air pressure gauge(s), and certain indicator lights shall be located on the front cowl 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. Illumination of the instruments shall 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 shall be minimized. Instruments and indicators shall be easily readable in direct sunlight.

Indicators immediately in front of the driver shall at a minimum include:

- Headlamp Highbeam
- Right Turn
- Left Turn
- Hazard warning
- Parking brake applied
- Service brakes applied ("STOP LIGHTS" - may be common with parking brake indicator)
- ~~Daytime Running Lights~~

RVA  


The instrument panel shall be a programmable virtual dash manufactured by I-O Controls and shall include a speedometer indicating no less than 80 mph and calibrated in maximum increments of 5 mph. The speedometer shall be a rotating point type, with a dial deflection of 220 degrees to 270 degrees and 40 mph near the top of the dial. The speedometer shall be sized and accurate in accordance with SAE Recommended Practice J678. A programmable electronic speedometer with odometer indicating vehicle speed in miles per hour, between 0 mph and 80 mph, shall be supplied. Speedometer speed and odometer mileage readings shall be accurate within limits of plus nothing to minus two percent (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.

The instrument panel shall also include air brake reservoir pressure gauge(s) with indicators for front and rear air tanks. 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.

A FLEETWATCH Model JX55 data logger as manufactured by S & A Systems, Inc., or approved equal shall be installed on each coach. Each data logger shall be suitable for mounting on a cruiser type coach and connecting directly to a J1939/2284 connector on the coach. The coach manufacturer shall communicate clearly with all approved equal data logger component manufacturers' to ensure that the units being supplied by the contractor are similar in every way to those units currently being provided to CTDOT by S & A Systems.

CTDOT will program the data logger after coach delivery.

**2.9.3.7 VISUAL AND AUDIBLE WARNING DISPLAY**

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 but need not be immediately in front of the operator and shall incorporate LED tell-tale 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 and be inclined to discontinue operation of the coach. Malfunction warnings and other indicators listed in Figure 2 shall also be supplied on the coach. Space shall be provided on the panel for future additions of no less than 4 indicators as the capability of onboard diagnostic systems improves. All diagnostic indicators shall be simultaneously tested by the activation of master switch.

**FIGURE 2: OPERATOR'S STATUS PANEL INDICATORS**

VISIBLE INDICATOR	AUDIBLE ALARM
BACK-UP INDICATOR (a)	BACK-UP ALARM
BAGGAGE DOOR OPEN	AUDIBLE and VISUAL ALARM

CHECK ENGINE INDICATOR	BEEP FIRST TIME
CHECK TRANSMISSION INDICATOR	BEEP FIRST TIME
ABS AND ESC / TC	NONE
ALT NOT CHARGING	NONE
HAZARD INDICATOR	CLICK
HEADLIGHT HIGH BEAM INDICATOR	NONE
HOT ENGINE INDICATOR (b)	BUZZER - COMBINED WITH STOP ENGINE
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	NONE
RIGHT TURN SIGNAL INDICATOR	CLICK
STOP ENGINE INDICATOR	BUZZER COMBINED WITH HOT ENGINE INDICATOR
STOP REQUEST INDICATOR	CHIME
WHEELCHAIR LIFT INDICATOR	AUDIBLE ALARM
WHEELCHAIR STOP REQUEST INDICATOR	CHIME
REAR RISE INDICATOR	SONALERT
SEATBELT	CHIME
SEAT ALARM	CHIME
ALT OVER-CHARGING	YELLOW
AUX HEATER ON	GREEN
AUX HEATER FAIL	YELLOW

**NOTE:**

- (a) This indicator may be located on electronic transmission control panel
- (b) These indicators may be combined with CHECK ENGINE indicator provided by engine manufacturer.

**2.10 INTERIOR TRIM**

**2.10.1 GENERAL REQUIREMENTS**

The interior trim shall be generally pleasing, clean, smooth and modern design. 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 in. below the lower edge of the side windows or windshield shall be shaped so that objects placed on them fall to the floor when the coach is parked on a level surface. Water and soap should not normally be sprayed directly on the instrument and switch panels. Handholds, lamps, air vents, armrests, and other interior fittings shall appear to be integral with the coach interior. 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.

Materials shall be selected on the basis of maintenance, durability, appearance, safety, flammability, and tactile qualities. Trim and attachment details shall be kept simple and unobtrusive. Materials shall be strong enough to resist everyday abuse and vandalism; they shall be resistant to scratches and markings. An anti-graffiti/vandalism surface treatment for interior surfaces shall be provided. Interior trim shall be secured to avoid resonant vibrations under normal operational conditions.

**2.10.1.1 TRIM PANELS**

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. The lower sidewall interior trim shall be covered with Camira Fabrics PRT03 (Previously known as HoldsworthT4K PRT03 CR087) carpet navy fabric, Arborite Vogue P-925-S or approved equal.

**2.10.1.2 HEADLINING**

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-resistant, 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 be white vinyl clad aluminum, or white melamine

laminate ceiling panels, except that the front interior cap may be finished in gray fiberglass.

### **2.10.1.3 FRONT END**

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.

### **2.10.1.4 REAR END**

The rear bulkhead and rear interior surfaces shall be paneled with fiberglass reinforced plastic. The rear interior fiberglass panel shall be light grey and not covered in fabric for ease of cleaning. Any trim shall be stainless steel, aluminum, vinyl-clad aluminum, or approved equal.

### **2.10.1.5 PASSENGER INFORMATION**

Provisions shall be made on the rear of the driver's barrier and rear wall or bulkhead for a two frames to retain information that are sized 17 in. wide and 11 in. high posted by the transit system, such as notices and schedule changes. The frames shall be Transit Information Products MC TAB HOR or equal. Overall size is 18.490 in. by 11.875 in. by .25 in. The unit shall be fabricated from clear acrylic and display one 17 in. wide x 11 in. tall insert, and shall have openings at the bottom to reduce dust accumulation. All outside edges shall be flame polished. The unit installs with nine (9) flat head 4-40 screws.

## **2.10.2 PASSENGER SEATS**

### **2.10.2.1 ARRANGEMENTS**

Passenger seats shall be arranged in a forward facing configuration, and shall accommodate the installation of a Ricon lift or approved equal. All seated positions wherever possible should be no less than 31 in. hip to knee room. Any areas within the passenger compartment that cannot meet the minimum 31 in. hip to knee room requirement, without incurring a reduction of the specified passenger seat layout, shall have no less than 29 in. hip to knee room. The flip-up sliding seat assemblies shall be equipped or designed to prevent debris from entering the sliding seat tracks. Final design will not interfere with sliding seats, shall not present a safety hazard, and shall be designed for long life and easy service.

No more than twelve (12) seated positions shall be lost on any bus configuration in order to accommodate two (2) wheelchair passengers occupying the securement positions.

Each forward facing seat, except the rear seats, shall accommodate two adult passengers. Footrests are not required. 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 welded, bolted or riveted to the sidewall. The contractor shall provide a safety barrier in front of the first row of seats to protect the passengers from being ejected from these seats on a hard brake incident. Arm rests with handles and hand rails will be provided for Parlor Seating or in other open positions where no other form of barrier protection can be provided.

### 2.10.2.2 STRUCTURE AND DESIGN

Passenger seats shall be either American Seating Premier; Kiel Avance 2050; 4ONE Torino; or American Seating Wayfarer or approved equal. Before a notice to proceed is issued CTDOT will, based on results of customer surveys, designate at least two of the above listed seats as being acceptable for this contract. All passenger seats other than the five located at the rear of the coach shall recline and all passenger seats shall be equipped with a lap/shoulder belt. The seatbelt anchorages, both torso and lap, on passenger seats shall be integrated into the seat structure, so as not to impede emergency egress and shall comply with the provisions of FMVSS Nos. 208 and 210 relative to lap/shoulder belt and anchorages, respectively. Seat frames shall be constructed of high strength, fatigue resistant, welded steel with a durable powder coated, corrosion resistant colored finish which compliments the coach interior.

The lap/shoulder seatbelts shall meet FMVSS No. 210 strength requirement, measured in a static "pull-test". The seat belt assembly anchorages shall meet the following FMVSS No. 210 requirement: "Withstand a force of 13,345 N (3,000 lbs.) applied to the lap portion and a force of 13,345 N (3,000 lbs.) applied simultaneously to the torso portion of the seat belt assembly, for a total "pull-test" load of 26,690 N (6,000 lbs.)". The seat belt assembly anchorages shall also meet the following FMVSS No.210 requirement: "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".

Seat width shall be nominal 39 in. Handholds shall be mounted on top of all the aisle seats in compliance with the continuous overhead assists requirement, subject to CTDOT approval. Aisle shall not be less than 14 in. wide. Seat cushions shall be supported by steel springs as supplied by the seat supplier. Seat cushions shall be covered in Morbern vinyl BS 362 Bayfield navy (053-I-5335) and Morbern vinyl M432 imperial blue. Bayfield navy shall be used for the center areas of seat back and cushion and imperial blue shall be used for the perimeter and side areas of the cushion and seat back. There shall be no significant wear after 200,000 double rubs with a no. 8 cotton duck using the Wyznebeek test method. The vinyl shall be supplied with an anti-bacterial/anti-microbial treatment. The front and back face of the headrest shall be covered with Morbern vinyl M432 imperial blue. Seat back panels shall be covered with dark blue fabric. Seat armrest shall be dark.

Seat foam padding shall be polyurethane, which shall be covered with a removable cover with Velcro for ease of maintenance. Duron shall be placed between the polyurethane foam and the steel springs.

## **2.10.3**

## **DRIVER'S SEAT**

### **2.10.3.1**

### **DIMENSIONS**

The driver's seat shall be a Recaro Ergo Metro 3-point, or approved equal, equipped with a three-point high-visibility preferably "safety orange" or similar color lap/shoulder belt system. The driver's seat shall be adjustable and shall have up to 9.05 in. of adjustment fore and aft direction. The seat back and cushion shall be adjustable. The seat shall have cushion depth adjustment, height adjustment (5.5 in. maximum), and 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 (1) 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.

A rubber boot shall be provided to cover the suspension to eliminate the potential for pinching. All air lines are to be 1/4 in. diameter and have a quick disconnect at the back of the seat. The suspension shall have a minimum of 12 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 in. 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.

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 102 degrees. The seat back shall come with a full protective plastic back shell.

The back structure shall be constructed of steel and include a one (1) 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.

The seat cushion shall be adjustable in length and rake to accommodate operators of various heights. The seat cushion shall have a 2 in. extension for taller operators. To accommodate shorter operators, the front of the seat cushion shall rake down and retract.

A three (3) 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 (4) way adjustable headrest with six (6) position vertical adjustment shall be provided.

### **2.10.3.2 STRUCTURE AND DESIGN**

The driver's seat cushion shall be made of silicon 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, excluding the pedestal, shall be unpainted aluminum or stainless steel. The pedestal shall be painted steel structure.

The drivers' seat shall be provided with a three-point lap/shoulder belt system. The seat belt assembly shall comply with all provisions of FMVSS, including FMVSS No.'s; 208 and 210 relevant to lap/shoulder belt and anchorages, respectively. The lap portion of the seat belt shall provide a minimum of 72 in. seat belt length that shall be stored in plastic anti-cinch automatic retractors mounted on the left side of the operators' seat. The seat belt buckle shall be located on the right hand side of the seat for easy access. An independent shoulder belt as well as an independent lap belt shall be provided as an option.

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 looser. The seat belt shall be long enough to secure a ninety-eight percent (98%) male driver.

The driver's seat shall be covered in LiquiCell and fresh performance fabric or approved equal. The seat cushion shall have an anti-bacterial seat cushion lining and LiquiCell or approved equal. Fabric shall have a Crypton water/oil repellent, antimicrobial, and antibacterial finish. Seat cushions shall withstand 100,000 randomly positioned 3 1/2 in. drops of a squirming, 150 lb., smooth surfaced, buttocks-shaped striker with only minimal wear on the seat covering. A Recaro, or approved equal seat alarm system shall be provided in the bus. The alarm sensor shall set off an Echo backup alarm, part number 7G-8519/Model 360, located in the operator's area if the operator leaves the seat with the emergency brake off. The alarm shall work in all master switch and transmission positions. The system shall permit operators to utilize personal foam or beaded auxiliary seat cushions without triggering a false alarm. The operating state of the seat sensor (operator seated, operator not seated) shall be electronically monitored and integrated to auto-neutral as specified in transmission section.

### **2.10.4 FLOOR COVERING**

#### **2.10.4.1 VESTIBULE**

The floor in the vestibule shall be covered with AltroTransflor Chroma 2.7 slip resistant flooring (color Pluto TFCR-27404) or approved equal. All floor-covering furnished shall be



a smooth high quality slip resistant vinyl with aluminum oxide granules throughout the entire thickness of the wear layer with silicon carbide and base colored quartz in the surface layer with dual scrim on the backside. The floor covering shall be a minimum of 2.7mm thickness. All seams shall be heat welded to prevent moisture from migrating into the substrate. The slip resistant non-skid walking surface shall remain effective in all weather conditions and comply with all ADA requirements in both wet and dry conditions for a minimum of fifteen (15) years. The floor covering shall include a bacteriostat to prevent the growth of mold and mildew for the life of the product. The floor covering as well as transitions of floor material to the main floor and to the stepwell area shall be smooth and present no tripping hazards. The standee line shall be white and 2 in. wide and shall extend across the coach 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.

#### **2.10.4.2 DRIVER'S COMPARTMENT**

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.

#### **2.10.4.3 PASSENGER AREA**

The floor covering in the passenger area shall be the same material, dimensions and color specified for the vestibule. Composition material that remains effective in all weather conditions. Flooring shall be installed to minimize the quantity of seams and a one (1) piece center strip shall extend from the rear seat between the aisle sides of transverse seats to the standee line with the exception of the ramp which will include a separate piece. The floor under the seats shall closely fit the sidewall cove or extend to the top of the cover.

### **2.11 WINDOWS**

#### **2.11.1 WINDSHIELD**

The windshields 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.

The windshield shall be easily replaceable by removing zip-locks from the windshield retaining moldings. Bonded-in-place windshields shall not be used. The glazing material shall have single density tint. The upper portion of the windshield above the driver's field of view shall have a dark, shaded band with a minimum luminous transmittance of six percent (6%) when tested in accordance to ASTM D-1003.

## **2.11.2 DRIVER'S SIDE WINDOW**

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 ¼ in. laminated, safety glass with single density tint, the same as the windshield. The side window shall be rated AS-2.

## **2.11.3 SIDE WINDOWS**

Large rectangular passenger side windows with a minimum clear glass opening of 32 in. x 52 in. shall be provided on each side of the 45 ft. coaches. The window in the wheelchair lift door is smaller. Each window on both sides shall be double glazed laminated safety float glass, one (1) piece fixed and interchangeable type and mounted in black anodized aluminum frames. Side windows shall be a minimum of 5 mm uniform grey tinted glass, allowing seventy-five percent (75%) light transmittance.

All sashes shall be top hinged with push out at bottom, with the exception of the wheelchair lift door sash and window behind the wheelchair lift. All top-hinged sashes 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 etched on metal plates shall be provided at each seat position for operating the push-out sash.

## **2.12 INSULATION**

### **2.12.1 MATERIAL**

#### **2.12.1.1 PROPERTIES**

The insulating materials may be of differing thicknesses and materials to achieve thermal insulating properties and low interior noise levels. The manufacturer shall meet the sound and HVAC performance requirements of this specification. The following insulation suggestions are listed as recommendations, but not absolute requirements.

- Roof: 2 in. thick, compressed at installation, resin coated, medium density non bagged fiberglass
- Sidewall: Rigid molded polyurethane foam of varying thickness.
- Driver's area: Minimum ½ in., high-density fiberglass under the floor in the driver's area.
- Stepwell area: 1 in. thick urethane foam insulation with Mylar face to minimize interior temperature variances during severe external climatic conditions and for sound deadening.
- Below windshield: 2 in. thick, high density fiberglass
- Complete rear lounge seat area shall be heavily insulated with fiberglass blankets and sound-dampened panels for both noise and heat protection as follows:
- Behind the rear cross-seat riser and rear cross seat back and cushion are a minimum total of 1 ½ in. thick high-density fiberglass blankets.

- An additional 5/8 in. fiberglass blanket is added behind the rear cross seat back to further impede engine noise propagation to coach interior.
- Sound barrier with ¼ in. urethane foam layered on either side of a 1/8 in. urethane elastomer loaded with barium sulfate.
- Cover panel behind rear cross-seat is 1 in. thick foamed polyurethane with Mylar facing
- Area behind and below this rear area is 2 in. medium density fiberglass with a ¾ in. thick heavy density fiberglass batt cemented to the inner face of the fiberglass.

#### **2.12.1.2 THERMAL INSULATION**

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.

#### **2.12.1.3 SOUND INSULATION**

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.

The 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 four (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 ft. 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.

#### **2.12.1.4 REAR SEAT INSULATION**

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.

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.

### **2.13 ANCILLARY FEATURES**

## **2.13.1 DRIVER'S AREA**

### **2.13.1.1 VISORS**

Three scissor type sunscreens shall be provided at the right and left hand windshield and at the driver's side window that shall 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, camera system, ITS control head or the destination sign control. Deployment of the sunscreens shall not restrict the vision of the rearview mirrors. Sunscreen adjustments shall be made easily by hand.

### **2.13.1.2 STOP REQUEST SIGN**

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 visible to the seated operator and seated passengers. The spotter display sign specified in Section 2.13.4.3 shall perform the function of the stop request sign. 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 switch shall be provided in the driver's area to function as the passenger chime circuit on/off.

A test switch shall be provided in the driver's area to permit testing of all passenger chime switches that are located throughout the interior of the coach sequentially without the need to cycle entrance doors to reset the chime function.

### **2.13.1.3 DRIVER'S STORAGE**

A double prong hook shall be provided for the driver's coat in the driver's area with a retention strap. A locker with a keyed lock to match the entrance door shall be provided in the forward section of the roadside parcel rack.

## **2.13.2 MIRRORS**

### **2.13.2.1 OUTSIDE MIRRORS**

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 in. while providing maximum visibility to the operator. Amber lights shall be provided on both mirrors, facing forward, and be integrated with the clearance and turn signal lights.

The streetside outside rearview mirror shall be manufactured by Hadley (B&R), and shall be a corrosion-resistant and remote adjustable from the driver's seat. Mirrors shall be split view flat and convex glass, each remote adjustable, integrated in the same housing, with overall measurement 10 in. by 13 in. 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.

The curbside outside rearview mirror shall be manufactured by Hadley B&R, and shall be a corrosion-resistant, and adjustable from the driver's seat. Mirrors shall be split view flat and convex glass each remote adjustable, integrated in same housing, with overall measurements of 10 in. by 13 in. and permit driver view of roadway as well as coach rear wheels. Mirror head shall be spring loaded to break away, should impact occur. 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. A mechanical stop shall be provided which prevents contact between the mirror arm and the entrance door. Mirror arm shall also have a 5 in. convex spot mounted on it to provide a clear view of the front of the coach. An additional exterior mirror mounted to the curbside outside mirror arm shall be provided to provide the forward/front of bus visibility.

Both mirrors in both housings shall be heated. A Hadley IP67 rated mirror Quad control switch shall be provided. The control switch shall be fully electronic with LED indicator lights and 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. Joystick switches are not acceptable.

### **2.13.2.2 INSIDE MIRRORS**

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 in. x 10.5 in. mounted just below the destination sign box and above the driver's line of sight.

### **2.13.3 PASSENGER ASSISTS**

#### **2.13.3.1 GENERAL REQUIREMENTS**

Passenger assists in the form of full grip, vertical stanchions or handholds shall be provided for the safety of standees and for ingress/egress. Passenger assists shall be convenient in location, shape, and size for both the 95th-percentile male and the 5th-percentile female standee. Handholds shall be mounted on top of all the aisle seats in compliance with the continuous overhead assists requirement. 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 seats, doors, and luggage racks, the assists shall be between 1.25 in. and 1.50 in. in diameter or width with radii no less than 0.25 in. All passenger assists except for the luggage rack nosing shall permit full hand grip with no less than 1.50 in. of knuckle clearance around the assist. The passenger assists on the door torque tubes, the passenger modesty panel, the dash, fare collection register grabrail and the operators barrier shall have the surface area provided for the passenger assist powder coated yellow in color.

### **2.13.3.2 FRONT DOORWAY**

Front doors, or the entry area, shall be fitted with assists no less than 3/4 in. in width. Assists shall be as far outward as practicable, but shall be no further than 6 in. 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.

### **2.13.3.3 VESTIBULE**

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 in. 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.

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 in.

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.

## **2.13.4 PASSENGER INFORMATION SYSTEMS**

### **2.13.4.1 DESTINATION SIGNS**

The destination sign system shall be a TwinVision Smart Series with amber all LED electronic illumination or approved equal. The system shall consist of front and side destination signs, rear route sign and front run sign. The front destination sign message shall be readable by a person with 20/20 vision from 250 ft. The side destination sign shall be readable by a person with 20/20 vision from 50 ft. The rear route sign shall be readable by a person with 20/20 vision from 225 ft. The characters formed by the LED's shall meet the requirements of the Americans with Disabilities Act of 1990 (ADA) reference 49 CFR Section 38.39. The sign shall be legible from 65 degrees on either side of a line perpendicular to the center of the display. The readings of the front and side destination signs, run sign and rear route sign shall be posted by an electronically controlled mechanism. The electronic control shall be operable by the driver and the posting shall be completed within 10 seconds from the time the driver actuates the control. The system shall be required to store no less than 10,000 message lines, based upon an average of

up to twelve (12) characters per message line. This memory shall be easily programmable from inside the coach for message revisions by means of a portable memory transfer unit. The front sign shall be one (1) continuous unit containing a matrix of 2560 LEDs, sixteen (16) rows by one hundred sixty (160) columns on a display area not less than 8.4 in. high and 67.8 in. wide. The side destination sign shall post in a matrix of 768 LEDs, eight (8) rows by ninety-six (96) columns on a display area not less than 2.7 in. by 36 in. The side route sign shall contain a matrix of four hundred eighty (480) LEDs, twelve (12) rows by forty (40) columns on a display area not less than 4.3 in. high. The side route sign and side destination sign shall be mounted side by side in the forward most curbside passenger window(s). The side route and destination signs shall post letters and the same message coordinated with the front sign. The front and side signs shall also be capable of displaying different messages. All alpha numerical characters shall be capable of being displayed in each position. A complete list of readings will be supplied to the successful bidder.

Each system shall have a System Processor Board (SPB) mounted in the Operator's Display Keypad (ODK), capable of controlling up to ten (10) components to allow for future expansion. A Flash SPB/Interface Assembly shall be the central control for the entire sign system. The Flash SPB shall be capable of storing up to approximately one (1) Megabyte (approximately 16,000 message lines) of memory containing message and sign system programming data. The Flash SPB shall also retain preset message codes and last message(s) displayed information indefinitely. The Flash SPB shall extract and process message writing data from its memory according to the codes it receives from the ODK, or other controlling device. The system shall be capable of operating additional information displays or signs, such as interior information signs and voice enunciators. The ODK shall have a direct high speed connection to Clever Devices' or other IVN control system. The ODK shall maintain full functionality in the event that the Trapeze system is removed or omitted from the coach.

Multiple line posting shall be designed so that no blank time is displayed between postings. All characters shall be equally illuminated. Cleaning shall also be accomplished without removing the sign or front windshield. Posting shall have a variable font format and allow the sign to automatically space out letters so they do not blend together when viewed from a distance.

The sign shall be mounted in the coach in such a manner as to eliminate vibration and to isolate noise caused by the sign moving around in the sign compartment. The sign shall be equipped with a blanking feature that shall operate automatically when the destination sign power switch is in the "off" position or when the Master Switch is turned off.

A means shall be provided, normally through the intelligent vehicle network, to enable the driver to verify the sign display (run number and destination) from inside the coach. The access door shall have blind catches to prevent the door from falling on mechanics while repairs or inspections are performed. Sign shall be capable of accepting two (2) pre-selected destinations with selection controlled by the tactile feel rubber switch.

The Operator's Display Keypad (ODK) shall be located in the front destination sign compartment. The actual control of the sign in normal operation is through the Trapeze system' Intelligent vehicle network. The ODK code selector shall utilize a 28 key rubber

pad keyboard with tactile feel designed especially for the harsh transit environment. The ODK shall contain a two (2) line by twenty (20) character vacuum fluorescent display which will inform maintenance personnel on the status of the sign system. The ODK shall contain an audio enunciator that beeps to alert the mechanic to view the display for a message, or beeps indicating that a key is depressed. The ODK shall continuously display the message associated with the selected destination readings. Sufficient slack shall be provided in all ODK cables to permit the ODK to be relocated to the interior of the destination sign compartment, if desired, to support mounting of the transit control head in its place. The ODK shall maintain full functionality in the event that the Clever Devices or other Transit Control Head (TCH) is removed or omitted from the coach.

A USB memory device shall be used to upload message databases into the ODK. An Ethernet port shall also be provided for uploading message databases from the intelligent vehicle network processor.

A five (5) function silent switch shall be provided on the left hand side of the steering column and in a location that permits activation with an operator's left foot while minimizing likelihood of inadvertent activation. When activated, the switch shall cause an emergency message to be posted on the destination sign, but shall not post the message on the interior display. The switch will also work in conjunction with the radio system. The interior display shall not change so as not to indicate that the emergency message is posted on the exterior sign. The sign system shall be wired through a separate switch. The third function shall cause Camera system to save the current stream of video. The fourth function shall trigger a change in the Intelligent vehicle network.

The destination sign glazing shall be glass and shall have a defroster grid that cleans the sign of condensation, snow and ice. The grid shall be activated whenever the defroster is activated. A suitable thermostat/time delay circuit shall be provided to prevent overheating of the grid and glazing.

All components of the electronic destination sign system shall receive its power from a dedicated power circuit from the Wilmore DC/DC power converter.

A Data Link function shall be provided which enables the ODK to be controlled from an external source. The ODK data link configuration shall conform to SAE standard J1708, the coded language used shall conform to SAE J1587, and all relevant sign parameters defined in SAE J1587 shall be supported. A remote programming function shall also be provided, wherein the ODK message database can be updated from the intelligent vehicle network via an Ethernet port on the ODK.

#### **2.13.4.2 RUN NUMBERS**

An LED four (4) character run number sign, electronically controlled by the destination sign controller shall be provided. The sign shall be mounted with a built-in appearance to eliminate glare and reflections in the windshield and shall minimize obstruction of the operator's view and shall not be obstructed by windshield tinting. The run number shall be communicated from the destination sign system to the run number box. Illumination of the sign shall be individually controlled through direct entry from the operator's display keypad



of the destination sign. Each character location shall be capable of displaying the numbers zero (0) through nine (9), a blank, and the letter X. The ODK Data Link function described above shall enable the run sign to be controlled from an external source.

### **2.13.5 FARE COLLECTION**

Provisions for installation of a Scheidt and Bachmann farebox shall be provided at the front of the vehicle, to the immediate right of the driver. Location of the farebox shall not restrict traffic in the vestibule, including wheelchairs if a front door loading device is used, and shall allow the operator to easily reach the farebox controls and to view the fare register. The fare box shall not restrict access to the operator area, nor shall it restrict operation of operator controls.

The farebox shall require a 10A, un-switched connection to the vehicle 24V system, provided through the DC/DC converter. The contractor shall supply required wiring to the 24V battery, as well as J1708 communication interface to the Intelligent Transportation System.

The Contractor shall supply and install all the components, bracketry, system cables, and reinforcements necessary to facilitate installation of this equipment.

### **2.13.6 LIFT**

A Braun NUVL855RM24 dedicated access extended travel lift, model F9TF-DE015 and two forward facing mobility device securement areas to accommodate a maximum 30 in. (762 mm) wide mobility device shall be provided. The lift assembly shall comply with all current ADA requirements and FMVSS 403 and 404. The lift shall be installed below the floor line at the #2 or #3 right-hand luggage bay on the curbside of the coach.

The lift shall be controlled by a dash mounted toggle switch and a rear lift area toggle switch, and operated by up/down switches pendant mounted to the lift support bracket inside the lift baggage bay.

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 a luggage bay. The brake and throttle interlock system shall be engaged whenever: the wheel chair loading system is activated; the lift is not securely stowed; the upper lift door is open or ajar; the cassette door is open or ajar; the lift access (luggage bay) door is open or ajar. The interlocking system shall be a failsafe design. The lift mechanism shall include a device to prevent stowing the lift platform when a passenger is on the lift platform. The outer barrier shall be automatically deployed without operator input. A dash mounted indicator light shall be provided and shall be illuminated when the loading system is activated. The lower cassette door shall be secured with a keyed lock, key code # FA0040, Locksmith # 51153 for the CTTransit buses. (With the exception of the radio box, the contractor may substitute a PS200 key code, common across the vehicle). The locking mechanism for the cassette door shall be a spring loaded design which shall allow removal of the key while the cassette door is in the open position and shall allow

keyless relocking of the cassette door from the open position. Brackets, clamps, screw heads, other fasteners used with passenger assists on the lift system shall be anodized aluminum or stainless steel and shall be flush with the surface and free of rough edges.

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

The lift shall include the following specifications:

Lifting capacity (main platform) .....	680 pounds
Vertical travel .....	55" (1,422 mm) maximum
Platform width (chair capacity) .....	30" (762 mm) minimum
Platform depth (chair capacity) .....	48" (1,219.2 mm) minimum
Platform side height .....	4.00" (101 mm)
Handrail height - two (2) .....	30" (762 mm) minimum
Stowed dimension (depth) .....	85.5" (2171.7mm) total
Operating controls .....	Dual pushbutton
Power source .....	Electro- hydraulic
Voltage .....	24 volts DC
Back-up system .....	Emergency hand pump
Construction .....	Steel and aluminum
Stow level to ground cycle time .....	21.0 seconds
Ground to floor level cycle time .....	14.0 seconds
Hydraulic system fluid capacity .....	1.4 quarts
Hydraulic system operating pressure .....	2000 psi minimum

The lift shall be designed to meet the Title 13 California Highway Patrol requirements and Federal Department of Transportation Regulations 49 CFR 38.

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.

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 to prevent the accumulation of dust and dirt. The pump

shall be easily accessible through the baggage bay door. The handle shall be stored adjacent to the pump to allow immediate usage.

Lift operating state (activated, deployed, stowed, in transit up, in transit down, deactivated) shall be monitored and reported to the intelligent vehicle network.

### **2.13.6.1 LIFT DOOR**

A power assisted, sliding wheelchair lift door shall be provided. The lift door shall be a single leaf design that operates in a sliding track mounted above the door leaf. The door shall open by sliding 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, for maximum safety. 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 and followed by a full brake application to release the parking brake in order to move the coach.

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. A keyed lock shall not be provided.

The lift storage door shall not block the visual observation of the lift assembly while utilizing the manual override mode of the lift. The lift storage door shall be a vertically hinged door with the hinge side of the door facing the front of the coach.

### **2.13.6.2 LIFT INSTALLATION**

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.

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.

The heating and air ducts shall be rerouted around the lift area to ensure proper interior air conditioning/heating airflow and distribution.

A passenger chime tape switch shall be mounted on the sidewall at the two (2) wheelchair securement positions, readily accessible by any person secured in those positions.

Each coach shall have adequate information decals installed which details the proper lift operation in both the normal and manual modes of operation.

### **2.13.6.3 LIGHTING REQUIREMENTS**

Lighting for the lift areas shall be designed to exceed Title 13, ADA and FMVSS 404 standards. Lighting shall be provided to effectively illuminate the lift area. Light shall be wired through the keyed master 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 one foot-candle at a distance of 3 feet 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.

### **2.13.6.4 SECUREMENT SYSTEM**

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" (762 mm x 1,219 mm) as required by ADA.

NOTE: As previously stated under Section 2.10.2.2 "Structure and Design", prior to a "notice to proceed" is issued; CTDOT will, based on results of customer surveys, designate at least two passenger seat manufacturers as being acceptable for this contract. Based on this determination, the manufacturer of the passenger seats being provided shall provide the securement restraint system in accordance with all ADA requirements.

A separate three-point belt securement shall be provided to effectively secure the occupant.

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. A minimum 10.5 in. (267mm) high barrier shall also be provided at the rear of lift area for additional passenger protection.

## **2.14 ROOF VENTILATORS/ESCAPE HATCH**

Two (2) roof ventilators shall be provided and designed to perform as an escape hatch. One (1) 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.

## **3.0 CHASSIS**

### **3.1 PROPULSION SYSTEM**

#### **3.1.1 VEHICLE PERFORMANCE**

##### **3.1.1.1 POWER REQUIREMENTS**

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.

### **3.1.1.2 TOP SPEED**

The coach shall be capable of reaching a governed speed of 70 mph, for emergency and passing maneuvers, on a straight, level road at SLW.

### **3.1.1.3 GRADABILITY**

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 40 mph on a two and a half percent (2½%) ascending grade and 7 mph on a sixteen percent (16%) ascending grade.

### **3.1.1.4 ACCELERATION**

Vehicle shall accelerate from 0 to 15 mph in five (5) seconds, with the coach at S.L.W.

### **3.1.1.5 JERK**

Jerk, the rate of change of acceleration, shall be minimized throughout the acceleration/ deceleration range and shall be no greater than 0.3g/sec. under normal operating conditions and normal driver actions.

### **3.1.1.6 OPERATING RANGE**

The operating range of the coach run on the design operating profile shall be at least four hundred (400) miles on a single fill-up of ultra-low sulfur diesel fuel.

### **3.1.1.7 OPERATING PERFORMANCE**

Speed, gradability, and acceleration performance requirements shall be met at, or corrected to, 85 degrees F, 29.00 inches Hg, dry air. Performance degradation at conditions other than the test standard shall not exceed one percent (1%) for each 3 degrees F and four percent (4%) for 1,000 ft. of altitude above the standard.

## **3.1.2 POWERPLANT MOUNTING AND ACCESSORIES**

### **3.1.2.1 MOUNTING**

The powerplant shall be mounted in a compartment in the rear of the coach. All powerplant 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. The engine and transmission

shall be mounted and supported, designed to reduce stress on bell housing and drive components.

### **3.1.2.2 SERVICE**

The powerplant 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 powerplant. The engine cradle shall be removable for engine replacement. Two mechanics shall be able to remove, replace and prepare the engine and transmission assembly for service in less than twenty-five (25) total combined man-hours.

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.

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

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.

The cooling system filler caps shall be hinged to 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 discourage daily fluid checking. 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 magnetic-type, external, hex head, drain plugs of a standard size except for the transmission which uses a recessed square socket type plug. The powerplant shall be equipped with a Probalyzer, or approved equal, brass mini-gauge plug to permit engine fluid analysis sampling. The powerplant shall be equipped with provisions for displaying engine and transmission data on an external reader or laptop computer.

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. Flexible lines shall be Teflon hoses with braided stainless steel jackets except in applications where premium hoses are required and shall have standard SAE or JIC brass or steel swivel end fittings. Hoses shall be individually supported and shall not touch one another or any part of the coach.

All fluid lines on the exhaust side and turbocharger side of the engine shall have heat resistant secondary containment jackets to prevent spraying of fluids onto exhaust system and turbocharger. All fluid lines and air piping shall be rigidly supported and isolated to

prevent chafing damage, vibration, fatigue failures, and tension strain. Lines passing through a panel, frame, or bulkhead shall 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.

Flexible fuel and oil lines shall be kept at a minimum and shall be as short as practicable. Flexible lines shall be routed or shielded so that failure of a line shall not allow fuel or oil to spray or drain onto any component operable above the auto-ignition temperature of the fluid. Flexible lines shall be Teflon hoses with braided stainless steel jackets except in applications where premium hoses are required and shall have standard SAE or JIC brass or steel, swivel, end fittings. Flexible hoses over 1 in. in diameter need not be Teflon with braided stainless steel jacket but shall be in conformance with SAE Standard J100R5. Flexible hoses and fluid lines shall not touch one another, or any part of the bus. Fuel lines shall have shut off valve for service and repair.

Lines shall have a maximum length of 6 ft. unless demonstrated inappropriate for a given application. Hoses/lines shall be secured with heavy-duty stainless steel, and full silicone rubber clamps.

Compression fittings shall be standardized as much as practicable 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.

### **3.1.2.3 AIR CLEANER**

The air cleaner shall be a dry type, be horizontally mounted, and be equipped with a pre-cleaner system. Airflow through the filter element shall be from the outside in. To service the filter shall take less than five (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 or quick release clamps A Filter Minder or Donaldson "Informer" air filter service indicator shall be provided and calibrated to 20 in. of water/vacuum.

### **3.1.2.4 ACCESSORIES**

These 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. (A larger power steering reservoir than the basic commuter coach shall be provided.) The alternator shall be an EMP Power 450 amp brushless or Niehoff C803D, or approved equal. Only the 24 volt alternator and A/C compressor may employ belt drives. Tension on the belt driven A/C compressor shall be maintained by manually adjusted turnbuckles or automatic belt tensioner. The alternator shall be automatically tensioned.

### **3.1.2.5 HYDRAULIC DRIVE**

Hydraulic system shall be used only for power assisted steering. 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.

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 the auto-ignition temperature of the fluid.

### **3.1.3 POWERPLANT**

#### **3.1.3.1 ENGINE**

The engine shall be an electronically controlled in-line six (6) cylinders Volvo D13, or Detroit DD13, or Cummins ISX12, current EPA certified and compliant engine, or an approved equal. The engine shall meet all regulatory requirements when operating on no. 1 or no. 2 ultra-low sulfur diesel fuel. The engine shall provide 380 gross horsepower and 1,400 pound feet of torque. The engine shall be governed by electronic controls that comply with J-1939 for Serial Data Communications. All cables and electronic devices utilized as part of the electronic engine control system shall be adequately shielded from external interference. An electrically erasable programmable read-only memory (EEPROM) shall provide basic engine control functions such as rated speed and power, vehicle speed, engine governing, torque shaping, cold start logic, transient fuel control, diagnostics and engine power reduction.

The engine shall be monitored by a series of sensors which provide signals to the electronic module indicating pertinent pressures, temperatures, and fluid levels necessary to preserve the operating life of the engine. The control module shall also be capable of controlling the engine through signals received from an electronic accelerator pedal. The electronic pedal shall be equipped with a sensor that picks up accelerator pedal position at an infinite number of points throughout the range of the pedal. The operation of the pedal shall be completely electronic without mechanical controls or linkage. The pedal shall not have any exposed wiring in the driver's area.

The electronic control module (ECM) shall provide control for the air and fuel systems on the engine. The air system fuel control shall be engine mounted and electronically controlled by the ECM to provide idle and no-load speed governing, failure diagnostics and auto calibration.

The engine shall be protected from premature failure by the electronic control module and sensors. If a reading exceeds an acceptable range, a warning light shall notify the operator and the engine operation shall be brought under control or to a controlled stop. The



electronic control module shall be equipped with a self-diagnostic system as well as an engine protection system and engine performance diagnostics. A failure shall be retained by the control module for evaluation by garage personnel using a diagnostic reader. The reader shall be capable of monitoring and evaluating engine system parameters such as intake manifold pressure, oil pressure, oil temperature, coolant level, coolant temperature, engine speed, throttle position and vehicle speed governing. The electronic control module shall be capable of communicating the features specified to the diagnostic reader.

The system shall be equipped with a means to limit the vehicle top speed via the engine's electronic controls.

The engine shall be equipped with an engine exhaust brake system to assist with stopping the vehicle.

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.).

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.

The engine shall be equipped with a fast idle and be driver controlled. The devices shall activate only with the transmission 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. The engine ECM shall also have sufficient inputs/outputs for the Fire suppression system control reactions.

The Data Link function shall be provided which enables the ECM to report the engine's operating condition to an external source. The ECM data link configuration shall conform to SAE standard J1939/2284, the coded language used shall conform to SAE J1939/2284, and all relevant powertrain parameters defined in SAE J1939/2284 and all relevant powertrain system alarms, fault codes and status codes available through the manufacturer's diagnostic tools shall be broadcast over the SAE J1939/2284 network. The Contractor shall provide Trapeze system AVM (automatic vehicle monitoring) certification that all codes available to the manufacturer's diagnostic tools have been defined to the Trapeze system AVM data dictionary and are being broadcast over the SAE J1939/2284 network. The contractor will provide the ability to broadcast critical engine data over J1939 to the Trapeze system. Two (2) connections in the controller shall be provided (one (1) output connection for Trapeze system IVN and one (1) diagnostic port connection).

### 3.1.3.2 COOLING SYSTEM

The cooling system shall utilize electric fans from EMP, Modine, Spal, or approved equal and 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 115 degrees F. Sufficient reserve capacity shall be provided by the cooling system to provide efficient cooling for the coolant and engine charge air cooler (CAC) with fifteen percent (15%) of the CAC and radiator blocked. The area of the CAC and radiator to be blocked shall be determined by CTDOT. The cooling systems shall be factory filled with a 50/50 mixture of Cummins ES Compleat EG anti-freeze compatible with Pencool 2790-N3 additives. 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 a hinged access door. The radiator and charge air cooler shall not be stacked in front of one another. Door shall include a manual prop to hold the door in the open position.

The charged air/cooling system radiator(s) shall be of durable corrosion-resistant construction with welded-on tanks. Radiator(s) plumbing shall be stainless steel, copper, aluminized steel or brass tubing and if practicable, rubber hoses shall be eliminated. Necessary hoses shall be premium, silicone rubber type that are impervious to all coach fluids. All CAC hoses and coolant hoses shall be secured with constant torque hose clamps. No heat producing components or climate control system components shall be mounted between the engine cooling air intake aperture and the radiator(s). All cooling system fittings are to be cast iron, brass or copper.

Electric fans shall move outside air through the radiator and charge air cooler at a minimum rate approved by the engine manufacturer for maximum cooling efficiency. For ease of maintenance, the cooling fans shall be easily accessible for service and/or replacement without draining or removing the radiator or charged air cooler (CAC).

Radiator surge tank shall be made of heavy-duty stainless steel. A sight glass to determine satisfactory engine coolant level may be provided should adequate space exist for installation and periodic inspection. If installed, it shall be accessible by opening the engine and/or blower compartment access doors. A spring-loaded, push-button type valve shall also be provided to safely release pressure or vacuum in the cooling system. The cap shall also include a positive locking device to prevent opening of filler cap until pressure is released. Filler cap shall be hinged to the filler neck and held closed by a spring. A temperature output for the alarm system meeting the approval of the engine manufacturer shall be provided to allow for proper cooling system function during warmer weather operation. If possible, cooling system function shall be controlled electronically through the engine control system.

Engine thermostats shall be easily accessible for replacement. The engine cooling system shall be equipped with a properly sized Penray Need Release cooling system filter with a spin-on, disposable borate element. Quarter-turn ball type shutoff valves shall be provided on the coolant filter base, which allow 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. Engine cooling and bus interior heater systems shall be separate systems if available at time of bus manufacture. The engine cooling system will be designed so as not to allow aeration or air pockets to form in any area of the engine or EGR system, nor shall it permit boiling or coolant loss

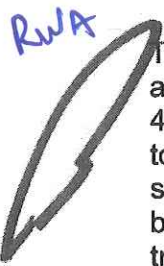
during the operations described above. The passenger heater/defroster system shall be controlled and supplied by a source that is not connected directly to the engine or dependent on engine temperature. This is necessary to eliminate damage to the engine and EGR cooler caused by aerated coolant returning from the heater cores

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.

Coolant levels and temperatures shall be monitored and reported to the Intelligent vehicle network.

### 3.1.3.3 TRANSMISSION

RWA



The transmission shall be an ALLISON WT series B500R six speed transmission or approved equal, ~~equipped with a retarder~~. Maximum input horsepower shall be less than 420 horsepower. Maximum input torque capability shall be less than 1400 pound feet of torque. The transmission shall be fully automatic with six (6) forward gear ratios and be supplied with a deep oil sump, if available. Shift calibration shall be set so that shifts shall be smooth under all operating conditions and provide optimal fuel economy. The transmission shall be equipped with a fuel optimization program and release clutch pressure when stopped in gear. The transmission shall only have one (1) 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.

Allison transmissions shall be supplied with Load Based Shift Scheduling, Reduced Engine Load at Stops and Transynd transmission fluid or approved equal.

The gearing shall be of the constant mesh, helical, planetary type with the following ratios:

<u>RANGE</u>	<u>Allison RATIO</u>
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

A function of the electronic controls shall be provided to prevent premature engagement and operation of the automatic transmission reverse gear.

The transmission shall be governed by electronic controls with Smart Controls, including Load Based Shift Scheduling, Prognostics and Shift Energy Management 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.

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 diagnostic reader.

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 underfloor baggage.

The Data Link function shall be provided to report the system's operating condition to an external source. The data link configuration shall conform to SAE standard J1939/2284, the coded language used shall conform to SAE J1939/2284, and all relevant transmission parameters defined in SAE J1939/2284 and all relevant transmission system alarms, fault codes and status codes available through the manufacturer's diagnostic tools shall be broadcast over the SAE J1939/2284 network. The Contractor shall provide Trapeze system AVM (automatic vehicle monitoring) certification that all codes available to the manufacturer's diagnostic tools have been defined to the Trapeze system AVM data dictionary and are being broadcast over the SAE J1939/2284 network. Two connections in the controller shall be provided (one (1) output connection for Trapeze system IVN and one (1) diagnostic port connection).

The transmission shall have an auto neutral feature that shall cause it to automatically and immediately shift to "Neutral" whenever the transmission is left in gear and either (a) the parking brake is applied, (b) no bus operator is sitting in the operator's seat, or (c) both Conditions (a) and (b) apply. This system shall also automatically shift the transmission to "Neutral," after a five (5) minute delay, whenever the exit door brake interlock is applied.

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. Brake lights shall illuminate when the retarder is activated.

The retarder or engine brake 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 0.13g. The resulting decelerations specified include the effects of engine braking, wind resistance and rolling resistance.

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

The retarder on/off switch shall be located in the engine compartment at a location approved during pre-production.

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

### **3.1.3.4 ELECTRIC STARTER**

The starter shall be a Delco MT-39 or approved equal and shall have a pre-engaged drive, which will engage 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.

#### **3.1.3.4.1 SUPER CAPACITOR START AID**

A KBI Kapower asymmetric super capacitor shall be supplied. The super capacitor shall be rated at 120 kilojoules and shall be installed in parallel with the batteries as an aid to starting the engine.

The module shall be activated to bring the capacitor in parallel with the batteries just prior to a start attempt and shall isolate the capacitor from the batteries when the vehicle is not running, ensuring that the capacitor is not supplying any electrical power to the bus when the engine is not running. The capacitor shall be mounted in a stainless enclosure that is easily serviceable and in an area where temperatures do not exceed 155 degrees F. The enclosure shall have a decal mounted on the exterior to indicate danger when handling high current amperage equipment.

### **3.1.4 EMISSIONS**

#### **3.1.4.1 MOTOR VEHICLE POLLUTION REQUIREMENTS**

The manufacturer shall provide in writing that:

The engine being provided is certified and compliant with current U.S. EPA emissions requirements when operated on both Number 1 and 2 ultra-low sulfur diesel fuel.

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.

#### **3.1.4.2 EXHAUST LOCATION**

The exhaust system shall be shielded from all combustible materials. All fluid lines shall be properly secured and shielded in the area of the exhaust system and exhaust after treatment system. Engine compartment ventilation shall be provided to reduce engine compartment temperature below the flash point of the combustible fluids in the engine compartment. The exhaust system shall vent on the street side rear corner.

### **3.1.4.3 AUXILIARY HEATER**

An auxiliary heater shall be provided to maintain passenger compartment temperatures. A PROHEAT X45, 45,000 BTU heater, or approved equal, shall be provided and shall be mounted on the street side of the bus. All electrical connectors shall be water tight and corrosion resistant. The heater shall be equipped with an inspection port that provides a visible check of the heater flame within the heater. All electrical connectors shall be water tight and corrosion resistant.

A remote diagnostic plug for the heater diagnostic tool shall be in an area easily accessible location for the mechanic shall be provided. This plug shall be located in the driver's area near the engine and transmission diagnostic plugs."

An option for the heater to be equipped with a momentary toggle switch located at the rear control panel located within the engine compartment that enables the Proheat ninety (90) minute auto preheat cycle shall be provided.

The heater shall be equipped with an electronic Heater Control Module (HCM) with built in microprocessor that incorporates circuit monitoring and protection. The HCM shall provide a LED display with signals for major heater components and specific function errors for supplying self-diagnostic information. The HCM shall be equipped with a memory function that records intermittent fault codes for retrieval with the manufacturer's diagnostic download kit. The HCM shall also incorporate a soft start feature that utilizes solid state switching with controller motor acceleration.

The heater shall be programmed for 24 volt power. The heater shall be supplied with an independent fuel supply pump. The heater shall utilize a coolant circulating pump to provide eight (8) gallons per minute minimum flow. The Contractor shall locate and wire a remote diagnostic plug for the heater diagnostic tool in an area easily accessible for a mechanic. This plug is to be located adjacent to the engine and transmission ECM diagnostic ports.

The heater is to be placarded to indicate compliance with applicable FHWA regulations. The heater is to be equipped with a momentary toggle switch located on the rear control panel located within the engine compartment that shall enable the heaters' ninety (90) minute auto preheat cycle. The heater shall be wired to insure that when the master battery disconnect switch is turned to the "off" position, the auxiliary heater shall also be turned off. Heater state will be indicated on the drivers dash as noted in Section II-36 regarding visual and audible warning display.

The heater shall provide a supplemental input connection on the HCM that receives a signal from the vehicle electrical system that enable the heater whenever the engine is running. The supplemental input connection shall be interrupted when the master switch is off. A mechanic's disable switch shall be provided within the auxiliary heater compartment, that when placed into the "Off" position, interrupts the supplemental input connection to disable the heater for service and maintenance.

## **3.2 FINAL DRIVE**

### **3.2.1 GENERAL REQUIREMENTS**

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.

#### **3.2.1.1 DRIVE AXLE**

The drive axle shall be a Meritor World Axle rated at 22,500 lbs. or an approved equal rear axle 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 greased lubricated, unitized wheel ends (UWE) type, and the differential shall be lubricated with synthetic oil. Rear axle ratio shall be selected for speed and fuel economy.

#### **3.2.1.2 TRAILING AXLE**

A Meritor Reverse Elliot design caster steer trailing axle shall be provided behind the drive wheels axle. The 45' coaches shall have a coach body rear rise feature which through a dash mounted switch, permit the redirection of suspension system air pressure which will raise the rear of the coach for maneuverability purposes. A dash mounted toggle switch will allow a minimum of 30 psi drop in tag axle air pressure to assist in low traction situations. This function should only be enabled between 0-5mph. The third axle shall have single tires with tires being the same size as the tires on the other axles. Tag axle weight shall not exceed 14,000 lbs. on 45' buses. *In no event, with a full seated passenger load shall the load on any axle exceed 22,400 lbs.* Combined weight on the rear tandem axles shall not exceed 34,400 lbs. The tag axle shall be equipped with grease lubricated UWE complete with factory pre-load bearing/hub assemblies, lubricant and seals.

#### **3.2.1.3 DRIVE SHAFT**

The drive shaft shall be a minimum 3 in. outside diameter, heavy-duty type Meritor 1810 series or Spicer/Dana 1710 series, or SPL, 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.

## **3.3 SUSPENSION**

### **3.3.1 GENERAL REQUIREMENTS**

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. Independent wheel suspension with dual parallel triangular frame with two (2) rolling lobe air bellows at the outer edge shall be permitted. The trailing axle shall be equipped with two (2) straight side lobe type air springs. Pressure in the trailing axle suspension shall be automatically adjusted as

required by the load-sharing system. Manual air dump valves shall also be provided in the engine compartment.

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. 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 supplied by Clevite part # 836520, or approved equal. 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.

### **3.3.2 SPRINGS AND SHOCK ABSORBERS**

#### **3.3.3 TRAVEL**

The suspension system shall permit a minimum wheel travel of 3.5 in. in jounce and 3 in. 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.

#### **3.3.4 KNEELING**

A driver-actuated kneeling device shall lower the coach floor 3 in. to 6 in. during loading or unloading operations regardless of load to a floor height of 42 in. 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 in. 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, visible to the boarding passenger which activates during the kneeling operation. This indicator shall be appropriately marked. The operating state of the kneeling device (kneeled, not kneeled) shall have the capability to be electronically monitored and reported to the Intelligent vehicle network. An optional reverse kneeling feature shall be provided at buyer's option that is capable of adjusting the exit height of the door to 15.5 in. When a reverse kneeling feature is provided, the three-position, spring loaded to center switch shall be modified such that release of the switch will completely stop motion and hold the height of the bus *whether the bus is being lowered or being raised.*

#### **3.3.5 DAMPING**

Vertical damping of the suspension system shall be accomplished by hydraulic shock absorbers mounted to the suspension arms or axles and attached to an appropriate location on the chassis. Damping shall be sufficient to control coach motion to four (4) cycles or less after hitting road perturbations. Shock absorbers shall maintain their effectiveness for at least 50,000 miles in normal service. The coach shall be equipped



with four (4) shock absorbers on the drive axle and one (1) on each side of the front axle and one (1) on each end of the tag. Shock absorbers shall be interchangeable on each axle, side to side.

### **3.3.6 LUBRICATION**

All elements of steering, suspension, and drive systems requiring scheduled lubrication shall be provided with grease fittings conforming to SAE Standard J534. These fittings shall be located for ease of inspection, and shall be accessible with a standard grease gun without flexible hose end from a pit or with the 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.

### **3.3.7 UNDERCOATING**

Tectyl, PPG Corashield undercoating, or approved equal, shall be applied to the underside of the body, frame, and wheelwells. 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. Correct application procedures should be followed so as to ensure proper bonding of undercoating materials. With the exception of periodically inspecting the visible coatings applied to prevent corrosion and reapplying these coatings in limited spots, the Contractor shall not require the complete reapplication of anti-corrosion compounds over the life of the bus.

## **3.4 STEERING**

### **3.4.1 STRENGTH**

Fatigue life of all steering components shall exceed 1,000,000 miles. 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, Douglas Auto Tech, or integral to the VDO workstation 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.

The front axle shall be a Meritor or DANA or approved equal non-driving axle rated at 16,500 lbs. and shall be equipped with air operated, integral, automatic self-adjusting disc brakes with a load rating sufficient for the coach loaded to GVWR. King pins shall be the low friction.

### **3.4.2 TURNING EFFORT**

The steering wheel shall be not less than 19.5 in. 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 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 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 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.

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.

### **3.5 BRAKES**

#### **3.5.1 SERVICE & PARK/EMERGENCY BRAKE SYSTEMS**

##### **3.5.1.1 ACTUATION**

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 in. 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 lower than the accelerator. Provisions at the front shall be made to activate the brakes from the towing vehicle. The Park/emergency brake control shall be provided to the immediate left of the operator's seat, located on the side console panel convenient to the driver, and adequately protected from inadvertent passenger intrusion by the driver's panels. Release of the emergency/parking brake shall require one full application of the service brake once the emergency/parking brake release valve is depressed. The brake system shall be equipped with a ~~yellow~~ green button/plunger type emergency brake release control valve. Use of this valve shall allow for three (3) consecutive emergency brake releases. The operating state of the service brake (applied, released) shall be electronically monitored and reported to the Intelligent vehicle network.

RWA  
↗

##### **3.5.1.2 FRICTION MATERIAL**

Brake lining (pads) must provide optimum performance with the brake system being used and shall minimize brake noise under all weather conditions and shall be interchangeable between axles.

##### **3.5.1.3 HUBS, ROTORS and CALIPERS**

Wheel bearing seals shall have integral replaceable wear surfaces. The drive axle hub

end wheel bearings shall be grease lubricated, unitized wheel ends type and the tag axle shall be equipped with unitized wheel ends complete with factory pre-load bearing/hub assemblies, lubricant and seals. The front axle shall use unitized greased bearings. Calipers shall be interchangeable between axle positions of the same side (roadside or curbside only).

#### **3.5.1.4 ANTILOCK BRAKE SYSTEM**

The coach shall be equipped with a Meritor Wabco, Bendix ABS Premium Cab model, or approved equal antilock brake system. The system shall utilize a six-channel antilock braking system (ABS) with an electronic controller assembly that will provide full vehicle wheel control braking for the coach. The design of the digital electronics shall provide a high degree of protection from radio and electromagnetic interference.

The electronic control unit (ECU) shall be remote mounted from the brake valve in a location that permits easy access of the controller for maintenance functions.

The antilock brake system shall provide individual wheel control by using a wheel speed sensor and modulator at each 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.

Outputs from the ECU shall be provided to the modulators. 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 six individual modulator assemblies.

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.

All electrical harnesses utilized to provide the antilock brake system shall be separate and independent of all other coach wiring. Under no circumstances shall antilock brake wiring harnesses, with the exception of twelve (12) volt power and ground wires, the serial interface wiring, and the ABS warning light circuit, be combined with or retained in existing harness looms, tape or trunks. 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 I/O controls multiplex modules 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 molded connectors at the exposed ends, or approved equal.

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 J1939/2284. The coded language used shall conform to SAE J1939/2284 and all relevant braking parameters defined in SAE J1939/2284 and all relevant braking system alarms, fault codes and status codes available through the manufacturer's diagnostic tools shall be broadcast over the SAE J1939/2284 network. The Contractor shall provide Trapeze system AVM (automatic vehicle monitoring) certification that all codes available to the manufacturer's diagnostic tools have been defined to the Trapeze system AVM data dictionary and are being broadcast over the SAE J1939/2284 network. Two connections in the controller shall be provided. *(one (1) output for Trapeze system IVN system and one (1) Diagnostic port connection).*

### **3.5.1.5 ELECTRONIC STABILITY CONTROL (ESC)**

The coach shall be equipped with a Meritor Wabco, Bendix, or approved equal electronic stability control system (ESC) system. The system shall be designed to intervene when sensors indicate that the bus is at risk due to: a) rollover instability; b) sliding due to excessive lateral forces (rotational or yaw). The active safety system shall at a minimum monitor lateral acceleration, steering angle, and yaw rate. Based on these measurements, the stability of the bus shall be enhanced by controlling vehicle speed through a combination of reduced engine torque, transmission retarder and/or use of the vehicle braking systems.

The electronic stability control 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 electronic stability control shall result in simultaneous illumination of the ESC condition lamp on the dash and disabling of all or part of the electronic stability control system.

All electrical harnesses utilized to provide the electronic stability control system shall be separate and independent of all other coach wiring. Under no circumstances shall the electronic stability control wiring harnesses, with the exception of twelve (12) volt power and ground wires, the serial interface wiring, and the ESC warning light circuit, be combined with or retained in existing harness looms, tape or trunks. 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 ECU condition lamp shall be provided which shall be controlled by the ECU via the I/O controls multiplex modules and shall serve as a means of providing the operator with the operating condition of the electronic stability control system. All electrical connections on the electronic stability control system shall be molded connectors at the exposed ends, or approved equal.

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 J1939/2284. The coded language used shall conform to SAE J1939/2284 and all relevant ESC parameters defined in SAE J1939/2284 and all relevant system alarms, fault codes and status codes available through the manufacturer's diagnostic tools shall be broadcast over the SAE J1939/2284 network. The Contractor shall provide Trapeze system AVM (automatic vehicle monitoring) certification that all codes available to the manufacturer's diagnostic tools have been defined to the Trapeze system AVM data dictionary and are being broadcast over the SAE J1939/2284 network.

### 3.5.1.6 AIR SYSTEM

The coach air system shall operate all accessories and the braking system with reserve capacity.

The engine drive air compressor shall be sized to charge the air system brake reservoir from 0 psi. to the governor cutoff pressure (125 psi.±2) in less than three (3) minutes while not exceeding the engines rated speed. The air compressor shall be set to cut in at 105 psi. Current air pressure in the brake reservoir shall be electronically monitored to a resolution of +/- 3 psi and have the capability of being reported to the Intelligent Vehicle Network (IVN).

Regardless of the system's 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.

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. 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.

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

D-1248, Type 1, Class C Grade E5 for polyethylene tubing if not subject to temperatures over 200<sup>0</sup> F. Accessory and other noncritical lines may use Type 3A tubing. Nylon tubing shall be installed in accordance with the following color coding standards:

Green	Indicates primary brakes and supply
Red	Indicates secondary brakes
Brown	Indicates parking brake
Yellow	Indicates compressor governor signal
Black	Indicates accessories
Blue	Indicates suspension

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.

The compressor air intake line shall have a diameter large enough in diameter and be short enough to prevent restricting air flow to the compressor inlet. 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, 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 ft. intervals or less. Air lines 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 fifteen (15) minutes from the point of governor cut-off.

All reservoir supply and delivery air lines shall be sloped toward reservoirs and routed to prevent water traps. Grommets shall protect the air lines 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 Schrader standard bore valve. The engine compartment Schrader 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 and any automatic moisture ejector valves shall be protected from road hazards by major structural members. The air system shall be protected by a pressure relief valves set at 200 psi at air dryer, and 250 psi at compressor, and shall be equipped with check valves and pressure protection valves to assure partial operation in case of line failures.

The main air line check valve located between the air compressor and the first reservoir shall be accessible for maintenance. Means shall be provided to establish the check valve to be in working order.

A model Bendix AD-IP or AD-IS air dryer shall be provided and installed according to component manufacturer's recommendations. A Bendix Puraguard filter, shall be provided. The Puraguard filter shall be installed between the air dryer and the wet tank. Separator shall be within 4 ft. of the air dryer. Inlet air temperature is not to exceed 150 degrees F from the compressor. The condition and performance of the air dryer heater shall be electronically monitored and reported to the IVN.

### **3.6 GENERAL CHASSIS**

#### **3.6.1 WHEELS AND TIRES**

**3.6.1.1**

**WHEELS**

Wheels shall be powder coated painted steel, hub piloted, Alcoa forged disk, Durabrite finish, or approved equal, with ten (10) hand holes. 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. Wheels shall be capable of accommodating Michelin Load Range L radial tires. One (1) spare wheel shall be provided for each coach when they arrive in Connecticut.

The drive axle wheel nuts shall be a three (3) piece free spinning vibration proof wheel nut, part number NMF-2090-M-GEO, manufactured by Disc-Lock America. The wheel nuts shall meet all physical property requirements defined in ASTM A 194-2H, ISO and SAE standards. The nut shall be phosphate 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 lug-nuts shall be standard components.

Electronic monitoring and reporting of tire pressure to the Intelligent vehicle network shall be priced as an option.

**3.6.1.2**

**TIRES**

The base price of the coach shall include the cost of the tires. CTTransit's or other procuring agency's tire contractor shall supply to the Contractor; eight (8) owned tires for each bus designated to be operated by CTTransit.

During the course of this contract CTTransit may change their leased tire supplier. Should this occur, CTTransit will notify the contractor and so that any new coaches ordered would then be supplied with the newly identified owned tires.

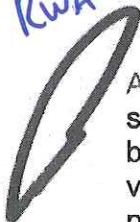
Tires shall be suitable for the conditions of commuter service and sustained operation at the maximum speed capability of the coach. Load on any tire at GVWR shall not exceed tire supplier's rating. All tires provided, both on vehicles and spares, will be branded on both sidewalls with a unique brand supplied by CTTransit.

**3.6.2**

**FUEL SYSTEM**

**3.6.2.1**

**FUEL TANK**

*RWA*  
 An aluminum ~~stainless steel, or cross-linked polyurethane~~ fuel tank shall be provided and securely mounted to the coach to prevent movement during coach maneuvers, and shall be easily removable for cleaning or replacement. The fuel tank will have a minimum total volume of one hundred eighty (180) U.S. gallons with a usable capacity of ninety-five percent (95%).

The fuel tank shall be equipped with an external, hex head, brass drain plug. The drain plug shall be at least 0.375 in. (10 mm) size and shall be located at the lowest point of the fuel tank. Access covers will be provided if needed for service. The fuel pickup location shall assure continuous full power operation on a six percent (6%) downgrade for thirty

(30) minutes starting with no more than ten (10) gallons of fuel over the unusable amount in the tank(s). The fuel pickup tube shall be perforated and mounted to the bottom face of the tank.

The fuel tank shall have a permanently affixed plaque stating manufacturer, certification, capacity and date of manufacture. The plaque shall be clean and legible after the undercoating process, and shall comply with FMCSR requirements. The plaque shall be substantially visible when the fuel fill door is opened. A non-heated Fuel Pro™ fuel filter shall also be provided. A clear cover will allow visual inspection of filter and fuel condition and fuel flow.

Fuel lines shall be securely braced and supported using "split-block" type PR stainless steel P-clamps; all mounting clamps shall be mounted to a rigid structure to minimize vibration and shall be protected against damage, corrosion or breakage due to strain, rubbing, or wear. "Floating clamps" (not mounted to a rigid structure) shall not be permitted. Fuel lines shall not be used to secure other components (wires, air lines, etc.). Manifolds connecting fuel containers shall be designed and fabricated to minimize vibration and shall be installed in protected location(s) to prevent line or manifold damage from unsecured objects or road debris. All fuel hoses shall be supported approximately every 12 in.

### **3.6.2.2 FUEL FILLER**

An Emco Wheaton Posi/Lock II, mechanically closed fuel filler system or an approved equal shall be located on the right side of the bus that provides a positively sealed connection between the refueling nozzle and the fuel neck of the fuel tank. The following components shall be Emco Wheaton; pressure relief valve, level control valve, audible whistle, dust cap and filler neck assembly with four (4) bolt poppeted adaptor. The fuel filler shall be designed to fill the fuel tank to the full point, shall automatically shut off when fueling is complete, and shall eliminate foaming and blow back. The filler cap shall be recessed into the body so that spilled fuel shall not run onto the outside surface of the bus. The filler shall accommodate a fill rate of forty (40) gallons per minute of foam-free fuel without causing the nozzle to shut off before the tank is full. An audible signal shall indicate when the tank is essentially full. The DEF filler shall be an Emco Wheaton Posi/Lock Blue system or an approved equal. The filler must be accessible and located as to prevent spills on other bus components.

### **3.6.2.3 FUEL MANAGEMENT**

All buses shall be equipped with a Fleetwatch JX55 fuel management system, or current model, or an approved equal, which will be located behind the driver's area on the roadside interior wall. Installation and location must be approved by CTTransit.

### **3.6.3 BUMPER SYSTEM**

#### **3.6.3.1 LOCATION**



Bumpers shall provide impact protection for the front and rear of the coach up to 26 in. above the ground. The bumpers shall wrap around the coach to the extent practicable without exceeding allowable coach width.

### **3.6.3.2 FRONT AND REAR BUMPER**

Front bumper shall be provided and shall consist of energy absorbing modules that are self-restoring, integral black urethane or a single piece urethane front bumper with a minimum 1700 psi tensile strength, two hundred fifty percent (250%) elongation, and 350 psi tear strength. Bumper support structure is to be constructed of aluminum or high strength steel, and provide a single, full length structural support for the bumper assembly.

The rear bumper shall consist of energy absorbing modules or a single piece urethane bumper assembly shall be shaped to wrap around the coach to protect the engine compartment doors. If the construction of rear bumper utilizes energy absorbing modules; the design shall provide for disassembly and service of the modules and structural components independently of one another.

### **3.6.4 ELECTRICAL SYSTEM**

#### **3.6.4.1 GENERAL REQUIREMENTS**

The basic coach electrical control and wiring system shall be I/O Controls G-4 DINEX Multiplex System or approved equal. Versatility and future expansion of the system shall be provided for by expandable system architecture. Gateway devices used to interface the vehicle level control system shall utilize the above recommended industrial standard with the communication protocol being either full or half duplex. The distributed multiplexing shall consist of a master module with satellite modules located throughout the bus with the intent to minimize primary wiring and to minimize vehicle weight. 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 and RFI.

The multiplex power source shall be isolated to avoid any ground noise. A built in self-test (BIST) system shall be provided utilizing the left and right turn signal tell tales to flash diagnostic codes when activated. The BIST shall check for module communication failures or output feedback problems within the system, and display module faults on the right turn signal tell-tale or module output faults on the left turn signal tell-tale. The BIST is activated with the engine override switch and will self-terminate after it has completed one cycle.

The components of the multiplex system shall be of modular design thereby providing for ease of replacement by field maintenance personnel. Furthermore, each module shall utilize LEDs to indicate circuit integrity and assist in rapid circuit diagnostics and verification of the load and wiring integrity. Each circuit shall be capable of providing a current load of up to ten (10) amperes of continuous load or twenty (20) amperes intermittent. The internal controls device shall be a solid state device, providing an extended life service cycle. Protection to each individual circuit shall be provided be either non-self-resetting circuit breakers or fuses. Programmable time delay functions and

A touchscreen LCD multifunction display (MFD) shall be included to provide operator information (Operator Mode) and as a diagnostic interface for maintenance personnel (Maintenance Mode). All menus shall be available through icons on the LCD touchscreen. A menu system that requires switches for navigation shall not be provided. At a minimum, Operator Mode shall include an image from the backup camera, gauges and a pre-trip function. At a minimum the pre-trip function shall test all interior and exterior lights and the horn. Maintenance mode shall include at a minimum displays for multiplex system module health status, input/output status for each multiplex I/O module, ladder logic status in real time (RTM). The RTM display shall show green as active inputs and red as active outputs. Non-active inputs / outputs shall be displayed as grey.

The electrical system shall provide and distribute power to ensure satisfactory performance of all electrical components. The system shall supply a nominal twenty-four (24) volts of direct current. Precautions shall be taken to minimize hazards to service personnel. The power generating system shall 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. The alternator(s) shall be sized to provide the electrical load plus ten percent (10%) reserve. All circuits shall be protected by circuit breakers or fuses. Fuses shall be used only where it can be demonstrated that circuit breakers are not practicable, and they shall be easily accessible for replacement. Redundant grounds shall be used for all electrical equipment except where it can be demonstrated that redundant grounds are not practical. One (1) ground may be the bus body and framing and shall be attached to ground studs. Grounds shall not be carried through hinges, bolted joints (except those specifically designed as electrical connectors), or powerplant mountings. Wiring and electrical equipment necessarily located under the coach shall be insulated from water, heat, corrosion, and mechanical damage.

The electrical system shall include the ability to, in response to a discrete input from the ITS intelligent vehicle network processor, maintain electrical power to the destination sign controller (ODK) and ITS processor for a customer-configurable time interval (nominally fifteen (15) minutes) after the run switch is turned off.

A Data Link function shall be provided which enables the master module to report the system's operating condition to an external source. The controller data link configuration shall conform to SAE standard J1939/2284, the coded language used shall conform to SAE J1939/2284, and all relevant electrical parameters defined in SAE J1939/2284 and all relevant electrical system alarms, fault codes and status codes available through the manufacturer's diagnostic tools shall be broadcast over the SAE J1939/2284 network. The Contractor shall provide Trapeze system AVM (automatic vehicle monitoring) certification that all codes available to the manufacturer's diagnostic tools have been defined to the Trapeze system AVM data dictionary and are being broadcast over the SAE J1939/2284 network. Two (2) connections in the controller shall be provided.

### **3.6.4.2 MODULAR DESIGN**

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 shall be removable and replaceable in less than thirty (30) minutes by a single mechanic. Powerplant 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.

### **3.6.4.3 JUNCTION BOXES**

All relays, controller, flashers, 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. If a rear junction box is required, it shall be located away from the surge tank or properly protected from coolant overflows. The components and circuits in each box shall be identified and their locations recorded on a schematic drawing permanently glued to or printed on the inside of the box cover or door. The drawing shall be protected from oil, grease, fuel, and abrasion. A rear start and run control box shall be mounted in an accessible location in the engine compartment. No electrical controls or junction boxes shall be located where spillover from the coolant surge tank or urea tank can wash over the electrical controls or enter junction boxes.

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.

### **3.6.4.4 WIRING AND TERMINALS**

All wiring between major electrical components and terminations, except battery wiring harnesses inside sealed electrical boxes shall have double electrical insulation, shall be weatherproof and shall meet specification requirements of SAE Recommended Practice J555 and J1128 Type SXL or GXL. TXL wiring is permitted when provided by the engine and transmission manufacturers. All wiring harnesses manufactured for buses purchased under this contract shall be designed/manufactured specifically 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 or SGR and SAE Recommended Practice J541. All wiring shall be properly grouped, numbered, and color-coded full length. Numbering shall be stamped at least every 3 in. Installation shall permit ease of replacement. All wiring harnesses, except for the parcel rack, front ceiling or other areas which are not accessible over 5 ft. long and containing at least two (2) wires shall include at least two or 10 percent (2% or 10%) excess wires whichever is greater for spares that are the same size as the largest wire in the harness excluding the battery cables. In addition, twelve (12) spare wires distributed proportionally between the lightest and heaviest gauge used (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. Double 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 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. Battery cables and alternator/generator output cables shall utilize AMP terminal ends or approved equal. 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.

**3.6.5 ELECTRICAL COMPONENTS**

**3.6.5.1 GENERAL REQUIREMENTS**

All electrical components, including switches, relays, flashers, 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.

Main Evaporator	Brushless
Condenser Motors	Brushless
Driver's Heater and Defroster	Permanent Magnet
ProHeat	Permanent Magnet
Coolant Recovery Pump Motor	Permanent Magnet
Windshield Wiper Motor	Permanent Magnet
Windshield Washer Motor	Permanent Magnet or air
Parcel Rack Evaporator Motors	Brushless


A dedicated and isolated circuit shall be incorporated that provides a filtered, conditioned power supply to CTTransit specified and future electronic systems. This shall be accomplished by utilizing a DC/DC converter manufactured by Wilmore Electronics Company, Model #1645-24-12-30 or approved equal. This DC/DC converter shall be connected across the bus 24 volt power source and shall provide a conditioned, regulated 13.6 volts DC. This DC/DC converter shall provide a minimum of 30 amps DC. If all combined electronic loads consume more than seventy-five percent (75%) of the maximum current capabilities of the converter, then a second DC/DC converter shall be utilized and the electronic loads shall be split such that one DC/DC converter shall be the

power source for the radio system, while the other DC/DC converter shall be the power source for the other electronic systems (fare collection and electronic signs). This conditioned, regulated power source shall be labeled Electronic Systems Conditioned Power Source. If two (2) converters are used, the output of one (1) converter shall be labeled ESCPS1 and the output of the other power converter shall be labeled ESCPS2.

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.

### 3.6.5.2 BATTERIES

The system shall supply a nominal 12V and/or 24V of direct current (DC). Batteries, except those used for auxiliary power, shall be easily accessible for inspection and serviceable only from outside the coach and shall be securely mounted on a sliding tray. The battery tray shall accommodate absorbed glass mat (AGM) Group 31 battery system and shall properly support the batteries during service, filling with automatic equipment, inspection, and replacement. A positive lock shall retain the battery tray in the normal position. Batteries shall be of premium construction and shall be fitted with threaded stud terminals. Each battery shall be AGM Group 31 with 1350 cold cranking amp (CCA) capacity with 450 CCA reserve minimum at 0° F conforming to SAE Standard J537-Type 20T8. No less than four (4) low-voltage batteries (24V) Group 31 Series deep-cycling sealed non spillage maintenance-free (AGM) batteries Odyssey or approved equal shall be provided. The batteries shall be designed and installed to withstand the operating environment. Batteries shall be tested not more than three (3) days prior to bus shipment. Battery manufacturing dates must be not more than three (3) months prior to bus shipment dates, and shall be fully maintained prior to shipment to the Buyer.

*RWA*  
 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. The battery terminal ends and the terminal end of the cables shall be color-coded with red for the primary positive, black for negative, and another color for any intermediate voltage cables. Battery cables shall be flexible and sufficiently long to reach the batteries with 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 or SGX and SAE Recommended Practice J541. All electrical and battery compartments shall have wiring diagram and identification on panel door.

Ultra capacitors (super capacitors) shall be used in conjunction with the AGM batteries to provide effective power storage and to ensure successful engine starting. Ultra capacitor technology is to be used for cranking applications and then employing AGM battery technology to manage auxiliary loads. Ultra capacitors shall deliver their storage electrical energy at a high crank rate in a variety of extreme temperatures to provide reliable and consistent starting. The ultra capacitors shall be rated at a minimum of 120 kJ for cold

Connecticut Department of Transportation 45' Heavy Duty High Floor Suburban Commuter Bus Consortium Procurement climates and 75 kJ for warmer climates. The batteries and ultra capacitors shall be designed and installed to withstand the operating environment.

A KBI EC501.2 KAPower Module super capacitor rated at 24 kw and 300 F or equal unit shall be installed in parallel with the batteries as an aid to engine start. The module shall be actuated upon engine start via the Multiplex system and through a solenoid. The solenoid shall be engaged for a period of one (1) minute. Electrical cables shall be 4/0 and shall not exceed 10 ft. in length. The module shall be enclosed within a stainless steel box, and the solenoid shall not be exposed to environmental hazards. A decal shall be installed on the outside of the box to indicate danger of high amp equipment.

A jump-start connector shall be provided in the engine compartment equipped with dust cap and adequately protected from moisture, dirt and debris and shall be compatible with an Anderson Power SB 350 24V Red 913 connector or approved equal.

### **3.6.5.3 BATTERY EQUALIZER**

A Vanner, model number 80-Series battery equalizer with CAN plus current, voltage and temperature sensor mounted at the house batteries shall be installed on the vehicle. The equalizer shall utilize a battery management program and be installed in accordance with the manufacturer's instructions. It shall communicate with Trapeze through J-1939 protocol.

### **3.6.5.4 MASTER BATTERY SWITCHES**

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 "knife" type switch. Rotary style switches are not acceptable. 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 powerplant operating shall not damage any component of the electrical system. A second and independent master switch shall disconnect all electronic circuits from the bus electrical system.

### **3.6.5.5 FIRE DETECTORS**

The fire suppression system shall provide fire detection capabilities to comply with this section. The sensors shall detect over temperature in the critical areas and shall activate the fire alarm bell and warning light in the driver's compartment and the fire suppression system. The sensors, once deployed, must be manually deactivated.

### **3.6.5.6 RADIO NOISE SUPPRESSION**

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 J1113 and FCC standards.

### 3.7 INTERIOR CLIMATE CONTROL

#### 3.7.1 CAPACITY AND PERFORMANCE

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 safety guard to prevent contact between mechanics and rotating fan blades. The appropriate safety warning labels shall be permanently affixed at this location. Both roof top and underfloor HVAC systems are acceptable provided that the performance requirements of this specification are met.

The system shall be tested to verify that the HVAC system performs as follows:

The air conditioning portion of the HVAC system shall be capable of reducing the passenger compartment temperature from 110 °F to 70°F +/-3 °F in less than thirty (30) minutes after system engagement. 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 at ¾ max governed speed that may be activated by a driver-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 in. from the surface of the coil, shall be less than 45 °F above the condenser inlet air temperature. No simulated solar load shall be used. There shall be no passengers on board, and the doors and windows shall be closed.

The pull-up requirements for the heating system shall be in accordance with Section 9 of APTA's "Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning." With ambient temperature at -10 F, and vehicle cold soaked at that temperature, the bus heating system shall warm the interior passenger compartment to an average temperature of 70 F ±2 F within seventy (70) minutes.

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 conditions found in the continental United States. The heating, ventilating, and cooling systems shall maintain an average passenger compartment temperature between 60 F and 80 F with a relative humidity of fifty percent (50%) or less. The system shall maintain these conditions in ambient temperatures of 10 F to 100 F, with ambient humidity of five to 100 percent (5% to 100%) while the coach is running. In ambient temperatures of 95 F to 115°F with relative humidity's greater than fifty percent (50%), the system shall maintain a temperature gradient of 20°F while the coach is running. In ambient temperatures of 10 F to -10 F, the average interior temperature shall not fall below 55 F when the coach is running with no passengers.

The compressor shall be belt driven through an electric clutch. The air conditioning compressor clutch shall be hub mounted not crankshaft mounted and the clutch bearing shall be able to be lubricated without the need for disassembly. Compressor drive belts shall be manufactured from Kevlar material to provide longer service life. A manually adjustable belt tensioning device shall be provided to maintain proper belt tension at all times.

The main air conditioning system capacity shall be at least 90,000 BTUs/HR with R134a. Driver's A/C capacity shall be at least 10,800 BTUs/HR.

The condenser fan motors shall be brushless ECDC type with totally enclosed grease lubricated bearings. Motor shall be 24 volt and operate only when the A/C is on for maximum efficiency.

The evaporator shall be mounted in the same compartment as the heater core for "Reheat Cycle" and humidity. The system shall be capable of introducing no less than fifteen percent (15%) fresh air into the bus without the need to open the door or windows.

A separate control shall be provided for the front dash heating and air conditioning. A Carrier Micrometeor, Thermo King Inteligeaire, or equal control panel is required for the system. Control shall be within easy reach of the operator. System shall allow the driver to set a specific interior coach temperature between the range of 60 F and 80 F. 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.

An internal ventilation system with individualized air outlets shall be provided and connected directly to the main A/C system, to provide conditioned air at each two (2) passenger seat. Individual air outlets shall be mounted in the console at the underside of parcel racks. Outlets shall be passenger controlled by twisting on or off, and by directing the air flow. Air shall enter the power ventilation system through inlet vents.

Heat shall be applied to the front step tread to prevent accumulation of snow, ice, or slush. Stepwell heat shall be supplied and controlled by the driver's heater and defroster system. The manufacturer shall provide and install two Schraeder or MADDEN valves with caps near the air conditioning compressor.

All electric motors which are part of the climate control system shall be brushless ECDC motors. Motors shall have double sealed pre-lubricated anti-friction, replaceable ball bearings with moisture resistant grease.

A Data Link function shall be provided which enables the HVAC Controller to report the system's operating condition to an external source. The controller data link configuration shall conform to SAE standard J1939/2284, the coded language used shall conform to SAE J1939/2284, and all relevant HVAC parameters defined in SAE J1939/2284 and all relevant HVAC system alarms, fault codes and status codes available through the manufacturer's diagnostic tools shall be broadcast over the SAE J1939/2284 network. The



Contractor shall provide Trapeze system AVM (automatic vehicle monitoring) certification that all codes available to the manufacturer's diagnostic tools have been defined to the Trapeze system AVM data dictionary and are being broadcast over the SAE J1939/2284 network. Two (2) connections in the controller shall be provided.

### **3.7.2 CONTROLS**

The heating, cooling, ventilating and off operational modes of the interior climate control system shall be controlled by switches or display conveniently located to the driver. In the heating and cooling modes, the system shall be governed by a control that regulates the amount of cooling and heating capacity available to the passenger area. The temperature will be adjustable by the operator between 68 degrees F and 72 degrees F. After being set all interior climate control requirements will be handled automatically unless changed by the operator or mechanic. The temperature sensors used shall be suitable for transit service and accurate to +/- 1°F.

### **3.7.3 AIR FLOW**

#### **3.7.3.1 PASSENGER AREA**

The cooling mode of the interior climate control system shall introduce air into the coach at a minimum rate of 25 cubic ft. per minute per passenger based on the standard configuration coach with full standee load. This air shall be composed of no less than fifteen percent (15%) outside air. Airflow shall be evenly distributed throughout the coach with air velocity not exceeding 60 ft. per minute on any passenger.

Airflow may be reduced to 15 cubic ft. 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 fifteen percent (15%) outside air. In the heating mode, the fans will activate immediately to assure an air outlet temperature of 70 degrees F. Outside airflow may be cut off during initial warm up/cool down, provided that manual manipulation is not required.

#### **3.7.3.2 DRIVER'S AREA**

The coach interior climate control system shall deliver at least 200 cubic ft. 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.

#### **3.7.3.3 AIR INTAKE**

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.

### 3.8 RADIOS AND PUBLIC ADDRESS

#### 3.8.1 MOBILE RADIO SYSTEM

A radio compartment, antenna, conduit, electrical and other requirements described herein shall be provided to support a mobile radio system. **The location, materials, and installation of all items installed on the bus in support of the mobile radio equipment are subject to approval by CTDOT.** Any special tools required such as, but not limited to, security screwdrivers and latch handles shall be supplied in quantities of twenty (20) per type. Part number for specialty tool(s) shall be provided.

CTDOT shall provide on loan to the Contractor, the necessary radio equipment and qualified personnel, if required, to assist in establishing the optimum configuration for the mobile radio system. The Contractor shall install all radio system components with the exception of the mobile radio, Motorola APX6500, itself. CTDOT shall list all of the components that the manufacturer shall be responsible for supplying and installing. This shall include description, manufacturer and part number. Listed below are the description, manufacturer and part numbers for the radio system components:

Radio Power Cable	Motorola	P/N HKN4192C
Radio Speaker	Motorola	P/N HSN4040A
Radio Antenna	Motorola	RAF4227A

#### 3.8.2 RADIO COMPARTMENT and COMPARTMENT COMPONENTS

The bus shall have a compartment to provide a weatherproof, secure location for radio equipment. The compartment shall be located within the roadside #2 parcel rack, subject to the approval of CTDOT. The inside compartment dimensions shall be 24 in. wide by 12 in. high by 20 in. deep or as required to adequately house the Motorola radio communication equipment, Trapeze Intelligent Transportation Systems (ITS) vehicle logistics unit, mobile access router, and video recorder systems. The Contractor shall supply and install any special brackets, trays, reinforcements and any other hardware necessary to install aforementioned equipment in the buses. The compartment shall be fabricated in a durable fashion. The compartment shall be attached to the bus in such a manner as to provide a low resistance electrical ground connection from the metal compartment walls to the chassis and engine block of the bus. The compartment shall be equipped with a switchable service light which shall provide illumination for routine service and maintenance of all components within this compartment. This compartment shall have a sliding tray, which shall have a flat removable mounting plate measuring seventeen in. by 17 in. and shall be constructed of ¼ in. aluminum, containing the radio system components. The sliding tray shall retain the mounting plate by incorporating an overlapping lip design located at the rear of the mounting tray. This lip shall lock the rear

of the mounting plate to the sliding tray. The mounting plate shall be locked into place at the front of the sliding tray through the use of two (2) weldnuts mounted in the sliding tray. CTDOT shall provide the bolt-hole pattern for the removable mounting plate to the Contractor. The sliding tray and the mounting plate shall be heavy duty enough to withstand the rigors of mass transit use during the course of radio PM and required troubleshooting procedures.

### **3.8.3 RADIO UNIT**

The radio unit, Motorola APX6500, will be supplied and installed by CTDOT at a later date. CTDOT's radio unit will be controlled by the Trapeze Mobile Data Terminal (MDT) and Intelligent Transportation System (ITS). The Contractor shall supply and install all the components, radio antenna, bracketry, system cables and reinforcements necessary to facilitate installation of the radio unit. These brackets shall be approved by CTDOT.

### **3.8.4 RADIO SYSTEM ANTENNAS AND COAXIAL CABLES**

Each bus shall be provided with one low profile antenna, Motorola model RAF4227A, with a 150 watt power rating, VSWR less than 1.5:1 @ nominal impedance of 50 ohms, with a 1 ft. radio pigtail of RG-303 with a female SMA type antenna cable termination for radio system use, P/N ACN-2678. A low loss, Teflon dielectric, type RG-CA coaxial cable shall be attached to radio pigtail of this antenna using a factory installed male SMA type connector, P/N RG-20S1. The antenna shall be installed in a location where the roof of the bus is a flat metal plane for at least 24 in. in all directions, and so that the coaxial cable run to the radio compartment shall be the shortest, most practical direct route. If no metal areas exist on the roof of the bus, then a steel metal plate measuring 24 in. in length by 24 in. wide shall be installed and centered directly below the installed antenna location in such a manner as to provide a low resistance electrical connection to the antenna. An access plate below the antenna shall be provided in the ceiling. The antenna installation shall be waterproof and replaceable. Both radio and GPS coaxial cables shall be routed into the radio compartment.

The Contractor shall provide the following: one (1) straight mini-uhf male connector PN: ACN-2612. This component shall be stored and protected in a plastic bag and located inside the radio compartment. The coaxial cables shall be run in a metallic or non-metallic conduit which has been installed between the exterior and interior walls so as not to be visible to passengers or on the outside of the bus. The conduit shall have a minimal bend radius to provide ease of coaxial cable replacement. The coaxial cables shall be the only cable run in this conduit. Under no circumstances shall the coaxial cables be kinked or otherwise installed in a manner that degrades their electrical performance. CTDOT shall test the coaxial cables and if defective cables are found, the Contractor shall replace the defective cable(s) at its expense.

### **3.8.5 D.C. POWER AND WIRING**

The approximate current required by the radio equipment shall be a constant 3 amperes, with intermittent peak requirements of up to 12 amperes. These intermittent current

requirements may last up to one (1) minute in duration. The bus electrical system shall be capable of supporting this electrical load.

Regulated 13.8 volts DC, provided by the output of the dedicated electronic systems power supply (as described in section 3.6.5), shall be provided inside the radio compartment and shall be terminated at the terminal block described in Section 3.8.2. The wire shall be stranded type #8 AWG. The positive lead shall be color-coded red, and the negative lead shall be color coded black. The DC power cables shall be routed to the radio compartment through a metallic conduit in all areas. The metallic conduit shall be attached to the compartment in such a manner as to provide a low resistance electrical connection to the compartment walls. The minimum bend radius of the conduit shall be adequate for ease in pulling of the DC power cable wires. These DC power cables shall be the only cables run in this conduit.

The Contractor shall incorporate a relay, which is controlled by the engine master switch located in the operator's area. This relay, in dual 12/24 charging systems is to be operated by 24 volts to provide 12 volts to the radio. The relay shall have a single pole double throw contact arrangement. The contact current rating shall be 10 amperes and be rated to provide a minimum of 100,000 operations without failure. The relay shall be located in the front electrical compartment and shall be installed in a manner that permits easy replacement by a service technician.

### **3.8.6 MOBILE RADIO SYSTEM PERIPHERAL DEVICES**

#### **3.8.6.1 EMERGENCY ALARM**

A switch (Trapeze part number 36T0033-003) shall be provided to operate in conjunction with the destination sign to permit activation of the destination sign and mobile radio emergency modes (see Section 2.13.4.1, Destination Signs). When activated, the "Emergency Call Police" sign posting shall be displayed on the front and side destination signs as well as provide a signal to the mobile radio system, and Intelligent Transportation System. The switch shall be a heavy-duty momentary double pole double throw snap action type switch. This switch shall be silent in operation with contacts sealed against dirt and moisture. This switch shall be rated at a minimum of 1 ampere of current at 12 volts and be capable of a minimum of 500,000 activations without failure or a measurable increase in electrical resistance. This switch shall be mounted in a protective metal enclosure made of stainless steel and mounted on the steering column or on the driver's left hand console directly across from the driver's seat and shall be a guarded toggle to enable the bus operator to actuate the switch with his/her left hand. The destination sign mentioned in Section 2.13.4.1 shall be wired utilizing one set of the double pole double throw contacts on this switch. A pair of #20 AWG stranded, black insulated wires shall be connected to a normally closed circuit on the switch and routed to the radio compartment for connection to the radio unit PEI connector for redundancy of the emergency alarm signal. There shall be sufficient wire length to facilitate an easy connection to the radio unit. These wires shall be shielded to prevent external interference.

#### **3.8.6.2 HANDSET/CRADLE ASSEMBLY**

An AudioSears Handset/Cradle assembly (Trapeze part number 36T0003-103) shall be provided and installed to the left of the bus operator's position. The handset/cradle assembly shall be connected to the Trapeze vehicle logistics control unit. **CTDOT shall select and approve the handset cable length and location for mounting the handset/cradle assembly during the pre-production meeting.** The Contractor shall supply and install all the components, bracketry, system cables, and reinforcements necessary to facilitate installation of this equipment.

### 3.8.7 DIAGRAMS

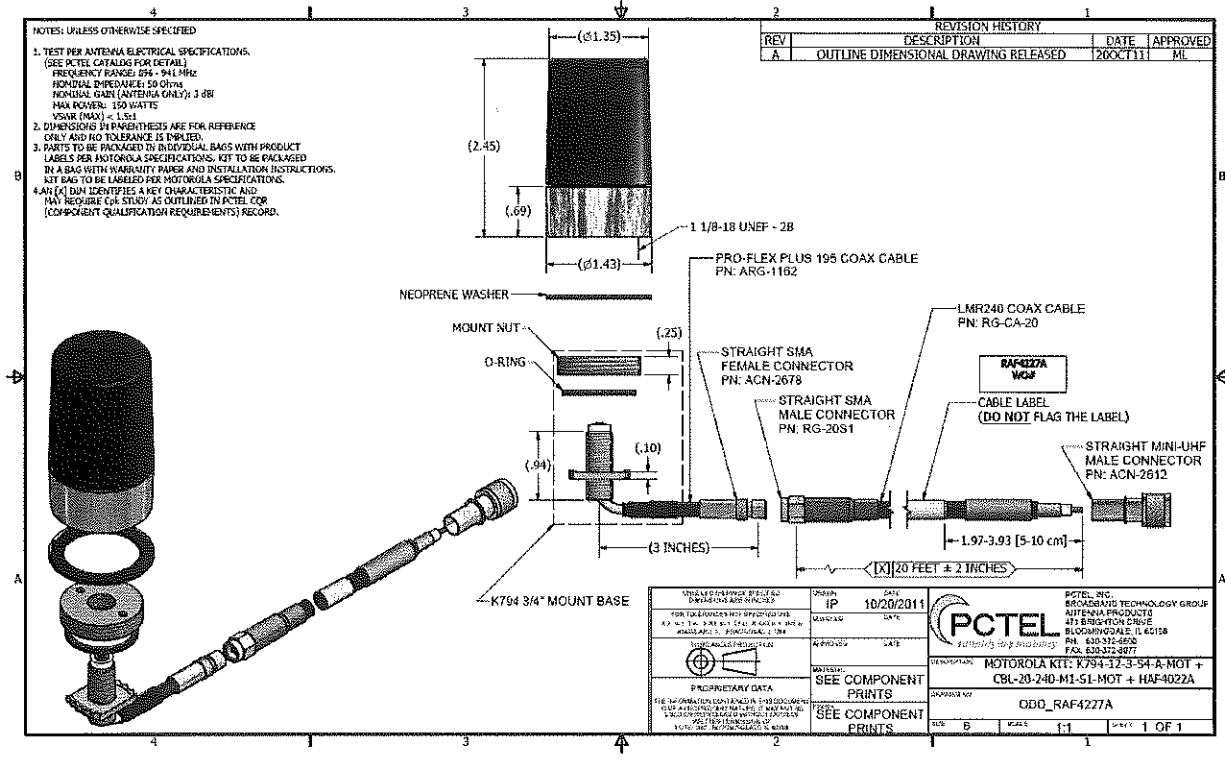
An attachment to the maintenance manual shall be provided for use by CTDOT radio technicians. The section shall cover and include bus radio installation schematics. It shall contain several schematics depicting all the provisions contained herein. Included shall be schematics for the following:

1. Top view of the bus shall be provided showing antenna locations and conduit runs.
2. Side view(s) shall be provided showing the location of the radio compartment and conduit runs.
3. Diagrams shall be provided for the operator's area showing the location and routing of speaker, the silent alarm double pole/action switch, and the location and routing of the MDT screen.

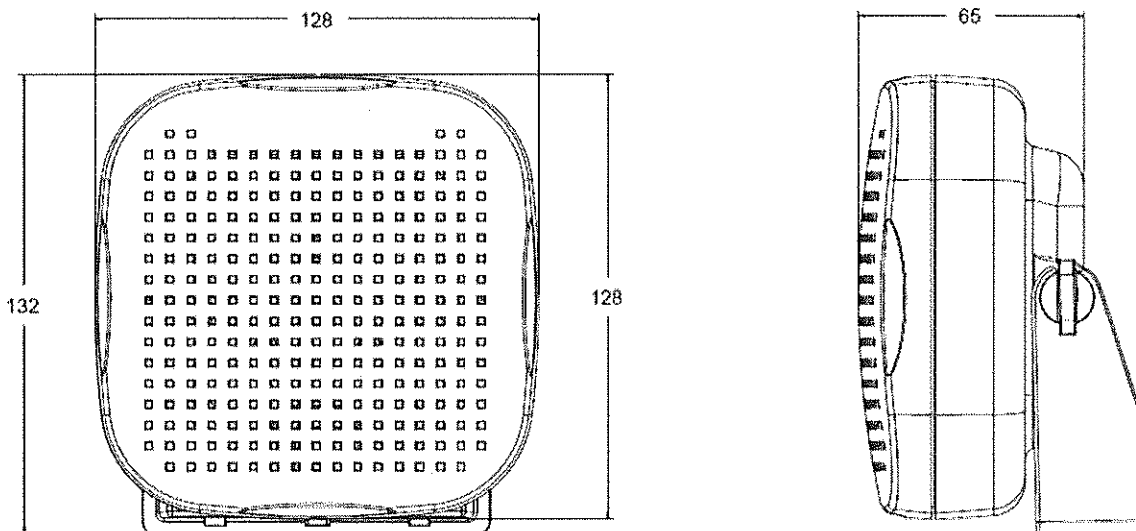
One or more schematics shall be provided clearly indicating wire sizes, terminal numbers, purposes and routing.

### 3.8.8 RADIO SYSTEM INSTALLATION SCHEMATIC

Installation of all mobile radio system components shall be as per the manufacturer's installation, specification and wiring diagrams. **Installation of radio system components shall be approved by CTDOT personnel before placement of any components on the prototype bus.**



HSN4040 Speaker Assembly Dimensions



APX6500 Radio Dimensions (Please note that the drawings show APX7500, but footprint is the same)

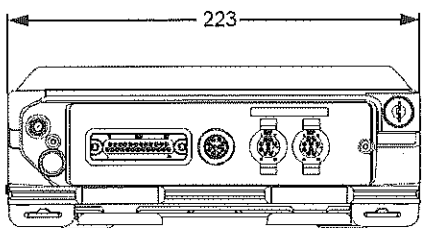


Figure 1-5. Front View of APX 7500 High Power (100W) Transceiver and Trunnion

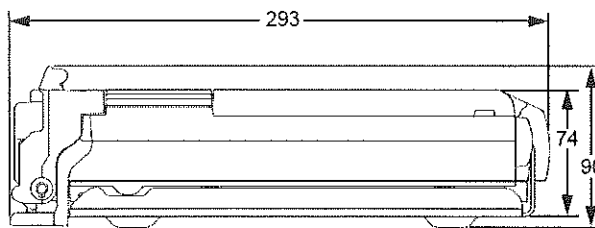


Figure 1-6. Side View of APX 7500 High Power (100W) Transceiver and Trunnion

### 3.9 WIRELESS LOCAL AREA NETWORK (WLAN) for Passenger Wi-Fi Usage

The Contractor shall provide and install a wireless local area network (WLAN) and related equipment and power supply to provide on-board mobile Wi-Fi hotspot service for passenger usage on each bus.

The WLAN system router and modem shall be rugged and designed for over-the-road heavy-duty vehicle usage and shall be fully compatible with AT&T, Verizon, T-Mobile and Sprint wireless mobile carrier provider service.

#### 3.9.1. REMOTE MANAGEMENT SOFTWARE

##### 3.9.1.1 GENERAL REQUIREMENTS

Each bus shall be provided with all required hardware and software to provide reliable WLAN coverage for all seated and standing passengers. This shall be done with the proper use and location of WLAN antenna(s) and cellular antenna(s). The WLAN system shall include management software which shall allow remote configuration and system monitoring for every vehicle equipped with WLAN hardware. The software shall display a Device List with the following indicated: Device name, device uptime, device last contact, number of WLAN users, WAN(s) in use, WAN signal strength (in dBm), WAN mode(s), Firmware version, device details link, device name edit function, link to device map, link to remotely configure device. The management software shall also display the following parameters:

- WAN traffic feature to be notified of WANs exceeding usage limits.
- Usage summary reporting to include either all units on account or individual units AND selectable time periods of last seven (7) days, this month, last month, total and custom period.
- User trends feature to indicate session length trends and user loyalty trends (to include either all units on account or individual units AND selectable time periods of last seven (7) days, this month, last month, total and custom period).
- Session details feature to include device name, session time, length of session, total data downloaded/uploaded and device MAC address (to include either all units on account or individual units AND selectable time periods of last seven (7) days,

this month, last month, total and custom period.) Must be able to export as .csv file type.

- Survey trends feature to graph survey responses (to include either all units on account or individual units AND selectable time periods of last seven (7) days, this month, last month, total and custom period).
- Survey details reporting feature to list all completed surveys; noting the date, time, MAC address and answers to all user survey items. Survey details can be pulled from these selectable time periods of last seven (7) days, this month, last month, total and custom period and shall be able to export as .csv file type.

### **3.9.1.2 USER SESSION MANAGEMENT**

CTDOT shall have the ability to monitor and configure user sessions with the following parameters:

- Set total data allowance (download and upload).
- Total time allowance (in minutes) with variables of: 15, 30, 60, 90, 120, 180, 240, 360, 480, 720, custom.
- Allowance reset option with variables of: six (6) hours, twelve (12) hours, one (1) day, one (1) week with a start hour of (set by agency).
- Configurable bandwidth limits by account with variables (in kbits/s) for both download and upload (no limit, 64, 128, 256, 512, 1024, 2048 and custom).
- Session timeout feature with the following variables (in minutes): No timeout, 15, 30, 60, 90, 120, 180, 240 and custom.
- Idle timeout feature with the following variables (in minutes): No timeout, 5, 10, 15, 20, 30, 45, 60, 90, 120 and custom.

### **3.9.1.3 CONTENT CONTROL AND FILTERING**

In order for CTDOT to screen and limit access to certain sites, features and services, the system shall comply with the following:

- Site blocking
  - Block by checking box of the following preset categories: adware, file hosting, P2P/file sharing, pornography, software updates, streaming media.
  - Ability to blacklist and whitelist individual domains.
- User blocking
  - Pull reports for individual vehicles or entire account with a table that shows the top twenty (20) users over the last seven (7) days for the specified category (either total download, total time online, number of sessions).
  - Feature includes the ability to view user sessions and block the user's MAC address.

### **3.9.1.4 CUSTOMER SURVEYS**

Occasionally CTDOT will conduct customer surveys in regards to WLAN quality and customer satisfaction. The surveys shall be conducted electronically via the customer's device. The surveys shall offer the ability to create, preview, manage, clone and deactivate



user surveys. The customer shall only see the survey campaign on their first visit. If subsequent surveys are needed for the same passenger, a new campaign shall be able to be created.

### **3.9.1.5 ADVERTISING CAMPAIGNS**

The system shall also have the ability to run an advertising campaign. The solution shall offer a way to create, preview, manage, start/stop and delete campaigns and display multiple banners within the ad campaign feature. Customers that click on an ad must be able to be redirected to a URL selected by CTDOT. The ad campaign feature shall show how many times customers selected a specific ad. The general ad requirements are as follows:

- The ad image specified here shall be overlaid on a Wi-Fi user's web page.
- The ad image will never be shown larger than the image dimensions, but it can be scaled down to fit the screen/window of the user's device.

### **3.9.2. WLAN HARDWARE**

#### **3.9.2.1 GENERAL REQUIREMENTS.**

The WLAN hardware shall be designed to be mounted in the parcel racks of the bus along with all other vehicle Intelligent vehicle network and radio hardware. The WLAN hardware shall be shock and vibration resistant and withstand the bus operating environment.

The Contractor shall supply and install all the components, bracketry, system cables, harnesses, adapters, antenna(s) and reinforcements necessary to facilitate installation of this equipment on each bus and shall be included in the base price of the bus.

#### **3.9.2.2 CELLULAR AND WLAN CONNECTIVITY**

The system shall be capable of functioning on GSM/EDGE, EV-DO Rev A and 3G UMTS/HSPA/HSPA+, LTE wireless frequencies and support at least two (2) cellular connections. The system shall also be able to broadcast the following WLAN frequencies and data transfer rates:

- 802.11b/g/n 2.400 ~ 2.483 GHz
- 802.11b: 1, 2, 5.5, 11Mbps
- 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps
- 802.11n: @800G(400G)
- 20MHz BW
  - 1 Nss: 65(72.2)Mbps max
  - 2 Nss: 130(144.4)Mbps max
- 40MHz BW
  - Nss: 135(150)Mbps max
  - Nss: 270(300)Mbps max

### **3.9.2.3 ELECTRICAL SPECIFICATIONS**

The system shall be capable of functioning on 10-36 VDC with no more than 28W power consumption. Provisions shall be provided for reverse polarity protection.

### **3.9.2.4 ANTENNA CONNECTORS AND INTERFACE PORTS**

The system shall have at least 1 of the following antenna connectors:

- RP-SMA for WLAN.
- RP-SMA for 3rd party WAN antenna.

In addition, the system shall have a 10/100 Ethernet RJ45 interface and a RS232 Serial interface.

### **3.9.2.5 WLAN SECURITY**

The system shall be capable of providing a secure WLAN network using WPA with AES TKIP (802.11i) and 128-bit WEP, 802.1x, RADIUS AAA4 protocols.

### **3.9.2.6 REGULATORY REQUIREMENTS**

All hardware shall be compliant with all FCC and IEEE standards that apply to in-vehicle WLAN.

## **3.10 SAFETY EQUIPMENT**

On board safety equipment per Federal Motor Carrier Safety Regulations part 393 shall be provided with each bus. The following equipment shall be mounted out of the way but shall be readily accessible. A fire extinguisher, with 5 lb. capacity, Underwriters' Laboratories rating of A, B, C or more, marked as such with charge indicator and mounted in a bracket. The fire extinguisher is to be mounted vertically in a mutually agreed upon location.

Safety triangles shall be provided and installed in a mutually agreed to location. Three bi-directional emergency reflective triangles conforming to FMVSS 125 stored in a plastic molded case.

## **4.0 SMART BUS FEATURES**

### **4.1 INTELLIGENT TRANSPORTATION SYSTEMS COMPUTER-AIDED PROVIS.**

The contractor shall supply all necessary cabling provisions and components, to make fully operational; passenger counter, computer aided dispatch & automatic vehicle location (CAD/AVL), and radio systems by Trapeze – TransitMaster on each bus. Trapeze ITS system provisions installed by the Contractor shall be fully compatible with the systems currently in use by CTDOT will be moving the following CAD/AVL equipment from retired vehicles to the new vehicles to complete the TransitMaster system once

1. IVLU (Intelligent Vehicle Logic Unit)
2. Cellular Mobile Gateway
3. MDT (Mobile Data Terminal)
4. Radio
5. APC Analyzer
6. APC Sensors

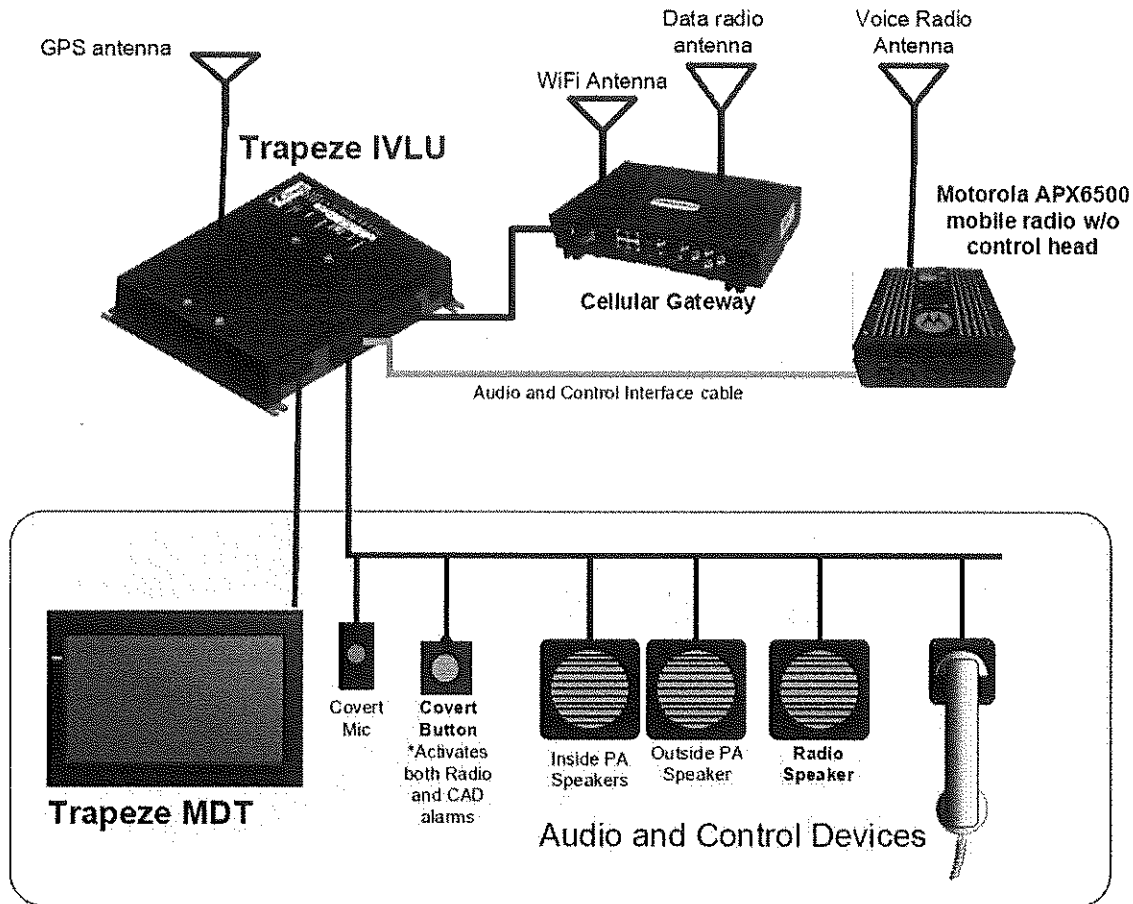
CTDOT will provide contractor one (1) set of the above TransitMaster systems components so that the complete system can be tested on each vehicle prior to delivery.

Contractor shall coordinate with CTDOT and Trapeze ITS to configure the various interfaces between CAD/AVL system and other devices/systems to ensure compatibility with the TransitMaster CAD/AVL system currently in use at CTDOT. Contractor shall coordinate with CTDOT and Trapeze ITS to determine location on bus for each component of the CAD/AVL and Radio system listed in this section.

Contractor shall clearly state all assumptions made in determining the cost of the CAD/AVL and Radio system.

The APC equipment shall include all sensors, logic, interfaces, wiring, cabling, calibration, profiling where applicable, and installation required to properly equip each bus for passenger counting at all passenger doors. Contractor shall integrate the APC equipment with the TransitMaster CAD/AVL system. Contractor shall work with the APC equipment supplier to ensure that the APC equipment is installed exactly as per the specifications and meets or exceeds the accuracy specifications from the manufacturer. Contractor shall work with CTDOT and APC equipment supplier to ensure compatibility between the APC equipment being installed and the TransitMaster Intelligent Transportation System (ITS).

Contractor shall provide all documentation and wiring diagrams for the APC, ITS and Radio system as a part of the overall maintenance manual package for the bus.



#### 4.2 IN VEHICLE DATA NETWORK

SAE-1939 data networks shall be provided for linking the transmission, engine, HVAC, electrical and anti-lock braking systems with ITS and other third party diagnostic and monitoring devices throughout the vehicle. An RS-485 serial data network shall be provided for linking a customer-installed electronic fare register with the ITS system. SAE J1708 and Ethernet data networks shall be provided for linking the IVN processor to the Destination Sign system. Serial data conveying the current state of various discrete components, including but not limited to the parking brake, the service brake, fire protection system, wheelchair lift, etc., shall also be provided.

A Trapeze system intelligent vehicle network shall be installed on each bus. The IVN wiring harnesses shall tie the various other in-vehicle data networks, discrete inputs and outputs, odometer signal and other ITS subsystems and components to the IVN processor. All sub-component systems of the coach shall maintain full functionality in the event that the Clever Device's TCH is removed or omitted from the coach.

The location, materials, and installation of all items installed on the bus in support of the vehicle data networks are subject to approval by CTDOT or the procuring agency.

### **4.3 PASSENGER COUNTING**

The Contractor shall supply and install all the components, bracketry, system cables, harnesses, adapters and reinforcements necessary to facilitate installation of passenger counting system on each bus. A discrete "doors closed"/"doors not closed" signal for the entrance/exit doorway shall be provided from the multiplexed electrical system to the Intelligent vehicle network. The location, materials, and installation of all items installed on the bus in support of passenger counting are subject to approval by CTDOT or the procuring agency.

### **4.4 MOBILE ACCESS ROUTER / CELLULAR DATA MODEM**

Brackets and cabling for a customer-supplied mobile access router or cellular data modem shall be provided for each bus.

### **4.5 ITS VEHICLE CONTROL UNIT**

An SAE J1708, SAE J1939 and RS-485 compliant vehicle control unit, Trapeze system IVN4 or approved equal, and associated Transit Control Head, equipment trays and tri-band antenna (GPS/cell/802.11) shall be provided on each bus, together with appropriate mechanical and electrical provisions at the operator's station and radio compartment. Special bracketry and housings may be required to properly mount the transit control head in a location that will not interfere with the safe operation of the bus. The vehicle control unit shall be capable of controlling radios, displaying graphics, voice annunciation, event recording, remote file upload, route and schedule adherence, SAE 1708 and RS-485 network control and communications, monitoring SAE 1939 network communications, serving as a mobile data terminal, and supporting automatic vehicle location and computer aided dispatch applications. The vehicle control unit shall additionally be capable of accepting and logging operator logon, vehicle assignment, passenger count, GPS location, time, vehicle identification, fare transaction, engine operation and equipment condition data from the SAE J1708 and J1939 vehicle data network, as well as uploading operating software, and stop and schedule reference data, and downloading event record files, vehicle location and real time alarm conditions through an IEEE 802.11 wireless LAN or mobile access router. The vehicle control unit shall also be capable of transmitting GPS position, current time, operator logon, route, run, trip, destination, next stop and vehicle identification over the SAE J1939 vehicle data network and via digital radio or cellular data modem, to a computer aided dispatch system. The vehicle control unit shall be connected to the public address system via standard analog audio and shall generate automatic ADA-compliant stop announcements for automatic stop annunciation. The vehicle control unit shall communicate with other onboard devices via the vehicle data network. All sub-component systems of the coach shall maintain full functionality in the event that the Clever Device's TCH is removed or omitted from the coach.

The vehicle control unit shall be located in the radio compartment, within the interior roadside #2 parcel rack. The vehicle control unit shall be mounted in a vertical configuration. Connections to all of the various vehicle data networks shall be provided. All sub-component systems of the coach shall maintain full functionality in the event that the Clever Device's IVN processor is removed or omitted from the coach.

The Vehicle Control Unit shall receive electrical power from the bus battery, through an uninterruptible power supply (UPS). The UPS shall have sufficient energy storage to power the vehicle control unit long enough to ensure a controlled shut down of the vehicle control unit without component damage, data loss or corruption in case of an unexpected loss of vehicle electrical power. The vehicle control unit shall be configured to initiate a controlled shut down upon an unexpected loss of vehicle electrical power (i.e. bus battery disconnect, etc.).

The vehicle control unit shall incorporate a "keep alive" function to maintain system operation for a customer-configurable time interval after the bus run switch is turned off. The vehicle control unit shall restart automatically upon engine start.

The Contractor shall supply and install all the components, antennas, bracketry, system cables and reinforcements necessary to facilitate installation of this equipment and shall be included in the base price of the bus. **The location, materials, and installation of all items installed on the bus in support of the vehicle control unit and transit control head are subject to approval by CTDOT or the procuring agency.**

#### **4.6 CAMERA SYSTEM and BACKUP CAMERA SYSTEMS**

A Mobile Digital Video Recording system (MDVR) shall be provided in each bus. The MDVR system shall be a Seon type or approved equal. The MDVR shall be capable of recording up to thirteen (13) simultaneous or sequential continuous grayscale or color camera inputs, as well as up to eight (8) opto-isolated sensor channels. The MDVR shall have the capacity for up to twenty (20) additional J1708 and J1939-compatible devices and minimum of one (1) high definition (HD) 720 pixels camera. Inputs are switched by an internal multiplexing system.

The bus digital video security recording system shall not interfere electrically with the operation of the transit bus or with its onboard electronic equipment such as the radio, farebox, engine controls, transmission or other electronic equipment. Furthermore, the unit shall be Federal Communication Commission listed and approved. The digital video recorder shall be installed in an appropriate secure location approved by the Procuring Agency, preferably on the "driver's side", so as to minimize its physical exposure and also to reduce shock and impact.

The digital video camera system shall be a high performance video monitoring system designed specifically for installation in transit buses. Features of the system shall include digital recording, rugged camera enclosures, versatile equipment enclosures, and the latest video technologies for capturing and retaining high quality images. The on-board digital video camera system shall perform mobile monitoring and surveillance of transit buses utilizing an end-to-end digital recording approach. The system shall be activated through the transit bus's master switch. When the transit bus is started, the digital recorder acquires and stores data from cameras. On a routine basis, recording may stop following a pre-programmed period or when the transit bus master switch is off and the system stands idle.

The system shall be installed according to industry standards meeting SAE recommended practices. All cables, wiring, interconnections, switches, and circuit breakers/fuses shall be heavy-duty and specifically designed for their purposes and automotive application. The selected wire sizes and insulation shall be based on the current carrying capability voltage drop, mechanical strength temperature and flexibility requirements. Video and audio wires selected shall be gauged to minimize signal loss. The system shall be GPS ready to provide geo-fencing and inertia sensor.

A protective filtering device shall be installed to protect the video system and its memories from electrical fluctuation typically found in a transit bus including, but not limited to, over voltage, under voltage, transient, power surge/dip during engine or other transit bus equipment startup, alternator noises, etc. It is important that the filtering device provides sufficient and proper protection to the video camera equipment supplied under this contract.

The buses in this procurement shall each come equipped with eight (8) operational high quality (600 line resolution) color, wide angle lens cameras installed in aesthetically pleasing enclosures. The cameras shall automatically switch from color to black & white in low light conditions. The enclosures shall be vandal resistant, secure, lockable, shock-resistant, dust resistant and weather and water-resistant and shall be made of impact-resistant non-toxic material. The cameras shall be installed as follows:

- Over Driver facing the front door
- Facing driver from over the front door
- Center of bus ceiling mount facing rear
- Facing out the windshield (driver eye view) High Def.
- Facing down the aisle from the front windshield to the back of the bus
- On outside center rear of bus facing back
- On the outside curb side of the bus behind the rear door facing back to front
- On the outside driver side of the bus in the upper rear corner facing back to front
- Final camera design and layout will be approved at preproduction

Digital video recorders, multiplexers, power converters/inverters and all other required electronic equipment shall be enclosed within a low-profile enclosure. The equipment enclosure shall be mounted so that it does not obstruct customer traffic flow, interfere with the transit bus operator, or create a safety hazard. The equipment enclosure shall be made of impact-resistant non-toxic material, designed to withstand blows, impacts, shock and vibration. The enclosure shall be fully enclosed, lockable, vandal-resistant, dust-resistant, and water-resistant, and designed to allow for temperature compensation through the use of cooling fans or other means. All locks, enclosures and cabinets utilized throughout the video system shall be keyed alike.

The design of enclosure shall allow for the quick and easy installation and removal of electronic equipment from within the enclosure, and all connectors shall terminate at a bulkhead board (Termination Board). Enclosure shall be designed to allow for any type of mounting, floor mount, roof mount or wall mount. The design of the equipment enclosure and mounting locations shall be approved at pre-production.

The MDVR shall operate on 8-32 volt DC power, with a unit operational draw of 2.0 amperes @ 24 volts, not including cameras. Operational draw with cameras is between 3.0 and 5.0 amperes, depending on cameras. All cables and connectors to and from the MDVR shall conform to SAE standards.

The MDVR shall not exceed the physical dimensions of 3 in. high, 12 in. deep, and 12 in. wide, exclusive of enclosure and mounting brackets.

The MDVR shall not exceed eight (8) pounds, exclusive of removable hard drive.

The operating temperature of the MDVR shall be from – 20 degrees F to +120 degrees F. The MDVR shall withstand humidity to ninety percent (90%) condensing and meet an environmental rating of IP 67 or better.

The MDVR shall be capable of withstanding shock pulses of up to 20 G-forces per 11ms period operating and 40 G-forces per 11ms period non-operating.

The MDVR shall be capable of being mounted in any orientation without detriment to its operation.

The MDVR shall have three (3) Ethernet ports to allow external programming and system diagnostics. Built-in software shall perform full and continuous system diagnostics and is capable of reporting failures.

The MDVR clock shall operate independently of the main power supply and shall have a minimum five (5) year operational lifetime before battery change is required. Clock drift shall be no more than one (1) minute per six (6) months. The MDVR shall be capable of updating and synchronizing the entire fleet of onboard clocks through a GPS interface.

Dates are to be pre-programmed to the year 2040, and shall take into account all leap years and daylight savings time changes automatically without external intervention. The clock data is digitally inserted into the image/sensor data stream prior to storage to hard disk.

The MDVR shall require no operator interface other than the Master Switch operation to effectuate operation, initiate shutdown, maintain the system, service or program the system, or prepare the system for operation.

The MDVR shall be controlled using embedded processors in an industrial form factor to assure adequate shock and vibration resistance. PC motherboards are not acceptable without a documented mobile rating.

The MDVR operating system software shall be of an embedded type contained within a firmware chip. The operating system shall be written specifically for MDVR operation and allow for the largest available drives to be used. Consumer-based operating systems residing on internal hard drives are not acceptable because they are subject to frequent failure.



The MDVR shall have thirteen (13) NTSC video inputs for composite 1V PP signals (12 analog and 1 HD) and shall be capable of black-and-white or color recording.

The MDVR shall have a standard recording resolution of 720 × 480 pixels and 1280 x 720 pixels for HD.

The MDVR shall provide ten (10) channels of digitized synchronous 16-bit audio with ADPCM compression at 16 KHz sampling rate. Input frequency is between 20 Hz and 8 KHz. The audio will not be turned on or recorded for any Connecticut bus.

The MDVR shall be equipped with the following external ports:

- (2) RJ-45 type RS-232 Communications Ports
- (1) RS-232 Serial Communications Port
- (1) System Diagnostics Port
- (3) RJ-45 Ethernet Port
- (2) Universal Serial Bus (USB) version 2.0 Ports

The MDVR shall have a wave engine module that accepts up to twelve (12) analog color and one (1) HD color camera inputs. Every time the MDVR boots, the cameras attached to the wave engine module are detected. This allows adjustable camera configurations. The wave engine module shall also have a separate input for an audio signal.

The MDVR shall be capable of directly digitizing, combining, compressing, encrypting, and storing NTSC video, audio sensors, and auxiliary sensor signals. Video and audio signals shall be encrypted using digital cryptographic methods that prevent alteration and tampering, restrict access and detect attempted alteration or tampering (authentication). Compressed, encrypted data is stored to mobile-rated removable disk storage media and is transmittable over a user's wired or wireless network.

In addition to accurate time and date, the MDVR shall append with image data the following ten (10) signal and alarm programmable analog vehicle parameters and the buses in this procurement shall be equipped and delivered recording these vehicle parameters:

- ♦ vehicle speed
- ♦ left signal (directional)
- ♦ headlights
- ♦ event switch
- ♦ wheelchair lift
- ♦ door actuation
- ♦ right signal (directional)
- ♦ brake operation
- ♦ throttle position
- ♦ passenger count

The MDVR combines the vehicle variables above with the other text data, such as time and date and vehicle identification number.

The MDVR shall be capable of supporting up to twenty (20) J-1708 and J1939 digital sensors and other devices. Proper operation of sensor input data can be reliant on the availability of appropriate interfaces and/or protocols being supplied by the vehicle owners and/or component manufacturers.

The MDVR shall have the ability to dynamically change video and audio settings during operation. Changes to the frame rate or image quality of any camera input can be changed based on time, sensor input, or J-1708/J1939 input in real time. Frame rates range up to 30 fps per camera. The MDVR shall be capable of recording multiple differing frame rates and differing levels of image quality per camera at the same time.

All data shall be recorded by the MDVR in a secure encrypted MPEG4 format that is not recognized or readable by standard digital video player software. Video recorded in standard AVI, MPEG, MOV, or MJPEG format is not acceptable. Video recorded and stored in standard AVI, MPEG, MOV, or MJPEG format is alterable by numerous off-the-shelf software packages and, as a result, provides insufficient data security to meet courtroom standards of admissibility.

The MDVR shall maintain a log file of its actions, which are stored on the removable hard drive. This information includes the time and date of the action and includes: ignition on/off, events start and stop, camera failure, drive errors, and other diagnostics.

The MDVR shall be capable of communicating utilizing the SAE "Electronic Data Interchange Between Microcomputer Systems and Heavy-Duty Vehicle Applications" standard (SAE J1708 and SAE J1587) and "Recommended Practice for a Serial Control and Communications Vehicle Network" (SAE J1939). The MDVR is optionally capable of acquiring data from electronic vehicle systems, including engines, utilizing this data communication standard. The MDVR and all sub-systems shall comply with SAE J1455, "Recommended Environmental Practices for Electrical Equipment Design" for vibration and shock isolation, including Section 202F. The electronic standard is in place and accessible to an installed vehicle electronic control module (ECM) if output is available from a manufacturer's ECM.

The MDVR shall comply with all the requirements of the "Buy America Act" (49 CFR Part 661), at the component level.

The MDVR shall have the capability to interface with diagnostic software operated from either a workstation or portable computer for system troubleshooting and configuration purposes.

The MDVR shall interface with a remote LED panel and provide the status of MDVR start up, normal operation, not recording, events full, and camera failure. The LED shall be programmable to indicate green, red, yellow, flashing green, flashing red, or off for each status. The LED shall also have an Event switch.

The MDVR shall interface with an Event switch that will be hardwired to the vehicle's panic button.

When a system input such as a panic button is activated the video recording unit shall tag the event. When retrieved, the tagged event shall be easily identifiable. The system shall be activated through the transit bus master switch. When the transit bus is started, the digital recorder shall acquire data from cameras and optional pre-selected sensor parameters. On a routine basis, recording may stop following a pre-programmed period or

when the transit bus master switch is off and the system stands idle. As available disk space is filled, new information overwrites old in a linear sequence. This linear sequence shall continue indefinitely until an event or incident occurs necessitating retrieval of stored data.

The MDVR shall have at least two (2) USB 2.0 ports. These ports shall allow up to two (2) additional 120GB hard drive canisters to be attached to the MDVR for additional video storage.

The MDVR shall have an internal power source that can supply the MDVR with power in the event of an unexpected loss of power. This internal power source must supply enough power for the MDVR to perform its normal shutdown processes. This power source must be maintenance free and have an expected life of at least eight years.

The MDVR shall have an expansion port such as eSTATA or compatible for data storage or memory expansion. The system shall be capable of transferring live video and audio data via a cellular network.

The removable disk media conforms to mobile requirements for reliability and durability and also conforms to SAE and MILSPEC vibration standards. The canister protects the media and is capable of withstanding shock pulses of 200G-forces per 2 millisecond period operating, and 800G-forces per 1 millisecond period non-operating, without system failure.

The rated life (Mean Time Before Failure) on the disk drive shall be 40,000 hours. The average Mean Time Before Failure of the disk drive units shall be an average of not less than four (4) years.

The removable drive shall be secured in place by a key lock mounted on the MDVR. Total storage capacity shall be at least 2 TB (terabytes).

One (1) spare removable hard disk drive per bus shall be provided to each transit system in this procurement. The spare disk drives provided are to be identical to the system drives and shall be individually wrapped and protected within a container supplied by the selected Proposer or manufacturer.

Duration is determined by video capture quality, drive size, and aggregate frame rate. The MDVR shall support a minimum of seventy-two (72) hours with ten (10) cameras at 300 fps aggregate at standard video quality. For this procurement seven (7) cameras will be provided with an initial setting each of 15 fps.

Disk capacity/storage time shall be field-upgradeable with nominal changes to software and/or hardware.

The disk media shall be capable of withstanding continuous vibration (5Hz to 500Hz) and frequent shock pulses of moderate duration (up to 10ms). Recorded data must survive all typical traffic accidents as well as collisions up to 40G-forces.

Disk storage media shall be conveniently portable, easily removable and transportable.

All recorded data shall be created in a secure encrypted file format using digital cryptography. The encryption restricts access, prevents alteration and tampering, and supports the detection or attempts to alter or tamper with video images or sensor information.

Recorded data shall be viewable in read-only format on a standard PC workstation or PC laptop. Software is supplied for on-site data playback and is compatible with standard PC-based operating systems such as Windows7. Data can be easily downloaded for long-term storage to high capacity storage media.

The MDVR shall support wireless connectivity. Data from the hard drive canister shall be transferable via a compatible 802.11x wireless Ethernet bridge or cellular modem and downloadable to a server via a wireless network. The transferred or downloaded data shall be reviewable by a workstation that has an installed copy of the vendor's video reviewing software. The system shall also be capable of delivering video data and system health status information automatically to the server for review.

A desktop viewing station shall be provided to each transit system in this procurement and consist of a personal computer dedicated to playback and review of the MDVR's recorded data. Minimum system requirements for the desktop viewing station are as follows:

- Microsoft Windows 7 or later current Operating System
- 2GB<sup>2</sup> Dual Channel DDR2 SDRAM at 667MHz - 2 DIMMs
- 250GB<sup>4</sup> or greater Serial ATA 3Gb/s Hard Drive (7200RPM) w/DataBurst Cache™
- ATI Mobility Radeon HD 2400 Video Card
- Integrated Gigabit Ethernet (10/100/1000Base-T)
- 32X Slot load CD/DVD burner (DVD+/-RW)
- Network interface card (NIC)
- 6 USB 2.0 ports
- Standard keyboard and mouse
- Audio with built-in speakers
- Storage devices to meet the user's requirements for archiving, including automated upload to a secure Internet server
- Removable drive adapter (docking station) that connects the MDVR's removable drive to the desktop computer via a USB 2.0 connection
  
- A Panasonic CF-53 or equivalent notebook computer shall be provided to each transit system in the procurement to act as a portable viewing station that will be dedicated to playback and review of the MDVR's recorded data. Storage devices to meet the user's requirements for archiving, including automated upload to a secure Internet server
- Removable drive adapter that connects the MDVR removable drive to the notebook via a USB 2.0 connection

The system's viewing software shall allow review of the data from the MDVR's removable drive canister. It shall allow for up to thirteen (13) simultaneous, synchronized playback windows as thumbnails, with one (1), two (2), four (4), eight (8), ten (10) or twelve (12) plus one (1) larger windows displayed at one (1) time in a tiled format.

It shall allow for a zoom function by means of a slide bar, double-clicking, or rubber banding. The screen shall display the Vehicle ID number, date of recorded video, display sensor information, and camera number. This option shall be capable of being turned on or off.

It shall allow for image enhancement consisting of sharpening, brightness, contrast, saturation, and hue. The MDVR shall allow all image enhancements to be applied to the motion video, but shall *not* modify the original video in any manner (i.e., enhancements to a video frame continue to play on subsequent frames, but are not saved to the removable drive canister).

The MDVR shall allow for archiving of all video, selected frames, or selected loops of video.

The MDVR shall allow for individual video frames or selected loops to be exported in JPEG, BMP, AVI or TIFF formats. The MDVR shall allow for thirteen (13) synchronized channels of audio playback with multiple filter options.

The MDVR shall allow searching for specific video via time and date stamps. The MDVR shall allow the user to select the time and date for viewing. It is not necessary to load the entire hard drive to view a set time. Specific Events and Incidents shall also be selectable.

Each video frame shall be decoded and authenticated dynamically upon request. The MDVR shall display the status as each frame is validated.

The MDVR shall allow users to create custom reports.

The MDVR data must be able to be accepted as evidence in criminal proceedings and civil proceedings, and be deemed to have sufficient forensic integrity to meet authentication and encryption requirements expected by the courts.

All video systems shall be delivered with the manufacturer's standard manuals for each component for the model offered.

The vendor shall provide each transit property in this procurement with any special diagnostic equipment necessary to maintain this video system.

Training shall be provided to insure satisfactory operation, servicing and maintenance of the equipment furnished. Instructions shall also include manufacturers' recommendations of test frequency, limits and methods, including downloading and transferring to a CD or DVD. When methods of access, removal, dismantling or application of a component are not self-evident, the instruction shall also cover these matters.

Training shall be provided to the personnel in each transit property receiving this equipment in maintenance, engineering, dispatch, and supervisory staff. Training includes maintenance procedures, installation and un-installation procedures, disk retrieval, and playback and data transfer.

Connecticut Department of Transportation 45 Heavy Duty High Floor Suburban Commuter Bus Consortium Procurement  
Digital video camera systems shall include all necessary equipment for total system functionality: cameras, digital video recorders, multiplexers, converters, hard drives, cabling, operating software, all connectors and mounting enclosures.

The system shall have been successfully tested for a minimum of twelve (12) months in actual documented field use in an urban mass transit bus environment.

The system shall be field-upgradeable both in hardware and software with minimal time loss and expense and be backward compatible where feasible.

The total system shall have a one (1) year parts and labor warranty. Repair and/or replacement shall be provided at no charge, during the warranty period, for parts with manufacturing defects.

Telephone troubleshooting service shall be available between 8:00AM and 5:00PM Connecticut time, Monday through Friday via a toll free telephone line.

Option; Backup Camera; A rear external "backup" camera shall be provided. A real-time image from the rear external backup camera shall be displayed to the vehicle operator via the IO Controls operator display whenever the bus is in reverse.

#### **4.7 DATA LOGGER**

Each bus shall be supplied with a FLEETWATCH Model JX55 Data Logger as manufactured by S & A Systems, Inc. The Contractor shall supply and install all the components, bracketry, system cables, harnesses, adapters and reinforcements necessary to facilitate installation of this equipment on each bus and shall be included in the base price of the bus. Each data logger shall be suitable for mounting on a commuter bus and connecting directly to a J1708 connector on the bus. Bus-mounted data recorders shall be programmable by CTDOT or the procuring agency with vehicle number and codes for defining the set of data to be recorded and reported. Programming software and hardware shall be provided to allow CTDOT or the procuring agency to program or re-program the bus-mounted data recorder units at any time. Bus-mounted data recorders shall be programmed to respond to a beacon signal sent from a Receiver Unit and upon receipt of such beacon signal shall transmit via radio frequency the bus number and other defined data to the Receiver Unit. Bus-mounted data recorders shall as a minimum provide the following capability:

- a) Data always collected and reported:

- Vehicle Number
- Vehicle Total Mileage
- Vehicle Total Engine Hours

- b) Fault Indicators captured and reported:

Fault Codes reported shall include Subsystem ID and Failure Mode Identifier as defined in SAEJ1587 documentation. Record the last ten (10) unique Active Fault

Codes reported with the Date and Time of the beginning and ending of the last occurrence observed.

c) Last value observed:

The Bus-mounted data recorder shall report the last value observed for ten (10) items. The user shall be able to define these ten (10) items using M.I.D. and P.I.D. codes as defined in SAEJ1587 documentation.

<b>Examples</b>	<b>M.I.D</b>	<b>P.I.D</b>
Engine Idle Hours	128	235
Idle Fuel Uses	128	346

d) Maximum and minimum value observed in 24 hours:

The Bus-mounted data recorder shall report the maximum and minimum values observed during the previous twenty-four (24) hour time period for ten (10) items defined using M.I.D. and P.I.D. codes. The date and time of the minimum and maximum occurrences shall also be reported. The user shall be able to define the codes for the items to be reported.

<b>EXAMPLES</b>	<b>M.I.D</b>	<b>P.I.D</b>
Engine Coolant Temperature	128	110
Engine Oil Pressure	128	100
Engine Oil Temperature	128	175
Transmission Oil Temperature	130	177
Ambient Air Temperature	128	171

#### 4.8 AUTOMATIC VEHICLE MONITORING (AVM) - Optional

AVM capability shall be provided to monitor and report faults, error codes, status and performance parameters for the following systems and components:

- Transmission
- Engine
- Antilock Brakes
- HVAC
- Multiplex Electrical System
- Parking brake
- Fire protection system
- Wheelchair lift system
- Operator Seat Occupancy Sensor and Seat Alarm system
- Bus Kneeling system
- Tire Pressure monitoring system
- ITS Automatic Voice Announcement system
- ITS Turn Warning System
- Destination Sign system
- Fare Register and Fare Collection system

- GPS system capability
- ITS cell data modem
- Digital Land Mobile Radio unit (customer supplied, PowerTrunk model #MDT-400)

The Contractor shall provide Trapeze system AVM certification that all codes available to the manufacturer's diagnostic tools have been defined to the Trapeze system AVM data dictionary and are being broadcast to the AVM system.

#### 4.9 TURN WARNING SYSTEM (TWS)

OPTION: The Turn Warning System shall provide external audio that the bus has begun to make a turn at an intersection. It shall not announce for routine curves and lane changes. This turn warning feature is included as part of the overall ITS system. The turn warning system shall operate independently from the Trapeze system transit control head (TCH). The turn warning system may not use the vehicle's turn signal switch to determine that a turn is about to be made. It shall utilize an optical sensor installed inside the steering column to determine the number of degrees the vehicles steering shaft is being turned.

#### 5.0 TRAINING

##### 5.1 GENERAL REQUIREMENTS

###### 5.1.1 RESPONSIBILITY

*RWA*  
~~The Contractor is responsible to train CTTransit or the procuring agency personnel in conformance with its detailed training proposal, submitted by the Contractor and agreed to by CTDOT or the procuring agency during vendor selection negotiations.~~

~~The Contractor is responsible to train, at their expense, CTTransit or the procuring agency personnel according to the requirements herein. These expenses include course development, providing instructors, and supplying handouts, manuals, classroom aids, etc. Expenses do not include salaries of persons attending training. The training requirements stated in this section are specific to all buses delivered.~~

###### 5.1.2 SCOPE OF TRAINING

###### 5.1.2.1 FORMAL CLASSROOM TRAINING

~~Instruction shall be designed and include courses to cover four major areas: operational training instructors, bus familiarization, maintenance management, and mechanics training for vehicle maintenance. The remaining items in the General Requirements section apply to all areas. The minimum training is that which is necessary to bring those employees designated to the level of proficiency in the operation and maintenance of the bus required for proper bus functioning. Formal training shall include both classroom and practical work, and shall be augmented by informal follow-ups as needed.~~

###### 5.1.2.2 WEB-BASED TRAINING



~~Contractor shall maintain at their expense an LMS system; web-based training for all operator training and mechanics training for vehicle maintenance. This training shall be available to CTTransit and its employees at no additional cost. Contractor shall provide CT DOT with three (3) DVD copies of web-based training for each subject matter for operations and maintenance training. Web-based training shall be updated with applicable new technology for a period of twelve (12) years. Quizzes shall be incorporated into all training to provide measureable feedback of attendee's comprehension of training material.~~

### **5.1.3 OBJECTIVE BASED TRAINING**

~~All instruction shall be designed and presented to insure that, at the conclusion of training, the participant shall be able to perform specific skills or have obtained specific knowledge in the area taught. General objectives for the four (4) areas listed above are outlined below. The Contractor is to provide final detailed objectives for each course when submission of their training plan is made.~~

### **5.1.4 COURSE CONTENT**

~~Course topics, subject matter, and structure are to be specifically selected to reach the training objectives.~~

### **5.1.5 TRAINING COSTS**


~~The Proposer shall provide for the cost to train personnel as required by these specifications.~~

### **5.1.6 SUBMISSION AND APPROVAL OF TRAINING PLANS**

- RWA  
B
- ~~1. Each proposer shall submit their training plans for meeting the requirements of this section with their technical bids. The plan shall include specific course objectives, details on how training shall be carried out, who shall conduct the training and their qualifications, what shall be involved in the training, and, if possible, draft outlines and lesson plans.~~
  - ~~2. Training plans may take into account previous training provided to CTTransit or other transit properties under previous bus procurements in various bus components and systems. Bids shall place an N/A on the PERSONNEL TRAINING REQUIREMENTS TABLE for the courses where such previous training is being substituted by the Contractor to meet the requirements of this section. A written justification for each substitution shall be included in the training plan.~~
  - ~~3. The TEC shall review the training plan submissions for compliance with the training requirements.~~
  - ~~4. The CTTransit Superintendent of Maintenance Training or equivalent at other properties shall advise the Contractor of any required changes to training proposals after award of the contract and prior to the commencement of training.~~

5. ~~The Contractor shall meet with Project Management and the CTTransit Superintendent of Maintenance Training not later than six weeks prior to the start of formal training. At this time they are to submit for approval, the final phase of their training program, and demonstrate any training aids and audiovisuals involved. Handouts shall be provided at class time in a ratio of one per student.~~
6. ~~Training shall not take place until Project Management and the Superintendent of Maintenance Training have given approval. This approval shall be based on the Contractor adequately demonstrating that the training shall meet the stated objectives, address the course topics identified herein, is well organized, shall be coordinated with the Director, Bus Maintenance Training, and that all handouts, training aids, slides, etc. are professional and acceptable.~~
7. ~~No production buses shall be accepted until all training, lesson plans etc., detailed herein, are approved by the Superintendent of Maintenance Training.~~
8. Maintenance Training shall coordinate and schedule all training.

#### 5.1.7 INSTRUCTORS

*Rmt*  
The Contractor is responsible for insuring that the instructors teaching these training courses are not only familiar with technical information, but are able to properly utilize Methods of Instruction Techniques, training aids, audio visuals, etc. to insure effective presentation both in the classroom and in the field.

#### 5.1.8 TRAINING AIDS AND EQUIPMENT

The Contractor is responsible for providing all training aids, audiovisual equipment and visual aids for the conduct of the training. Specific assistance, if requested well in advance, may be provided by CTTransit, depending upon CTTransit's prior need for the equipment for other in-house courses.

A fully operational engine/transmission module, air brake board for disc brakes, multiplex training module and two (2) (one (1) for maintenance and one (1) for operational training) wheelchair lift mockups shall be provided by the Contractor to CTTransit or other properties using these buses at the beginning of training, and will become the property of CTDOT at the conclusion of training. For bidding purposes, sample training module configurations will be provided by the Superintendent of Maintenance Training upon request. If a particular training module would result in a duplication of one (1) received in a prior year of this contract, an additional training module would not be required.

The Contractor shall provide to each CTTransit and Private Carrier operating locations' or procuring agency receiving the production buses; one (1) complete set of any and all specialty tools, software and equipment that may be required by the end user to properly diagnose, maintain and repair the vehicle. These tools and equipment shall be provided to each location prior to them receiving their first production bus. Each bus system which

Connecticut Department of Transportation 45' Heavy Duty High Floor Suburban Commuter Bus Consortium Procurement  
procures vehicles through this procurement shall receive a complete set of separate severe duty notebook computer preloaded with software for each of the applications listed below:

- ~~Engine programming and diagnostics~~
- ~~Transmission programming and diagnostics~~
- ~~Multiplex system programming and diagnostics~~
- ~~ABS / Traction control system programming and diagnostics~~
- ~~HVAC system programming and diagnostics~~
- ~~Electronic Destination Sign programming and diagnostics~~
- ~~Video Security System programming and diagnostics~~
- ~~Electronic Fan System, Beltless Alternator System~~
- ~~Electronic Communication, Radio System, Passenger Counter, ITS~~

All software and software licenses for all systems and subsystems necessary to diagnose bus, powertrain and auxiliary components as well as necessary communication links and cables are to be provided to each CTTransit property and operating locations' receiving the production buses.

#### **5.1.9 TRAINING MATERIALS**

Lesson plans and student handouts shall be in the same format used by CTTransit, (sample shall be provided, if requested).

All equipment and materials used in training are to be designed for and specifically applicable to and identified with CTTransit or other properties CTDOT indicates. All original training materials, slides, view graphs, charts and aids (but not audio visual hardware) shall become the property of CTDOT at the conclusion of training. The training aids and lesson plans may be used by CTTransit for subsequent training. CTTransit shall receive an electronic copy of all training lesson plans.

#### **5.1.10 TRAINING FACILITIES AND LOCATION**

CTTransit shall provide the actual training facilities, if available and if requested at least two (2) weeks in advance by the Contractor. Locations for specific courses shall be designated after award and be in one or more of the following Connecticut locations: Hartford, New Haven and Stamford. If facilities are not requested or available, the Contractor shall provide suitable training facilities in the specified locations.

#### **5.1.11 TRAINING HOURS**

Hours for training are to be between 7:00 a.m. and 4:00 p.m. unless otherwise specifically authorized or requested by CTTransit or other properties.

#### **5.1.12 TRAINING DAYS**

All training is to take place Monday through Friday unless otherwise specifically authorized or requested by CTTransit or other properties.

~~5.1.13~~

~~PILOT SESSIONS~~

~~When more than one (1) session is required herein for a particular course, the first session shall be a pilot course, which allows CTTransit to evaluate its effectiveness. Any improvements and changes required by CTTransit shall be made prior to other sessions of the same course being offered. Where a course has only one session, a dry run may be required.~~

~~5.1.14~~

~~SCHEDULE~~

~~The schedule shall allow for a sufficient time gap between pilot and regular courses to effect changes. Training shall be completed in a timely fashion. Technical proposals shall provide a scheduled completion date for all training specified that takes into consideration the requirements outlined in this section and the quantities and durations outlined in the Minimum Personnel Training Requirements Table.~~

~~5.1.15~~

~~SAFETY~~

~~Specific safety points shall be covered and stressed in all training as appropriate. Safety practices shall be adhered to during the presentation of all training.~~

~~5.2 OPERATIONAL INSTRUCTOR TRAINING~~

~~5.2.1~~

~~OBJECTIVES~~

~~This training shall acquaint CTTransit Operational Instructors with all the information necessary for them to subsequently train any employees who shall operate the bus.~~

~~5.2.2~~

~~STRUCTURE/TOPICS~~

~~The training shall include but not be limited to: vehicle specifications, interior and exterior component description and demonstration, operation of the bus, and operator and Supervisor level troubleshooting. Training shall include classroom with slides, etc., and on-bus work. CTTransit Instructors shall be trained for 1-3 days on the prototype bus prior to in-service prototype bus testing as described below.~~

~~5.2.3~~

~~Day One (1)~~

~~General overview of the vehicle: to include interior, exterior, Operator's compartment, and all other accessible compartments of the bus. This overview shall consist of classroom training with slides and on-bus demonstration of interior/exterior features of the bus. Overview shall include placing the bus over a pit or on a lift for a general overview of the undercarriage of the bus.~~

~~5.2.4~~

~~Day Two (2)~~

~~Operational Instructor Training during Day two (2) shall consist of specific features that require an operator's knowledge to effectively and safely operate the bus. These shall~~

RWA  


Connecticut Department of Transportation 45' Heavy Duty High Floor Suburban Commuter Bus Consortium Procurement  
include but are not limited to an overview of the bus brake and throttle interlock system and wheelchair lift operation. Final content of day two (2) shall be determined after discussion between successful bidder and CTTransit.

**5.2.5 Day Three (3)**

Shall be hands-on driving the bus on CTTransit bus route(s).

*(Clarification: Contractor shall provide assistance for the drivers with the location of the various switches and controls, etc., but will not be responsible for providing actual driving instructions of the vehicle).*

**5.2.6 SCHEDULE FOR TRAINING**

Training is to begin as soon as the prototype bus is accepted.

**5.2.7 NUMBER TO BE TRAINED**

To be provided by CTDOT sixty (60) days prior to delivery of the first production bus. Minimum numbers are outlined in the Minimum Personnel Training Requirements Table.

**5.3 MAINTENANCE MANAGEMENT TRAINING**

Warranty practices and procedures, preventive maintenance, service cycle as well as maintenance and repair parts technical manual overview.

**5.3.1 OBJECTIVES**

This session is to be aimed at maintenance Superintendents, Foremen and selected mechanics. Training is to acquaint them with the bus design, use limitations, preventive maintenance cycles, warranty procedures, unit exchange procedures, parts and maintenance manual layout and use, and other requirements that the attendees need to know as managers of mechanics.

**5.3.2 SCHEDULE FOR TRAINING**

CTDOT shall provide a schedule of training to the Contractor sixty (60) days prior to the beginning of training.

**5.3.3 TOPICS**

Contractor may assume that the attendees shall have completed the eight (8) hour Bus Familiarization. Specific topics to satisfy this section are to be provided with the training plan submission.

**5.3.4 NUMBER TO BE TRAINED**

To be provided by CTTransit sixty (60) days prior to the delivery of the first production bus.

Connecticut Department of Transportation 45' Heavy Duty High Floor Suburban Commuter Bus Consortium Procurement  
 Minimum numbers are outlined in the Minimum Personnel Training Requirements Table.

**5.4 MECHANICS TRAINING**

**5.4.1 OBJECTIVES**

This training shall familiarize repairman and mechanics with all the bus systems. Training is to provide knowledge and information, which shall allow them to perform proper preventive and corrective maintenance. Contractor is required to provide specialty items at time of training (i.e. diagnostic equipment, tow bars etc.).

**5.4.2 TOPICS/STRUCTURE**

The training is to include, but not be limited to vehicle and component specifications, their troubleshooting, repair and replacement. See attach personnel training requirements table for specific topics. Training shall include classroom as well as hands on training. Training topics may differ from the requirements table dependent on specific vehicle involved after awarding of the contract.

**5.4.3 SCHEDULE**

Training shall begin when the first production bus is accepted. CTTransit shall provide a schedule of training to the Contractor sixty (60) days prior to the beginning of training.

**5.4.4 NUMBER TO BE TRAINED**

*RMA*  


To be provided by CTTransit sixty (60) days prior to the delivery of the first production bus. Minimum numbers are outlined in the Minimum Personnel Training Requirements Table.

The courses listed in the Minimum Personnel Training Requirements Table are not all inclusive. The courses as well as the target duration and total training days are to be determined by CTTransit's Director of Maintenance Training and the Project Manager after a successful bid is awarded. CTTransit will meet with the successful bidder to determine the final numbers and days for each area listed above.

The estimates listed in the Minimum Personnel Training Requirements Table are for the full term of the contract. These numbers and days will be split proportionately to accommodate training for each year and/or production run of the awarded contract.

See REFERENCED TABLE - NEXT PAGE

END OF ARTICLE 5.4.4

**MINIMUM PERSONNEL TRAINING REQUIREMENTS TABLE**

<u>Courses/Priority</u>	<u>Estimated Enrollment</u>	<u>Per Sessions Enrollment</u>	<u>Sessions</u>	<u>Target Duration</u>	<u>Total Days</u>
	6	6	4	2	2

Connecticut Department of Transportation 45' Heavy Duty High Floor Suburban Commuter Bus Consortium Procurement

Cadre Instructor (Operations Instructors)					
Bus Familiarization (Contract Employees)	80	10	8	0.5	4
Maintenance Management	45	5	3	0.5	2
Mechanics Training:	0	0	0	0	0
Brake/Air System (ABS included)	50	10	5	2	10
Electrical/Electronics' System	30	10	3	3	9
Trapeze - Radio	20	5	4	2	8
Door Operation and Adjustment	30	10	3	0.5	1.5
Suspension, Steering, & Kneeling Systems	40	8	5	4	5
Destination Sign (Vendor)	30	10	3	0.5	1.5
HVAC, Operations and Maintenance (Manufacturer and Vendor Interface)	24	8	3	1	3
Wheelchair Lift/Ramp Operations and Maintenance (Vendor)	24	7	3	1	3
Engine Familiarization, Service, Diagnostics, Tune-Up and DEF (Engine Vendor)	50	8	6	3	18
Transmission Service and Diagnostics (Transmission Vendor)	48	8	6	1	6
Fire Suppression System	36	7	5	0.5	2.5
Auxiliary Heating System (Vendor)	24	8	3	0.5	1.5
Vehicle Recovery (Towing)	60	8	7	0.5	3.5
Engine Rebuild (Engine manufacturer to present training 90 days prior to warranty expiration).	15	5	3	5	15
Transmission Rebuild (Transmission manufacturer to present training 90 days prior to warranty expiration).	15	5	3	5	15
TOTAL					

Duration of each session may be adjusted with prior approval of CT Transit.

**6.0 DOCUMENTATION**

**6.1 HARD COPY DOCUMENTATION**

The comprehensive maintenance, parts and electrical manuals shall be completed for all components of the bus. The supplied maintenance and operator's manuals shall incorporate all equipment ordered on the buses covered by this procurement. These manuals shall be:

- Specifically tailored to the production vehicles being manufactured in compliance with this contract.
- The maintenance and parts manuals shall be in loose-leaf construction.
- The contractor shall keep applicable and current manuals available for a period of three (3) years after the close out documents have been completed.
- The Contractor shall also keep parts books up-to-date for a period of twelve (12) years.
- Electrical manual pages shall be laminated.

The Contractor shall provide the following quantities of documents:

- Current maintenance manuals - one (1)/every five (5) buses per property
- Current parts manuals - one (1)/every ten (10) buses per property
- Current operator's manuals. - one (1)/bus
- A set of interim manuals shall be delivered with the prototype buses.

Manuals for ITS, power/drive train and auxiliary/optical systems and equipment are to be provided in like amounts. The Contractor shall also have the responsibility to ensure the timely delivery of individual component supplier's technical manuals, e.g., engine, transmission, wheelchair lift, etc.

Final manuals shall include the review comments provided by CTTransit. The Contractor shall provide the final hard copy, electronic manuals and wall size charts ninety (90) days after receipt of comments from CTTransit.

Manuals are to be delivered proportionately with each production run to accommodate changes that may occur from earlier productions run to later production runs.

## **6.2 WALL SIZE CHARTS**

The Contractor shall supply thirty (30) wall size charts displaying the following maintenance functions and/or components of the bus:

- Lube chart
- Air brake system chart
- Electrical chart
- Exploded body/exterior skin chart
- Exploded front end frame chart
- Air Conditioning chart.
- Wheelchair Lift specific lube chart.

Charts shall be delivered with final manuals.

## **6.3 ELECTRONIC CATALOG DOCUMENTATION (ECD)**

The Contractor shall supply complete electronic versions of all maintenance, parts and electrical manuals. The ECD shall be structurally integrated and correlate all text and graphics related to the equipment and components specifically tailored to the production



vehicles being manufacture in compliance with this contract. All electronic updates shall be provided for the twelve (12) year anticipated life of all buses purchased under this contract. The general requirements of the ECD shall be:

- Allow user interface by employing on-screen "buttons" for the most important or frequently used options and menus through a pointing device or touch screens
- Provide custom context sensitive help that is available anywhere within the ECD. The "Help Function" shall provide users with guidance that would eliminate the need to look up paper manual instructions.
- All illustrations shall be adapted as necessary and oriented for the display of the PCs used for the applications of the ECD.
- Users should be able to print on demand all multimedia information.
- ECD shall be designed so the CTTransit personnel can easily complete updates after the warranty period has expired.

A total of twenty (20) sets shall be provided in Adobe pdf files with interactive capability and shall be compatible with CTTransit's or other properties mainframe software as well as have the ability to be loaded onto and run on CTTransit Windows based diagnostic laptops. These files must not be copyright protected that would prevent CTTransit from making additional copies for future distribution.

## 7.0 SERVICE AND SPARE PARTS

The Contractor shall state below the representatives responsible for assisting CTTransit in regards to Service and Spare Parts. The Contractor shall supply for approval by CTTransit lists of Preventive Maintenance (PM) parts and initial Centralized List (CL) of parts. The Contractor shall be responsible to continue to supply Service, Spare and Warranty parts including, but not limited to preventative maintenance items (belts, filters, etc.), maintenance parts accident parts, and general wear items.

The Contractor shall have the ability to supply all parts, but CTTransit shall not be obligated to purchase all parts from the Contractor. The Contractor shall supply listings of all service parts manufacturers and the manufacturers part numbers for all items contained on the PM and CL lists.

The manufacturer shall provide for a full time Technical Service Representative for the term of the base warranty period at no additional cost to CTDOT or the procuring agency. Further, the Technical Service Representative shall be readily available to assist CTTransit for the entire service life of the buses.

Location of nearest Technical Service Representative to CTTransit:

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Telephone: \_\_\_\_\_

Location of nearest Parts Distribution Center to CTTransit:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

The Contractor shall guarantee the availability of replacement parts for these buses for at least fourteen (14) years after the date of acceptance of the last production bus. Replacement parts shall be made available a maximum of ninety (90) days after the first bus order is placed. Spare parts shall be interchangeable with the original equipment and shall be manufactured in accordance with the quality assurance provisions of this contract.

## **8.0 OPTIONAL EQUIPMENT**

### **8.1 TIRE COST PRICING**

The Contractor shall provide pricing for Tires: The purchase cost for a set of eight (8) tires. - Add to the base purchase price, per coach. (Reference: Section 3.6.1.2 "Tires").

### **8.2 ROUTER AND MODEM (WLAN) - COST CREDIT**

The Contractor shall provide credit pricing for pricing for mobile router and modem: The cost credit for eliminating the router and modem. – Deduct from the base purchase price, per coach. (Reference; Section 3.9 "Wireless Local Area Network (WLAN) - for Passenger Wi-Fi Usage").

- The Contractor shall supply and install all the components, bracketry, system cables, antenna(s), harnesses, adapters and reinforcements necessary to facilitate installation of this equipment on all buses and shall be included in the base prices of the buses.

### **8.3 TRAPEZE SYSTEM TRANSIT CONTROL HEAD (TCH) COST CREDIT**

The Contractor shall provide credit pricing for the Transit Control Head: The cost credit for eliminating the Trapeze system Transit Control Head (TCH). – Deduct from the base purchase price, per coach. (Reference Section's: "4.0 Smart Bus Features"; "4.1 In-Vehicle DATA Network"; "4.4 Smart Bus Vehicle Control Unit"; and Section "4.8 Turn Warning System").

- The Contractor shall supply and install all the components, bracketry, system cables, harnesses, adapters and reinforcements necessary to facilitate installation of this equipment on all buses and shall be included in the base prices of the buses.

**EXHIBIT A.2**

**VEHICLE TECHNICAL INFORMATION**

## Exhibit A.2

### VEHICLE TECHNICAL INFORMATION

*The Proposer shall submit a completely filled-in Vehicle Technical Information form below as part of their proposal submission for the 45' Diesel Bus.*

#### A. BUS MANUFACTURER:

Motor Coach Industries, Inc.

Bus Model:

D4500

#### B. UNDERSTRUCTURE MANUFACTURER:

Motor Coach Industries, Inc.

Model Number:

MCI 45 FT COMMUTER

#### C. BASIC BODY CONSTRUCTION

1.Type:

Semi-Monocoque

2.Tubing or frame member Thickness, Dimensions & Material

a. Overstructure

Various from .048 Thk, Steel HSLA A606 and T304

b. Understructure

Various from .050 Thk, Stainless steel T304

3. Skin Thickness and Material

a. Roof

.051 Thk, Alum AA5052

b. Sidewall

.052 Thk, Galvanized steel, A525

c. Skirt panel

.064 Thk, Alum AA5052 – for painted option (baggage doors), .036 Stainless 304 (lower post covers)

d. Front End

.187 Thk Fibreglass

e. Rear End

.036 Thk, stainless 304 (motor doors), .187 Thk Fibreglass cap and rad door

#### D.DIMENSIONS

1.Overall length

a. Over Bumpers

45 ft 6 in.

b.Over Body

44 ft 9 in.

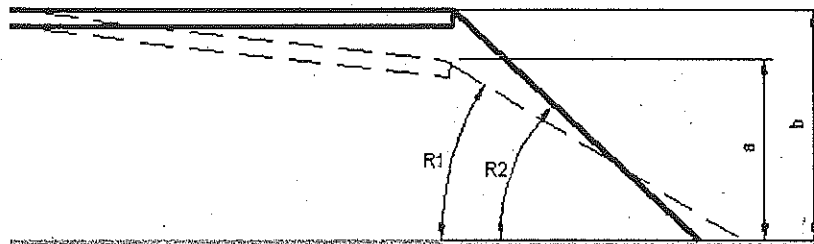
2. Overall width	a. Over Body excluding Mirrors	<u>102</u>	in.
	b. Over Body including Mirrors—driving Position	<u>118</u>	in.
	c. Over Tires Front Axles	<u>85.7</u>	in.
	d. Over Tires Rear Axle	<u>76.5</u>	in.

3. a. Overall Height (maximum)	<u>137</u>	in.
b. Overall Height (main roof line)	<u>135</u>	in.

4. Angle of Approach	<u>9.5</u>	Deg
5. Breakover Angle	<u>7.2</u>	Deg
6. Angle of Departure	<u>6.2</u>	Deg

7. Doorway Dimensions	<u>Front</u>		<u>Rear</u>	
a. Width between door posts	30 in.		N/A	in.
b. Door width between panels	28.5 in.		N/A	in.
c. Clear door width	27 in.		N/A	in.
d. Doorway height	85 in.		N/A	in.
e. Knuckle clearance	1.5 in.		N/A	in.
f. Door protrusion beyond side pnl	8.6 in.		N/A	in.

8. Step height from ground measured at center of doorway



	Front doorway, empty	Ramp angle	Rear Doorway, empty
(Kneeled)	a. <u>12.5</u> in.	R1 N/A deg	a. N/A in.
(Unkneeled)	b. <u>15.5</u> in.	R2 N/A deg	b. N/A in.
(Reverse Kneeled)	c. <u>12.5</u> in.	R3 N/A deg	c. N/A in.

9. Interior Head Room (Center of Aisle)

a. Front Axle Location	<table border="1"><tr><td>87.25</td></tr></table>	87.25	in.
87.25			
b. Drive Axle Location	<table border="1"><tr><td>78.25</td></tr></table>	78.25	in.
78.25			

10. Aisle width between transverse seats (minimum) 

14
----

 in.

11. Floor Ride Height Above Ground (Centerline of Bus)

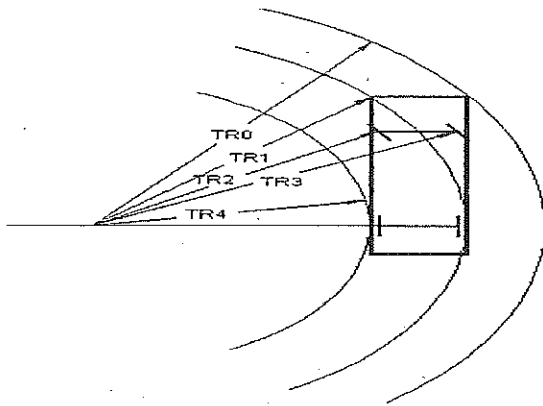
a. At front door	<table border="1"><tr><td>45</td></tr></table>	45	in.
45			
b. At front axle	<table border="1"><tr><td>51</td></tr></table>	51	in.
51			
c. At drive axle	<table border="1"><tr><td>54</td></tr></table>	54	in.
54			
d. At rear door	<table border="1"><tr><td>54</td></tr></table>	54	in. At wheelchair lift door (middle of coach)
54			

12. Minimum Ground Clearance (between bus and ground, with bus unknéeled)

a. Excluding axles	<table border="1"><tr><td>10</td></tr></table>	10	in.
10			
b. Including axles	<table border="1"><tr><td>6.5</td></tr></table>	6.5	in.
6.5			

13. Horizontal Turning Envelope (see diagram below)

a. Outside body turning radius, TR0 (including bumper)	<table border="1"><tr><td>47</td></tr></table>	47	ft.	<table border="1"><tr><td>10</td></tr></table>	10	in.
47						
10						
b. Front inner corner radius, TR1	<table border="1"><tr><td>42</td></tr></table>	42	ft.	<table border="1"><tr><td>9</td></tr></table>	9	in.
42						
9						
c. Front wheel inner turning radius, TR2	<table border="1"><tr><td>38</td></tr></table>	38	ft.	<table border="1"><tr><td>10</td></tr></table>	10	in.
38						
10						
d. Front wheel outer turning radius, TR3	<table border="1"><tr><td>43</td></tr></table>	43	ft.	<table border="1"><tr><td>6</td></tr></table>	6	in.
43						
6						
e. Inside Body Turning Radius innermost point, TR4 (including bumper)	<table border="1"><tr><td>25</td></tr></table>	25	ft.	<table border="1"><tr><td>10</td></tr></table>	10	in.
25						
10						



14. Wheel Base (front) 318 in.  
 Wheel Base (rear, between drive and tag) 48 in.

15. Overhang, Centerline of Axle Over Bumper

a. Front 6 ft. 4 in.  
 b. Rear 8 ft. 10 in.

**16. Floor**

a. Interior length 37 ft. 6 in.  
 b. Interior width (excluding coving) 8 ft. 0 in.  
 c. Total standee area (approximately) 41 ft<sup>2</sup>

d. Minimum distance between wheelhouses:

Front N/A in.  
 Rear N/A in.

e. Maximum interior floor slope (from horizontal) 5.35 Deg.  
 (in ramp area)

**17. Passenger capacity provided**

a. Total maximum seating 57  
 b. Standee capacity 9  
 c. Minimum hip to knee room 28.5 in.  
 d. Minimum foot room 14 in.



**E. WEIGHT OF BUS**

	No. of people	Front Axle			Center Axle (Drive)			Rear Axle (Tag)			Total Bus
		Left	Right	Total	Left	Right	Total	Left	Right	Total	
Empty bus, full fuel and farebox	0			11500			17250			11050	39800
Fully seated, full fuel and farebox	57 seated and driver			14989			20445			13097	48530
Fully loaded standee and fully seated, full fuel and farebox	57 seated 9 standee driver			15563			20917			13399	49880
Crush load (1.5x fully loaded)	57 seated driver			16635			22047			14123	52805
GVWR											50000
GAWR				16000			22500			14000	52500

## F. ENGINE, MAIN

1. Manufacturer Cummins  
2. Model Number ISX 12L 425 HP  
3. Type Diesel  
4. No of cylinders 6 cylinders  
5. Bore 5.11 in.  
6. Stroke 5.91 in.  
7. Displacement 729 in.<sup>3</sup>  
8. Compression Ratio 16.6:1  
9. Injector Type & Size XPI (High pressure injection)

10. Net SAE Horsepower	425	HP. at	1800	RPM
11. Net SAE Torque	1450	lb./ft. at	1200	RPM

### 12. Crankcase Oil Capacity

- a. New engine, dry 12 gal.  
b. New engine, wet 10 gal.

### 13. Turbocharger

- a. Make Holset  
b. Model HE400VG - Variable Geometry Turbocharger

14. Maximum speed, no load	2100	RPM
15. Maximum speed, full load	1700	RPM
16. Speed at Idle	700	RPM
17. Speed at Fast Idle	950	RPM

18.Engine Information/graphs to be attached with this form:

Engine speed vs. road speed

Torque vs. engine speed

Horsepower vs. engine speed

Fuel consumption vs. engine speed

Vehicle speed vs. time (both loaded and unloaded)

Vehicle speed vs. grade (both loaded and unloaded)

Acceleration vs. time

Change of acceleration vs. time

### G. TRANSMISSION

Allison WT B500R

Other Yes

1.Manufacturer

Allison

2.Model number

B500 Gen V

3.Type

Automatic

4. Speeds

Six

5. Gear Ratios

Forward:

Reverse:

6. Shift Speeds

a. 1st-2nd	<input type="text" value="13.7"/>	mph
b. 2nd-3rd	<input type="text" value="31.4"/>	mph
c. 3rd-4th	<input type="text" value="42.5"/>	mph
d. 4th-5th (if applicable)	<input type="text" value="61.5"/>	mph
e. 5th-6th (if applicable)	<input type="text" value="84.6"/>	mph

7.Fuel capacity (including heat exchanger and filters

### H. Voltage Regulator

1.Manufacturer	Delco Remy
2.Model number	Included with alternator

### I. Voltage Equalizer

1.Manufacturer	Vanner
2.Model number	80-100 CAN series

### J. Alternator

- EMP Power 450amp brushless or  
 Niehoff C803D or equal as listed below

<input checked="" type="checkbox"/> 1.Manufacturer	Delco	
2.Model Number	55SI 24V 250A	
3.Type	Dual, air cooled, brushless	
4.Output at Idle	175 x 2 alternators	amps
5.Output at Maximum Speed	250 x 2 alternators	amps
6.Maximum Warranted Speed	9000	rpm
7.Speed at Idle (apx)	2500	rpm
8.Drive Type	Belt driven (from engine crankshaft pulley)	

### K. Starter Motor

1.Manufacturer	Mitsubishi
2.Model number	M009T84479
3.Type	Gear and pinion – 105P70

### L. Air Compressor

1.Manufacturer	Cummins (designed by Wabco)	
2.Type	Dual cylinder	
3.Rated Capacity	37.4	CFM
4.Capacity at Idle (apx)	9.5	CFMs

5.Capacity at Maximum Speed (engine)	37.4	CFM
6.Maximum Warranted Speed	3000	rpm
7.Speed Idle	700	rpm

8.Drive Type Gear driven (from engine crankshaft)

9.Governor:

a) Cut-in Pressure	105	psi
b) Cut-out Pressure	125	psi

### M. AXLE, FRONT

**First – solid beam, non-driving**

1.Manufacturer	Meritor Automotive	
2.Type	Rigid beam steer axle	
3.Model Number	FH941KX19	

4.GAWR	16000	lbs
5.Axle Load	11250	Lbs At curb weight

### N. AXLE, REAR, DRIVE

1.Manufacturer	Meritor Automotive	
2.Type	Single reduction, floating	
3.Model Number	RC23162NFKF74 (3.73 drive ratio)	

4.GAWR	22500	lbs
5.Axle load	16650	Lbs At curb weight

### AXLE REAR, TAG

1.Manufacturer	Meritor Automotive	
2.Type	Steerable (square section beam)	
3.Model Number	FH946KX56-steerable	

4.GAWR	14000	lbs
5.Axle Load	10650	Lbs At curb weight

6.Axle Ratio

3.73 basic

**O.Suspension System**

1.Manufacturer	MCI	
2.Type:	First:	Air spring (Firestone) and shock absorbers (Gabriel)
	Second:	Air spring (Firestone) and shock absorbers (Gabriel)
	Third:	Air spring (Firestone) and shock absorbers (Gabriel)
3.Springs:	First:	2 (Gabriel)
	Second:	4 (Gabriel)
	Third:	2 (Gabriel)

**P. WHEELS AND TIRES**

1.Wheels

a.Make	Accuride
b.Size	22.5 x 9.0
c.Capacity	10,000 Lbs
d.Material	Steel (powder coat finish)

2.Tires

a.Manufacturer	Firestone
b.Type	Radial
c.Size	315/80 R22.5

d.Load Range/Air Pressure 

L / 130
---------

 lb/psi

**Q.STEERING, POWER**

1.Pump

a.Manufacturer.	Ixetic (Luk)	
b. Model Number	LF183	
c.Type	Vane pump (Flange mounted and gear driven)	
d.Relief Pressure	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>1500</td></tr></table> psi	1500
1500		

2. Booster/Gear Box

a. Manufacturer	TRW
b. Model Number	TAS85
c. Type	Integral steering unit
d. Ratio	23.3:1

3. Power Steering Fluid Capacity	8	gal
4. Maximum Effort at Steering Wheel	10	Lbs/Ft (unloaded stationary coach on dry asphalt pavement)
5. Steering Wheel Diameter	20	in.

**R. BRAKES**

1. Make of Fundamental Brake System Meritor EX-225

2. Brake Chambers Vendor Size and Part Number:

a. First:	TSE brake chamber, Type 24
b. Sec'd:	MGM spring brake
c. Third:	TSE brake chamber

3. Brake operation effort Max force to operate brake pedal not to exceed 50 Lbs

4. Slack Adjuster's Vendor's Type and Part Numbers

a. First:	Right:	N/R (MCI uses self adjusting disk brakes)
	Left:	N/R (MCI uses self adjusting disk brakes)
b. Second:	Right:	N/R (MCI uses self adjusting disk brakes)
	Left:	N/R (MCI uses self adjusting disk brakes)
Third:	Right:	N/R (MCI uses self adjusting disk brakes)
	Left:	N/R (MCI uses self adjusting disk brakes)
c. Length:	First take-up:	N/R
	Second take-up:	N/R
	Third take-up:	N/R

5. Brake Drums/Discs – No drum brakes, Disc brakes EX-225

a. First:	1. Manufacturer	Meritor
	2. Part number	EX-225



3.Diameter 17 in.

b.Second: 1.Manufacturer Meritor  
2.Part Number EX-225

3.Diameter 17 in.

c.Third: 1.Manufacturer Meritor  
2.Part Number EX-225

3.Diameter 17 in.

6.Brake Lining Manufacturer Meritor  
Type MA 703 (Front and rear)

7.Brake Lining Identification – N/A for EX-225

First: Forward N/A  
Reverse N/A

Second: Forward N/A  
Reverse N/A

Third: Forward N/A  
Reverse N/A

8.Brake Linings Per Shoe - N/A for EX-225

a.First N/A  
b.Second N/A  
c.Third N/A

9.Brake Lining Widths – N/A for EX-225

a.First N/A in.  
b.Second N/A in.  
c.Third N/A in.

10.Brake Lining Lengths – N/A for EX-225

- a.First  in.
- b.Second  in.
- c.Third  in.

11.Brake Lining Thickness  in.

12.Brake Lining Per Axle – N/A for EX-225

- a.First  sq. in.
- b.Second  sq. in.
- c.Third  sq. in.

**S. COOLING SYSTEM**

1.Radiator/Charge Air Cooler

a.Manufacturer	Modine/Modine
b.Model Number	1A021403
c.Type	Aluminium welded tube/Aluminium extruded tube down flow type, Electric fans
d.Number of Tubes	184/28

e.Tubes Outer Diameter  in./  in. Proprietary info from Modine

f.Fins per Inch  fins

g.Fin Thickness  in. Proprietary info from Modine

2.Total Cooling & Heating System Capacity  gal

3.Radiator Fan Speed Control

4.Surge Tank Capacity  quarts

5.Engine Thermostat Temperature Setting:

- a.Initial opening  °F
- b.Fully closed  °F

6.Overheat Alarm Temperature Sending Unit  °F

) Setting

7.Shutdown Temperature Setting

 °F

**T. Air Reservoir Capacity**

1. Supply Reservoir	2059	in. <sup>3</sup>
2. Primary Reservoir	2059	in. <sup>3</sup>
3. Secondary Reservoir	2059	in. <sup>3</sup>
4. Packing Reservoir	2059	in. <sup>3</sup>
5. Accessory Reservoir	1180	in. <sup>3</sup>
6. Other Reservoir Type	1180	in. <sup>3</sup>

**U. HEATING, VENTILATION AND AIR CONDITIONING EQUIPMENT**

Thermo King T-series Rear Mount with Screw Compressor

Or equal Yes MCI HVAC system design

1. Heating system capacity	186K	BTU/hr
2. Air conditioning capacity	120K	BTU
3. Ventilating capacity	15-60	CFM in passenger area

4. Compressor

a. Manufacturer	Bitzer
b. Model number	4NFCY

c. Number of cylinders	4	
d. Drive ratio	.9	
e. Maximum warranted speed	3500	rpm
f. Operating speed	1750	rpm (recommended)
g. Weight	73	lbs
h. Oil capacity		

1) Dry	.68	gal
2) Wet	.68	gal
i. Refrigerant: Type	R134A	37 lbs

5. Condenser

a. Manufacturer	Heatcraft
b. Model number	3CY1204
c. Number of rows	26
d. Number of fins/in.	12

e. Outer diameter of tube 

.37
-----

 in.

f. Fin thickness 

.006
------

 in.

6. Condenser Fan

a. Manufacturer	Spal	
b. Model Number	VA-89A	
c. Fan Diameter	13" x 4 fans	in.
d. Speed Maximum	3650	rpm
e. Flow Rate (maximum)	N/A	CFM

7. Receiver

a. Manufacturer	Steel fab	
b. Model	A12621	
c. Capacity	2	lbs

8. Condenser Fan Drive Motors

a. Manufacturer	Spal	
b. Model	VA-89A	
c. Type	Brushless	
d. Horsepower	1.44	hp
e. Operating Speed	3650	rpm

9. Evaporator Fan Drive Motors

a. Manufacturer	Ametek	
b. Model	64FR	
c. Type	Brushless	
d. Horsepower	1.4/10.8	hp
e. Operating Speed	2800/2340	rpm

10. Evaporator(s)

a. Manufacturer	Heatcraft	
b. Model	3EY1406	
c. Number of Rows	20	
d. Number of Fins/in.	14	

e. Outer Diameter of Tube

.375

in.

f. Fin Thickness

.008

in.

g. Number of Evaporators

1

11. Expansion Valve

a. Manufacturer

Alco

b. Model

TCLE-7 1/2

12. Filter-Drier

a. Manufacturer

Sporlan

b. Model

C-415

13. Heater Cores

a. Manufacturer

Carrier

b. Model

68GH

c. Capacity

140K

BTU/hr

d. Number of Rows

20

e. Number of Fins/in.

12

f. Outer Diameter of Tube

N/A

in.

g. Fin Thickness

.006

in.

h. Number of Heater Cores

1

14. Floor Heater Blowers

Front

N/A

Rear

N/A

15. Controls

a. Manufacturer

Carrier

b. Model

Micromax

c. Type

Electronic, 4 button display



16. Driver's Heater

a. Manufacturer

Red Dot

b. Model

R-7166 (for below floor defroster)

c. Capacity

31K (for below floor defroster)

BTU/hr

17. Ventilation System

a. Type

Combined (along sidewall from main HVAC) and from parcel rack vents (from p/rack A/C))

18. Coolant Heater

a. Make

Proheat

b. Model

X-45

c. Capacity

45,000

BTU

**V. INTERIOR LIGHTING**

Dinex with Nichia or Phillips LED's

Or equal as listed below:

1. Manufacturer

LED Smart Inc

2. Type

LED Strip

3. Number of Fixtures

16 (basic) and plus 15 (with window light option)

4. Size of Fixtures

48.5 in Length

5. Power Pack

20W power consumption

Per LED strip

**W. Doors**

Vapor bus International Bi-part leaf panel doors

Or equal as listed below:

1. Front

a. Manufacturer of Operating Equipment

MCI (OEM manufacturer)

b. Type of Door

Bi-fold

c. Type of Operating Equipment

An electrically controlled, air-operated, power bi-fold door

) 2.Rear – This is for WCL passenger only

a.Manufacturer of  
Operating Equipment

MCI (OEM manufacturer)

b.Type of Door

WCL sliding door – single leaf design

c.Type of Operating  
Equipment

Power assisted, sliding

**X.PASSENGER WINDOWS**

1.Manufacturer	Dura Automotive systems
2.Model Number	Egress window (Top hinged, push out at bottom) and non-egress
3.Type	Framed

4.Number:	Side	8 LH and 8 RH
	Rear	N/A

5.Sizes:	36.19 x 56.00	Passenger	15 ea
	36.19 x 34.07	WCL door	1 ea

6.Glazing:	a.Type	Dual pane
	b.Thickness	.25 and .188 Dual pane
	c.Color of Tint	Gray
	d.Light Transmission	26% Dual

**Y.Mirrors**

	Size	Type	Manufacturer	Part No.	Model No.
1.Right Side Exterior	10x13	HTD	Hadley	M07G11FM	
2.Left Side Exterior	10x13	HTD	Hadley	M07G10FM	
3.Center Rearview			N/A		
4.Front Entrance Area	10x6		Mekra	STS 0152	
5.Upper-Right Corner			N/A		
6.Rear Exit Area			N/A		

**Z.SEATS**

**1. Passenger seats (to be selected by customer)**

a.Manufacturer	Kiel or Amaya (4One)
b.Model	2050 Avance (For Kiel) or Torino GT (For 4One)
Type	With passenger restraints

**2. Bus Operator seat**

a.Manufacturer	Recaro
b.Model and part number	AM-80 Ergo metro
c.Type	Air ride, with 3 point restraint, orange belt

**AA. PAINT**

1.Manufacturer	Axalta
2.Type	Polyurethane(Former Dupont Elite paint system)
3. Minimum paint thickness	Per MCI paint standard

**BB. WHEELCHAIR RAMP/LIFT EQUIPMENT**

Manufacturer	Braun (Basic)
Model Number	NUVL885RM24(Braun)

Capacity	700(Braun)	lbs
Width of Platform	30 (Braun)	in.
Length of Platform	48 (Braun)	in.
System Fluid Capacity	1	quarts

Type of Fluid Used	Oil/Hydraulic/HFA Aviation or as specified by lift manufacturer
--------------------	---

Operating Hydraulic Pressure		psi
------------------------------	--	-----

Hydraulic Cylinders:	Size	
	Number	

**CC. Wheelchair SECUREMENT EQUIPMENT**

- American Seating ARM & Dual Auto-Lok System
- Or equal as listed below:

1.Manufacturer	Q-straint
2.Model number	Q-straint delux retractor

**DD.DESTINATION SIGNS**

Manufacturer	Twin Vision Smart by Luminator
Type	SMT, LED, Amber, SS3 series

**Character Length**

Front Destination	64.5	in.
Front Run	15.4	in. (Dash run number sign)
Curbside Destination	42.3	in.
Rear Route	18.5	in.

**Character Height**

Front Destination	8	in.
Front Run	3.9	in. (Dash run number sign)
Curbside Destination	4.3	in.
Rear Route	6.6	in.

**Number of Characters**

Front destination	matrix	Programmable 16x160 pixel matrix
Front run	matrix	Programmable 12x40 pixel matrix (Dash run number sign)
Curbside destination	matrix	Programmable 14x112 pixel matrix
Rear route	matrix	Programmable 16x48 pixel matrix

**Message Width**

Front destination	64.5	in.
Front run	15.4	in. (Dash run number sign)
Curbside destination	42.3	in.
Rear route	18.5	in.

**EE. ELECTRICAL**

1. Multiplex System

a. Manufacturer	Dynex
b. Model number	I/O Controls G-4

2. Batteries

a. Manufacturer	Northstar
b. Model number	Type 31 (Qty 4),
c. Type	Maintenance free, AGM batteries

**FF. PA System (If required)**

Clever Devices Speakeasy II Microphone with Minneapolis speakers model EN5WI-6WB

Or equal as listed below:

	<b>Manufacturer</b>	<b>Model Number</b>	<b>Number</b>
Amplifier	REI	700962	1
Microphone	REI	480015 or 480228	1
Internal Speakers	REI	231010	15
External Speaker	REI	230011	1

**GG. SECURITY CAMERA SYSTEM**

<input checked="" type="checkbox"/> Manufacturer	Seon Explorer DX
Model number	
Number of Cameras	8 (5 intr and 3 extr)
Storage Capacity	2 TB

**HH. BICYCLE RACK (If included with Sales order)**

<input checked="" type="checkbox"/> Manufacturer	Sportworks
Model Number	DL2 SS with Ten Second Bracket

**II. ENGINE FIRE SUPPRESSION SYSTEM**

1.Manufacturer	Amerex
2.Model Number	ABC V25
3.Description	Fire suppression system with PHD detectors in engine bay

**JJ. TRANSMISSION FLUID**

Manufacturer	Transynd synthetic
Type	TES-295

**KK. ENGINE BYPASS CENTRIFUGAL NON-DISPOSABLE FILTER (If Required)**

Spinner II Model 976

Or equal as listed below:

1.Manufacturer	Cummins
2.Model number	LF1400NN
3.Description	Full flow spin-on cartrifge, with Nanonet technology for fine particle

**LL. FUEL FILLER**

<input checked="" type="checkbox"/> Manufacturer	Emco Wheaton Posi/Lock II
--	---------------------------

**MM. AUXILIARY BUS AIR SYSTEM CONNECTION**

<input checked="" type="checkbox"/> Manufacturer	Lincoln Air Quick Disconnect #11659 (available as special)
--	--

**NN. BUS SUBFLOOR**

Spaceage Synthetics Thermo-Lite Composite

Or equal as listed below:

1. Manufacturer                      Protectolite
2. Model number                      Composite floor
3. Description                      Compression molded fiberglass

**OO. INTERMEDIATE PLATFORM RIBBED YELLOW FLOOR COVERING**

Hypalon

Manufacturer

Model Number

N/A
N/A
N/A

**PP. EXTERNAL REFLECTIVE GRAPHICS STRIPING**

Manufacturer                      3M Cast Vinyl

**QQ. INTERNAL SIDE TRIM PANELS**

Arborite Vogue P-295-S

Or equal as listed below:

1. Manufacturer                      MCI
2. Model number                      N/A
3. Description                      Fabric covered aluminium panels

**RR. BUS FLOORING**

Gerflor Apollo NT Self-adhesive

Or equal as listed below:

1. Manufacturer                      Altro Transflor
2. Model number                      2.7 mm slip resistant transit flooring
3. Description                      Chroma Windmill TRCR 27404 Pluto

**SS. PASSENGER SEAT FABRIC**

Holdsworth 5621/6094/3267

Or equal as listed below:

1. Manufacturer                      Morbern Vynil
2. Model number                      M432 IMPERAIL BLUE and BS 362 BAYFIELD NAVY
3. Description                      Stain resistant, anti-microbial, antibacterial, easy to clean vynil



**TT. PASSENGER NOTICE SIGN FRAMES**



Transit Information Products MC TAB HOR

**UU. SCHEDULE HOLDER**



Transit Information Products OBIC-WW8P (if selected on CSO)

**VV. SUPERCAPACITOR ENGINE START AID**



PAPower KBI EC501.2



Or equal as listed below:

1. Manufacturer KBI
2. Model Number KSM05002418
3. Description 120KJ Ultracapacitor

**WW. RADIO HANDSET AND CRADLE**



Audiosears Corp. 1001A00AEMJLUC-QHC



Or equal as listed below:

1. Manufacturer Audiosears
2. Model Number 3441ENV
3. Description Radio handset and cradle

**XX. COVERT EMERGENCY ALARM BUTTON**



Square D #9001KR2U Push Button



Or equal as listed below:

1. Manufacturer Cole-Hersee
2. Model Number 90072
2. Description Momentary 2 positions, 2 circuits switch

**YY. ITS SYSTEM**



Manufacturer

Trapeze Transit Master

SCAAN No. : 297755  
 Description : D4500 ISX 425 B500 3.73 Belt Fan  
 Date : 8/5/2016  
 User : Kurt Friesen, MCI/NAC  
 Application Review Status :  
 Output Units : US

ALLISON TRANSMISSION  
 INPUT SUMMARY

L RTP POSSIBLE BUT NOT REQUIRED

VOCATION

Service	Bus
Application	Intercity Bus
Configuration	Straight Vehicle
Vocation Number	44-25-14

VEHICLE PARAMETERS

*Description*

End User (and Region, Sub Region)	Various (North America)
Manufacturer (and Region, Sub Region)	Motor Coach Industries (North America, Canadian)
Model	D4500COM
Description	D4500 Commuter

*Area and Weight*

Power Packs	1
Height	11.40 (ft)
Width	8.50 (ft)
Standard Wind Resistance Coefficient ( No Deflector )	0.45
User Defined Resistance Coefficient ( No Deflector )	0.00
Weight, Rated ( No Trailer, GVW )	50000 (lb)
Weight on Drive Wheels	42.00 (%)
Weight on Drive Wheels	21000 (lb)

*Tires*

Number of Tires	8
Manufacturer	
Tire Model & Size	
Tire Type	Standard Radial Tire
Revs	490 (revs/mi)
Radius	20.58 (in.)
Standard Surface Factor	1.0 Smooth Concrete
User Defined Surface Factor	0.0
Standard Traction Limit Coefficient ( On-Road )	0.70

ENGINE

Engine Manufacturer	Cummins
Model	ISX12 EPA13
Description	425hp / 1450lbf / 2100rpm
Certification Year	2013
Peak Torque/Speed	1450.0/1100 (lb-ft)/(rpm)
Peak Power/Speed	425.0/1800 (hp)/(rpm)
Governed Power/Speed	397.8/2100 (hp)/(rpm)
Cruise Velocity/Speed	65.0/1370 (mph)/(rpm)
Vocation	0
Engine Curve Reference	FR20402MC
No. Of Curves	Single
SCAAN File Number	2-1307

This SCAAN information is subject to the SCAAN Disclaimer set forth elsewhere.

## ACCESSORIES (Power at governed speed)

	Standard (hp)	User (hp)
Fan (clutch fan)	57.36	65.00
Alt/Generator	8.50	12.00
Air Compressor	2.48	1.50
Steer Pump	2.48	1.50
Air Conditioning	0.00	22.00

## TRANSMISSION

Manufacturer	Allison
Configuration	B500 (1-6) (1-500-3)
Converter	TC541 (NOT RECOMMENDED - Smoke Control) (1-541-1)
Retarder	
Shift Calibration	1950 rpm, S1/S5 Cal, Std Preselect, (1-6) (1-40002-1950-1003)
Rating	Intercity Coach w/4th & 5th Gen Controls (1-500-4)

## DRIVELINE

Propshaft	DriveAxles
Std Efficiency	98.60 (%)
Axle	6x2 On Hwy Single Red
Manufacturer	
Description	
Ratio Description	Single
Ratio	3.730
Std Efficiency	97.00 (%)
Overall Driveline	
Ratio	3.730
Std Efficiency	95.64 (%)
Output Torque Limit	0.00

## GRADES

Std Acceleration	0.00 (%)
------------------	----------

## INERTIA

Engine (estimated)	2.7672 (lb-ft-sec <sup>2</sup> )
Tires/Wheels (estimated)	80.4717 (lb-ft-sec <sup>2</sup> )

## ENGINE DETAIL - Standard Accessories (AC On where applicable)

## Low And High Power

Speed (rpm)	Power (hp)	Torque (lb-ft)	Fan On/AC On Net Power (hp)	Fan On/AC On Net Torque (lb-ft)	Fan Off/AC On Net Power (hp)	Fan Off/AC On Net Torque (lb-ft)	
1100	303.7	1450.0	284.4	1357.8	292.6	1397.2	Peak Torque
1200	331.3	1450.0	309.3	1353.7	320.0	1400.5	
1300	358.9	1450.0	333.8	1348.5	347.4	1403.4	
1400	386.5	1450.0	357.8	1342.1	374.8	1405.9	
1500	414.1	1450.0	381.2	1334.8	402.1	1408.0	
1600	429.6	1410.0	392.0	1286.6	417.3	1369.8	
1700	430.5	1330.0	387.6	1197.5	418.0	1291.5	
1800	425.0	1240.0	376.2	1097.6	412.3	1202.9	Peak Power
1900	419.6	1160.0	364.3	1006.9	406.7	1124.2	
2000	411.3	1080.0	348.6	915.4	398.1	1045.4	
2100	397.8	995.0	327.1	818.1	384.4	961.5	Governed
2300	0.0	0.0	-89.2	-203.6	-13.9	-31.7	No Load Governed

Peak Power point has been defined for the purposes of assessing Accessory Losses

This SCAAN information is subject to the SCAAN Disclaimer set forth elsewhere.

## ENGINE DETAIL - User Defined Accessories (AC On where applicable)

## Low And High Power

Speed (rpm)	Power (hp)	Torque (lb-ft)	Fan On/AC On Net Power (hp)	Fan On/AC On Net Torque (lb-ft)	Fan Off/AC On Net Power (hp)	Fan Off/AC On Net Torque (lb-ft)	
1100	303.7	1450.0	269.3	1285.6	278.6	1330.2	Peak Torque
1200	331.3	1450.0	292.9	1281.9	305.0	1335.0	
1300	358.9	1450.0	316.0	1276.7	331.4	1339.0	
1400	386.5	1450.0	338.6	1270.2	357.9	1342.5	
1500	414.1	1450.0	360.6	1262.5	384.3	1345.5	
1600	429.6	1410.0	369.8	1213.7	398.5	1308.1	
1700	430.5	1330.0	363.8	1123.9	398.3	1230.4	
1800	425.0	1240.0	350.6	1023.0	391.6	1142.5	Peak Power
1900	419.6	1160.0	336.9	931.2	385.0	1064.3	
2000	411.3	1080.0	319.3	838.5	375.5	986.0	
2100	397.8	995.0	295.8	739.9	360.8	902.5	Governed
2300	0.0	0.0	-124.8	-284.9	-39.4	-89.9	No Load Governed

Peak Power point has been defined for the purposes of assessing Accessory Losses

This SCAAN information is subject to the SCAAN Disclaimer set forth elsewhere.

SCAAN No. : 297755  
 Description : D4500 ISX 425 B500 3.73 Belt Fan  
 Date : 8/5/2016  
 User : Kurt Friesen, MCI/NAC  
 Application Review Status :  
 Output Units : US

ALLISON TRANSMISSION  
 SCAAN SUMMARY  
 Based On Standard Parameters

L RTP POSSIBLE BUT NOT REQUIRED

Vocation: Bus, Intercity Bus, Straight Vehicle  
 End User: Various (North America)  
 Manufacturer: Motor Coach Industries (North America, Canadian)  
 Model: D4500COM, D4500 Commuter

Engine: Cummins ISX12 EPA13 425hp / 1450lbft / 2100rpm  
 Engine Certification Year: 2013  
 Transmission: B500 (1-6)  
 Rating: Intercity Coach w/4th & 5th Gen Controls  
 Converter: TC541 (NOT RECOMMENDED - Smoke Control)  
 Retarder:

Converter

Check	Check Name	Recomm/R tin	Units	Min/Max	Actual	Over Limit
C1	Transmission/Converter Compatibility					OK
C2	Engine/Converter Compatibility					OK
C4	Engine Speed at Converter Stall		rpm		1628	
C9	Minimum Engine Speed Required at Converter Stall	1825	rpm	Min	1628	XX
C5	Minimum Engine Speed	1200	rpm	Min	1628	OK
C7	Turbine Torque at Converter Stall	2450	lb-ft	Max	2347	OK
C8	Converter Speed Ratio at Engine Governed Speed	0.800		Min	0.916	OK
C3	Converter Stall Torque Ratio				1.897	

Transmission

Check	Check Name	Recomm/R tin	Units	Min/Max	Actual	Over Limit
T1	Transmission/Vocation Compatibility					OK
T2	Transmission/Engine Compatibility					OK
T20	Engine is SEM/LRTP Capable					OK
T17	Transmission Permitted in End User/Chassis Mfg Locations					OK
T15	Transmission Input Power (Gross)	550	hp	Max	431	OK
T14	Transmission Input Torque (Gross)	1700	lb-ft	Max	1450	OK
T3	Transmission Input Speed	1700 / 2300	rpm		2100	OK
T4	Transmission Output Speed		rpm		3286	

Vehicle/DriveLine

Check	Check Name	Recomm/R tin	Units	Min/Max	Actual	Over Limit
V21	1st Range Converter Stall Gradeability		percent		35.5	
V13	1st Range 70% Converter Efficiency Gradeability		percent		23.9	
V14	1st Range 80% Converter Efficiency Gradeability	18.0	percent	Min	20.5	OK
V17	Maximum Geared Vehicle Speed at Engine Governed Speed		mph		107.9	
V18	Maximum Speed on 0.50% Grade	65.0	mph	Min	90.9	OK
V43	Heat Generated in 1st Range 70% Converter Efficiency		Btu/min		5259	
V44	Heat Generated in 1st Range 80% Converter Efficiency		Btu/min		3684	

Vehicle/DriveLine/Fuel Economy

Check	Check Name	Recomm/R tin	Units	Min/Max	Actual	Over Limit
V51	Maximum Driveline Ratio for Optimum Engine Speed	4.039		Max	3.730	OK
V59	Gradeability at 65.0 mph Cruise Velocity	0.50	percent	Min	2.54	OK
V60A	Gradeability at 2C-2L Shift	7.0	percent	Min	9.8	OK
V61	Vehicle Speed at 5L-6L Shift	60.0	mph	Max	83.5	C

OK: Acceptable  
OK-1: OK based on pre-acceptance by Engineering  
OK-2: OK based on Accepted Application Review  
C: Consider - manufacturer to assess  
XX: Questionable - may not be acceptable  
XXX: Not Acceptable - rating or usage violation

This SCAAN information is subject to the SCAAN Disclaimer set forth elsewhere.

## Notes

Check	Comments
C9	Minimum Engine Speed at Converter Stall is specified by the Engine Manufacturer to avoid performance problems. Requires ATI Review.
C5	Net peak torque speed (1100 rpm) + allowable variation (100 rpm).
T4	Check made in Range 6L at 2100 rpm Engine Governed Speed
V17	In 6 Lockup
V18	At 1769 rpm Engine Speed, Range 6L
V43	At 1759 rpm Engine Speed
V44	At 1806 rpm Engine Speed
V51	Recommended Ratio based on 6L operation at Engine Manufacturer's recommended Cruise Conditions of 65.0 mph at 1370 rpm. Actual Ratio results in 65.0 mph at 1265 rpm.
V60A	Actual Gradeability in 2L
V61	Recommended 5L-6L Shift Speed is Cruise Speed - 5.0 mph

This SCAAN information is subject to the SCAAN Disclaimer set forth elsewhere.

SCAAN No. : 297755  
 Description : D4500 ISX 425 B500 3.73 Belt Fan  
 Date : 8/5/2016  
 User : Kurt Friesen, MCI/NAC  
 Application Review Status :  
 Output Units : US

ALLISON TRANSMISSION  
 SCAAN SUMMARY  
 Based On User Defined Parameters

L RTP POSSIBLE BUT NOT REQUIRED

Vocation: Bus, Intercity Bus, Straight Vehicle  
 End User: Various (North America)  
 Manufacturer: Motor Coach Industries (North America, Canadian)  
 Model: D4500COM, D4500 Commuter

Engine: Cummins ISX12 EPA13 425hp / 1450lbft / 2100rpm  
 Engine Certification Year: 2013  
 Transmission: B500 (1-6)  
 Rating: Intercity Coach w/4th & 5th Gen Controls  
 Converter: TC541 (NOT RECOMMENDED - Smoke Control)  
 Retarder:

Vehicle/DriveLine

Check	Check Name	Recomm/Rating	Units	Min/Max	Actual
V21	1st Range Converter Stall Gradeability		percent		34.0
V13	1st Range 70% Converter Efficiency Gradeability		percent		23.0
V14	1st Range 80% Converter Efficiency Gradeability	18.0	percent	Min	19.7
V17	Maximum Geared Vehicle Speed at Engine Governed Speed		mph		107.9
V18	Maximum Speed on 0.50% Grade	65.0	mph	Min	89.1
V43	Heat Generated in 1st Range 70% Converter Efficiency		Btu/min		5187
V44	Heat Generated in 1st Range 80% Converter Efficiency		Btu/min		3632

Vehicle/DriveLine/Fuel Economy

Check	Check Name	Recomm/Rating	Units	Min/Max	Actual
V51	Maximum Driveline Ratio for Optimum Engine Speed	4.039		Max	3.730
V59	Gradeability at 65.0 mph Cruise Velocity	0.50	percent	Min	2.35
V60A	Gradeability at 2C-2L Shift	7.0	percent	Min	9.2
V61	Vehicle Speed at 5L-6L Shift	60.0	mph	Max	83.5

OK: Acceptable  
 OK-1: OK based on pre-acceptance by Engineering  
 OK-2: OK based on Accepted Application Review  
 C: Consider - manufacturer to assess  
 XX: Questionable - may not be acceptable  
 XXX: Not Acceptable - rating or usage violation

This SCAAN information is subject to the SCAAN Disclaimer set forth elsewhere.



## Notes

Check	Comments
V17	In 6 Lockup
V18	At 1734 rpm Engine Speed, Range 6L
V43	At 1751 rpm Engine Speed
V44	At 1797 rpm Engine Speed
V51	Recommended Ratio based on 6L operation at Engine Manufacturer's recommended Cruise Conditions of 65.0 mph at 1370 rpm. Actual Ratio results in 65.0 mph at 1265 rpm.
V60A	Actual Gradeability in 2L
V61	Recommended 5L-6L Shift Speed is Cruise Speed - 5.0 mph

This SCAAN information is subject to the SCAAN Disclaimer set forth elsewhere.

SCAAN No. : 297755  
 Description : D4500 ISX 425 B500 3.73 Belt Fan  
 Date : 8/5/2016  
 User : Kurt Friesen, MCI/NAC  
 Application Review Status :  
 Output Units : US

ALLISON TRANSMISSION  
 CUSTOMER PERFORMANCE SUMMARY  
 Based on Standard Parameters

L RTP POSSIBLE BUT NOT REQUIRED

Vocation: Bus, Intercity Bus, Straight Vehicle  
 End User: Various (North America)  
 Manufacturer: Motor Coach Industries (North America, Canadian)  
 Model: D4500COM, D4500 Commuter

Engine: Cummins ISX12 EPA13 425hp / 1450lbf / 2100rpm  
 Engine Certification Year: 2013  
 Transmission: B500 (1-6)  
 Rating: Intercity Coach w/4th & 5th Gen Controls  
 Converter: TC541 (NOT RECOMMENDED - Smoke Control)  
 Retarder:  
 Weight: 50000 (lb) (GVW)  
 Driveline Ratio : 3.730  
 Desired Cruise Velocity: 65.00 (mph)  
 Tires: Standard Radial Tire, 490.0 (revs/mi)

Geared Speed: 107.9 (mph) 6L

Clutch Fan Status : Fan On  
 Air Conditioning Status : No AC

Gradeability

Plot

Launch Gradeability	33.5(%)
Low Speed Gradeability	20.5(%) at 10.1(mph), 80(%) Conv Eff Grade
Maximum Speed On Grade	0.00(%) at 93.3(mph), 6L, Road Load Speed
	0.25(%) at 90.7(mph), 6L
	0.50(%) at 88.0(mph), 6L
	1.00(%) at 80.7(mph), 5L
	2.00(%) at 70.8(mph), 5L
	3.00(%) at 59.1(mph), 4L
	4.00(%) at 52.2(mph), 4L
	5.00(%) at 42.6(mph), 3L
	6.00(%) at 39.9(mph), 3L
	7.00(%) at 32.3(mph), 2L
	8.00(%) at 31.3(mph), 2L
	9.00(%) at 27.9(mph), 2L
	10.00(%) at 20.2(mph), 2C

Acceleration (full throttle, brakes locked start)

Plot

Time And Distance To Speed, 0(%) Grade	0-20 (mph)	in 5.6(sec) 100(ft)
	0-30 (mph)	in 10.8(sec) 293(ft)
	0-40 (mph)	in 18.0(sec) 663(ft)
	0-50 (mph)	in 28.3(sec) 1350(ft)
	0-60 (mph)	in 41.6(sec) 2428(ft)

This SCAAN information is subject to the SCAAN Disclaimer set forth elsewhere.

SCAAN No. : 297755  
 Description : D4500 ISX 425 B500 3.73 Belt Fan  
 Date : 8/5/2016  
 User : Kurt Friesen, MCI/NAC  
 Application Review Status :  
 Output Units : US

ALLISON TRANSMISSION  
 CUSTOMER PERFORMANCE SUMMARY  
 Based on User Defined Parameters

LRTP POSSIBLE BUT NOT REQUIRED

Vocation: Bus, Intercity Bus, Straight Vehicle  
 End User: Various (North America)  
 Manufacturer: Motor Coach Industries (North America, Canadian)  
 Model: D4500COM, D4500 Commuter

Engine: Cummins ISX12 EPA13 425hp / 1450ibft / 2100rpm  
 Engine Certification Year: 2013  
 Transmission: B500 (1-6)  
 Rating: Intercity Coach w/4th & 5th Gen Controls  
 Converter: TC541 (NOT RECOMMENDED - Smoke Control)  
 Retarder:  
 Weight: 50000 (lb) (GVW)  
 Driveline Ratio : 3.730  
 Desired Cruise Velocity: 65.00 (mph)  
 Tires: Standard Radial Tire, 490.0 (revs/mi)

Geared Speed: 107.9 (mph) 6L

Clutch Fan Status : Fan On  
 Air Conditioning Status : On

*Gradeability*

Launch Gradeability	32.0(%)
Low Speed Gradeability	19.7(%) at 9.9(mph), 80(%) Conv Eff Grade
Maximum Speed On Grade	0.00(%) at 91.2(mph), 6L, Road Load Speed
	0.25(%) at 88.6(mph), 6L
	0.50(%) at 85.8(mph), 6L
	1.00(%) at 78.6(mph), 5L
	2.00(%) at 67.2(mph), 5L
	3.00(%) at 57.2(mph), 4L
	4.00(%) at 47.7(mph), 4L
	5.00(%) at 41.0(mph), 3L
	6.00(%) at 37.8(mph), 3L
	7.00(%) at 31.9(mph), 2L
	8.00(%) at 29.7(mph), 2L
	9.00(%) at 26.1(mph), 2L
	10.00(%) at 18.8(mph), 2C

*Acceleration (full throttle, brakes locked start)*

Time And Distance To Speed, 0(%) Grade	0-20 (mph)	in 5.9(sec) 105(ft)
	0-30 (mph)	in 11.5(sec) 311(ft)
	0-40 (mph)	in 19.1(sec) 708(ft)
	0-50 (mph)	in 30.3(sec) 1450(ft)
	0-60 (mph)	in 44.9(sec) 2632(ft)

This SCAAN information is subject to the SCAAN Disclaimer set forth elsewhere.

SCAAN No. : 297755  
 Description : D4500 ISX 425 B500 3.73 Belt Fan  
 Date : 8/5/2016  
 User : Kurt Friesen, MCI/NAC  
 Application Review Status :  
 Output Units : US

ALLISON TRANSMISSION  
 VEHICLE FULL THROTTLE PERFORMANCE  
 Based on User Defined Parameters

L RTP POSSIBLE BUT NOT REQUIRED  
 Power Packs: 1

Transmission Input Ratio : 1.0000  
 Transmission Input Efficiency (%): 100.00

Clutch Fan Status : Fan On  
 Air Conditioning Status : Off

Axle Ratio: 3.730  
 Auxiliary Gearing Ratio: 1.000

Reverse (R1C)

	Vehicle Speed (mph)	Engine Speed (rpm)	Tractive Effort (lb)	Drawbar Pull (lb)	Wheel Power (hp)	Net % Grade (%)	Transm Heat Rej (Btu/min)		
R1C	0.0	1621	22422	22210	0.0	49.6	16353	*	
R1C	4.0	1711	17622	17399	188.0	37.1	7791	*	
R1C	5.7	1751	15751	15522	237.6	32.7	5390	*	70Percent
R1C	7.3	1797	13650	13414	266.3	27.8	3878		80Percent
R1C	8.0	1815	12823	12584	273.5	26.0	3458		
R1C	8.6	1831	12150	11909	279.5	24.5	3109		85Percent
R1C	12.0	1968	8447	8190	270.3	16.6	2670		
R1C	13.2	2100	7309	7046	257.2	14.2	2077		Governed
R1C	15.2	2248	0	-274	0.0	-0.5	686		

Automatic (1C-2C-2L-3L-4L-5L-6L)

	Vehicle Speed (mph)	Engine Speed (rpm)	Tractive Effort (lb)	Drawbar Pull (lb)	Wheel Power (hp)	Net % Grade (%)	Transm Heat Rej (Btu/min)		
1C	0.0	1621	16802	16590	0.0	35.2	16353	*	
1C	4.0	1683	14018	13795	149.5	28.7	9591		
1C	7.7	1751	11760	11522	242.6	23.7	5166		70Percent
1C	8.0	1756	11578	11339	247.0	23.3	4946		
1C	10.0	1797	10190	9943	271.9	20.3	3629		80Percent
1C	11.8	1831	9067	8812	285.3	17.9	2852		85Percent
1C	12.0	1834	8950	8693	286.4	17.7	2787		
1C	12.7	1850	8514	8254	288.4	16.7	2611		
2C	12.7	1735	6707	6446	227.2	13.0	5931		
2C	16.0	1769	6040	5762	257.7	11.6	4400		
2C	20.0	1814	5234	4931	279.2	9.9	3217		
2C	22.5	1838	4801	4480	287.9	9.0	2699		
2L	22.5	1306	5110	4790	306.4	9.6	449		
2L	24.0	1394	5087	4755	325.5	9.6	482		
2L	28.0	1626	4768	4405	356.0	8.8	550		
2L	32.0	1858	3894	3496	332.3	7.0	622		
2L	32.3	1876	3830	3429	329.9	6.9	633		
3L	32.3	1406	3818	3418	328.9	6.9	455		
3L	36.0	1567	3697	3261	355.0	6.5	509		
3L	40.0	1741	3261	2784	347.9	5.6	547		
3L	43.1	1875	2882	2370	331.0	4.7	592		
4L	43.1	1312	2694	2182	309.4	4.4	380		
4L	44.0	1340	2691	2169	315.8	4.3	382		
4L	48.0	1462	2679	2109	343.0	4.2	381		
4L	52.0	1584	2591	1968	359.3	3.9	392		
4L	56.0	1706	2376	1698	354.8	3.4	421		
4L	60.0	1828	2124	1388	339.8	2.8	454		
4L	61.6	1875	2033	1273	333.6	2.5	472		
5L	61.6	1382	1960	1201	321.7	2.4	536		

5L	64.0	1437	1953	1156	333.3	2.3	563	
5L	68.0	1527	1925	1062	349.0	2.1	600	
5L	72.0	1617	1847	916	354.6	1.8	635	
5L	76.0	1706	1722	720	349.1	1.4	672	
5L	80.0	1796	1584	507	337.9	1.0	705	
5L	83.5	1875	1472	327	327.9	0.7	725	
6L	83.5	1626	1569	424	349.5	0.8	840	
6L	84.0	1635	1558	403	349.0	0.8	843	
6L	88.0	1713	1462	226	343.2	0.5	899	
6L	92.0	1791	1357	36	333.0	0.1	951	
6L	96.0	1869	1260	-150	322.6	-0.3	996	
6L	100.0	1946	1163	-338	310.2	-0.7	1051	
6L	104.0	2024	1064	-532	295.1	-1.1	1115	
6L	107.9	2100	963	-728	277.2	-1.5	1189	Governed
6L	108.0	2102	948	-746	273.1	-1.5	1190	
6L	112.0	2180	421	-1375	125.7	-2.8	1202	
6L	115.2	2242	0	-1880	0.0	-3.8	1210	

1st Lockup Hold

	Vehicle Speed (mph)	Engine Speed (rpm)	Tractive Effort (lb)	Drawbar Pull (lb)	Wheel Power (hp)	Net % Grade (%)	Transm Heat Rej (Btu/min)	
1C	0.0	1621	16802	16590	0.0	35.2	16353	*
1C	4.0	1683	14018	13795	149.5	28.7	9591	
1C	7.7	1751	11760	11522	242.6	23.7	5166	70Percent
1C	8.0	1756	11578	11339	247.0	23.3	4946	
1C	10.0	1797	10190	9943	271.9	20.3	3629	80Percent
1C	11.8	1830	9076	8820	285.2	17.9	2858	
1L	11.8	1260	9410	9155	295.7	18.6	457	
1L	12.0	1283	9400	9144	300.8	18.6	468	
1L	16.0	1711	8188	7910	349.4	16.0	636	
1L	19.6	2100	5463	5163	286.1	10.4	792	Governed
1L	20.0	2139	4038	3734	215.3	7.5	774	
1L	21.0	2248	0	-310	0.0	-0.6	713	

Clutch Fan Status : Fan On  
Air Conditioning Status : On

Axle Ratio: 3.730  
Auxiliary Gearing Ratio: 1.000

Reverse (R1C)

	Vehicle Speed (mph)	Engine Speed (rpm)	Tractive Effort (lb)	Drawbar Pull (lb)	Wheel Power (hp)	Net % Grade (%)	Transm Heat Rej (Btu/min)	
R1C	0.0	1596	21787	21575	0.0	47.8	15671	*
R1C	4.0	1689	17061	16837	182.0	35.8	7388	*
R1C	5.6	1726	15320	15091	227.8	31.7	5181	70Percent
R1C	7.2	1772	13258	13023	255.2	27.0	3711	80Percent
R1C	8.0	1793	12326	12088	263.0	24.9	3251	
R1C	8.5	1803	11802	11561	267.4	23.8	2995	85Percent
R1C	12.0	1958	8045	7789	257.4	15.8	2443	
R1C	13.3	2100	6780	6517	240.3	13.1	1893	Governed
R1C	15.1	2237	0	-273	0.0	-0.5	684	

Automatic (1C-2C-2L-3L-4L-5L-6L)

	Vehicle Speed (mph)	Engine Speed (rpm)	Tractive Effort (lb)	Drawbar Pull (lb)	Wheel Power (hp)	Net % Grade (%)	Transm Heat Rej (Btu/min)	
1C	0.0	1596	16327	16115	0.0	34.0	15671	*
1C	4.0	1660	13580	13357	144.9	27.7	9107	
1C	7.6	1726	11437	11200	232.6	23.0	4968	70Percent
1C	8.0	1733	11180	10942	238.5	22.4	4666	
1C	9.9	1772	9897	9650	260.5	19.7	3474	80Percent

1C	11.6	1803	8807	8552	272.9	17.4	2751	85Percent
1C	12.0	1810	8583	8326	274.7	16.9	2634	
1C	12.7	1828	8142	7882	275.8	16.0	2478	
2C	12.7	1712	6493	6233	220.0	12.6	5609	
2C	16.0	1747	5826	5547	248.6	11.2	4142	
2C	20.0	1791	5031	4728	268.3	9.5	3021	
2C	22.5	1815	4600	4280	275.9	8.6	2553	
2L	22.5	1306	4894	4573	293.4	9.2	445	
2L	24.0	1394	4870	4539	311.7	9.1	477	
2L	28.0	1626	4552	4189	339.9	8.4	544	
2L	32.0	1858	3678	3280	313.8	6.6	615	
2L	32.3	1876	3614	3213	311.3	6.4	626	
3L	32.3	1406	3656	3255	314.9	6.5	451	
3L	36.0	1567	3535	3099	339.4	6.2	505	
3L	40.0	1741	3099	2621	330.5	5.2	543	
3L	43.1	1875	2719	2207	312.3	4.4	587	
4L	43.1	1312	2579	2067	296.3	4.1	380	
4L	44.0	1340	2577	2054	302.3	4.1	382	
4L	48.0	1462	2565	1994	328.3	4.0	381	
4L	52.0	1584	2476	1854	343.4	3.7	392	
4L	56.0	1706	2261	1584	337.7	3.2	421	
4L	60.0	1828	2009	1273	321.5	2.5	454	
4L	61.6	1875	1918	1159	314.9	2.3	472	
5L	61.6	1382	1876	1117	308.0	2.2	531	
5L	64.0	1437	1869	1072	319.0	2.1	558	
5L	68.0	1527	1841	979	333.8	2.0	595	
5L	72.0	1617	1763	833	338.5	1.7	630	
5L	76.0	1706	1639	637	332.1	1.3	666	
5L	80.0	1796	1500	423	320.1	0.8	699	
5L	83.5	1875	1389	243	309.3	0.5	719	
6L	83.5	1626	1497	351	333.4	0.7	834	
6L	84.0	1635	1486	330	332.8	0.7	837	
6L	88.0	1713	1390	153	326.2	0.3	893	
6L	92.0	1791	1285	-37	315.2	-0.1	944	
6L	96.0	1869	1188	-222	304.0	-0.4	989	
6L	100.0	1946	1091	-411	290.9	-0.8	1044	
6L	104.0	2024	991	-605	275.0	-1.2	1107	
6L	107.9	2100	891	-801	256.3	-1.6	1181	Governed
6L	108.0	2102	876	-819	252.3	-1.6	1181	
6L	112.0	2180	349	-1448	104.1	-2.9	1194	
6L	114.6	2231	0	-1865	0.0	-3.7	1200	

1st Lockup Hold

	Vehicle Speed (mph)	Engine Speed (rpm)	Tractive Effort (lb)	Drawbar Pull (lb)	Wheel Power (hp)	Net % Grade (%)	Transm Heat Rej (Btu/min)	
1C	0.0	1596	16327	16115	0.0	34.0	15671	*
1C	4.0	1660	13580	13357	144.9	27.7	9107	
1C	7.6	1726	11437	11200	232.6	23.0	4968	70Percent
1C	8.0	1733	11180	10942	238.5	22.4	4666	
1C	9.9	1772	9897	9650	260.5	19.7	3474	80Percent
1C	11.6	1803	8807	8552	272.9	17.4	2751	85Percent
1C	11.8	1806	8711	8455	273.8	17.2	2698	
1L	11.8	1260	9013	8757	283.3	17.8	451	
1L	12.0	1283	9003	8746	288.1	17.8	462	
1L	16.0	1711	7791	7512	332.4	15.2	628	
1L	19.6	2100	5066	4765	265.3	9.6	782	Governed
1L	20.0	2139	3640	3337	194.1	6.7	764	
1L	20.9	2237	0	-309	0.0	-0.6	709	

Note : \* Tractive Effort exceeds vehicle traction limit (wheelslip possible) using On-Road Traction Limit Coefficient = 0.70  
This SCAAN information is subject to the SCAAN Disclaimer set forth elsewhere.

SCAAN No. : 297755  
 Description : D4500 ISX 425 B500 3.73 Belt Fan  
 Date : 8/5/2016  
 User : Kurt Friesen, MCI/NAC  
 Application Review Status :  
 Output Units : US

ALLISON TRANSMISSION  
 VEHICLE ACCELERATION PERFORMANCE  
 Brakes Locked Start  
 Based on User Defined Parameters

L RTP POSSIBLE BUT NOT REQUIRED  
 Power Packs: 1

Transmission Input Ratio : 1.0000  
 Transmission Input Efficiency (%): 100.00

Clutch Fan Status : Fan On  
 Air Conditioning Status : Off  
 Grade: 0.0 percent

Axle Ratio: 3.730  
 Auxillary Gearing Ratio: 1.000

Reverse (R1C)

	Vehicle Speed (mph)	Time (sec)	Distance (ft)	Accel Rate (mph/sec)	Engine Speed (rpm)	Plot
R1C	4.0	0.5	1.6	6.898	1711	*
R1C	8.0	1.2	7.7	4.971	1815	
R1C	12.0	2.2	22.9	2.888	1968	

Automatic (1C-2C-2L-3L-4L-5L-6L)

	Vehicle Speed (mph)	Time (sec)	Distance (ft)	Accel Rate (mph/sec)	Engine Speed (rpm)
1C	4.0	0.7	2.0	5.620	1683
1C	8.0	1.4	8.9	4.626	1756
1C	12.0	2.4	23.6	3.557	1834
1C	12.7	2.6	27.3	3.334	1850
2C	16.0	3.9	54.2	2.448	1769
2C	20.0	5.7	101.1	2.097	1814
2C	22.5	6.9	140.0	1.904	1838
2L	24.0	7.7	166.3	1.948	1394
2L	28.0	9.8	246.6	1.810	1626
2L	32.0	12.3	356.0	1.438	1858
2L	32.3	12.5	366.1	1.407	1876
3L	36.0	15.1	497.7	1.367	1567
3L	40.0	18.3	673.3	1.169	1741
3L	43.1	21.1	847.6	0.994	1875
4L	44.0	22.1	911.9	0.920	1340
4L	48.0	26.5	1209.4	0.895	1462
4L	52.0	31.1	1546.8	0.836	1584
4L	56.0	36.3	1953.7	0.723	1706
4L	60.0	42.4	2476.2	0.591	1828
4L	61.6	45.2	2721.6	0.541	1875
5L	64.0	50.0	3169.1	0.494	1437
5L	68.0	58.4	3982.3	0.455	1527
5L	72.0	67.8	4951.5	0.393	1617
5L	76.0	79.3	6199.0	0.309	1706
5L	80.0	94.7	7963.5	0.218	1796
5L	83.5	114.8	10370.3	0.140	1875
6L	84.0	117.5	10707.1	0.174	1635
6L	88.0	147.9	14554.4	0.098	1713
6L	92.0	238.3	26564.3	0.017	1791

1st Lockup Hold

--	--	--	--	--	--



	Vehicle Speed (mph)	Time (sec)	Distance (ft)	Accel Rate (mph/sec)	Engine Speed (rpm)
1C	4.0	0.7	2.0	5.620	1683
1C	8.0	1.4	8.9	4.626	1756
1C	11.8	2.4	22.6	3.601	1830
1L	12.0	2.4	23.7	3.335	1283
1L	16.0	3.7	49.4	2.902	1711
1L	20.0	5.5	96.7	1.452	2139

Clutch Fan Status : Fan On  
 Air Conditioning Status : On  
 Grade: 0.0 percent

Axle Ratio: 3.730  
 Auxiliary Gearing Ratio: 1.000

Reverse (R1C)

	Vehicle Speed (mph)	Time (sec)	Distance (ft)	Accel Rate (mph/sec)	Engine Speed (rpm)
R1C	4.0	0.5	1.6	6.684	1689 *
R1C	8.0	1.2	8.0	4.801	1793
R1C	12.0	2.3	24.1	2.669	1958

Automatic (1C-2C-2L-3L-4L-5L-6L)

	Vehicle Speed (mph)	Time (sec)	Distance (ft)	Accel Rate (mph/sec)	Engine Speed (rpm)
1C	4.0	0.7	2.0	5.438	1660
1C	8.0	1.5	9.2	4.462	1733
1C	12.0	2.5	24.5	3.395	1810
1C	12.7	2.7	28.4	3.173	1828
2C	16.0	4.0	56.3	2.357	1747
2C	20.0	5.9	105.0	2.012	1791
2C	22.5	7.2	145.7	1.817	1815
2L	24.0	8.0	173.3	1.860	1394
2L	28.0	10.2	257.5	1.721	1626
2L	32.0	12.8	373.3	1.349	1858
2L	32.3	13.1	384.1	1.318	1876
3L	36.0	15.8	522.4	1.299	1567
3L	40.0	19.1	708.0	1.101	1741
3L	43.1	22.2	894.1	0.926	1875
4L	44.0	23.3	961.9	0.872	1340
4L	48.0	27.9	1276.2	0.846	1462
4L	52.0	32.8	1633.7	0.788	1584
4L	56.0	38.3	2067.7	0.674	1706
4L	60.0	44.9	2632.4	0.542	1828
4L	61.6	47.9	2900.9	0.493	1875
5L	64.0	53.1	3382.6	0.459	1437
5L	68.0	62.2	4261.9	0.419	1527
5L	72.0	72.5	5320.7	0.357	1617
5L	76.0	85.3	6712.0	0.274	1706
5L	80.0	103.2	8762.9	0.182	1796
5L	83.5	128.5	11803.6	0.104	1875
6L	84.0	131.9	12212.0	0.143	1635
6L	88.0	172.2	17310.7	0.067	1713

1st Lockup Hold

	Vehicle Speed (mph)	Time (sec)	Distance (ft)	Accel Rate (mph/sec)	Engine Speed (rpm)
1C	4.0	0.7	2.0	5.438	1660
1C	8.0	1.5	9.2	4.462	1733

1C	11.8	2.4	23.4	3.449	1806
1L	12.0	2.5	24.6	3.190	1283
1L	16.0	3.8	51.5	2.757	1711
1L	20.0	5.7	102.2	1.307	2139

Note: \* Indicates acceleration limited by wheel slip (wheel slip possible) using On-Road Traction Limit Coefficient = 0.70  
This SCAAN information is subject to the SCAAN Disclaimer set forth elsewhere.



# Engine Performance Curve

Cummins Inc  
Columbus, Indiana 47202-3005  
http://www.cummins.com

## ISX 12 425

425 hp (317 kW) @ 1800 rpm  
1450 lb-ft (1968 N-m) @ 1100 rpm

Automotive  
Pg. No.

Curve Number  
FR20604MC

CPL Code  
44589

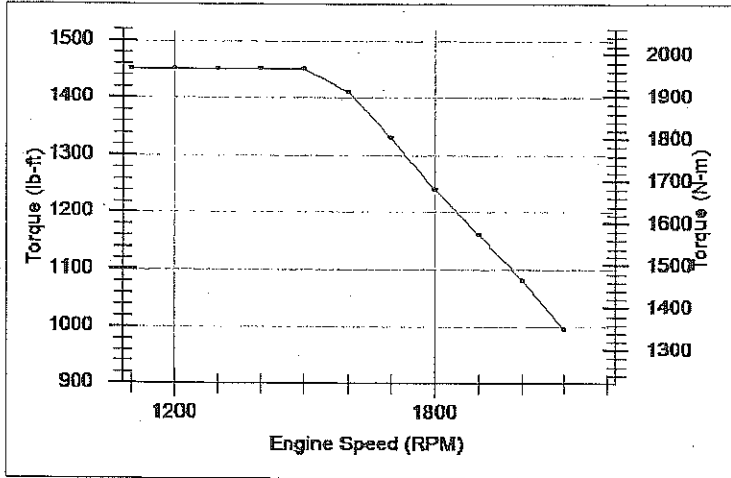
Date  
9-Oct-2014

1

Compression Ratio: **16.6:1**  
Fuel System: **XPI**  
Cylinders: **6**  
Bore: **5.11 in (130 mm)**  
Stroke: **5.91 in (150 mm)**

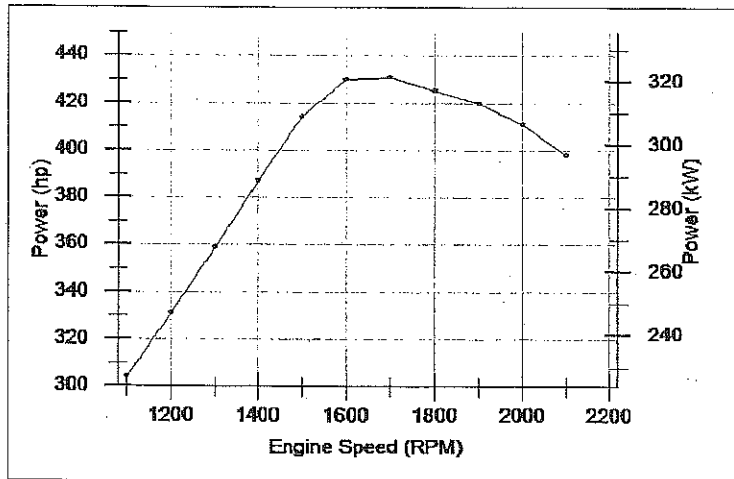
Engine Configuration: **D0K3003BX03**  
Emission Certification: **CARB 2013, EPA 2013**  
Aspiration: **Turbocharged and Charge Air Cooled**  
Displacement: **729 in3 (11.9 L)**

Restricted to Motor Coach Applications



### Torque Output

RPM	lb-ft	N-m
1,100	1,450	1,966
1,200	1,450	1,966
1,300	1,450	1,966
1,400	1,450	1,966
1,500	1,450	1,966
1,600	1,410	1,912
1,700	1,330	1,803
1,800	1,240	1,681
1,900	1,160	1,573
2,000	1,080	1,464
2,100	995	1,349



### Power Output

RPM	hp	kW
1,100	304	227
1,200	331	247
1,300	359	268
1,400	387	289
1,500	414	309
1,600	430	321
1,700	431	321
1,800	425	317
1,900	420	313
2,000	411	306
2,100	398	297

Curves shown above represent mature gross engine performance capabilities obtained and corrected in accordance with SAE J1349 conditions of 29.61 in Hg (100 kPa) barometric pressure [300 ft (90 m) altitude], 77 deg F (25 deg C) inlet air temperature, and 0.30 in Hg (1 kPa) water vapor pressure with No. 2 diesel fuel.

A Keith McIntire  
Chief Engineer

Certified within 5%

Final-(Measured data)

<b>Engine Performance Curve</b> <b>Cummins Inc</b> Columbus, Indiana 47202-3005 <a href="http://www.cummins.com">http://www.cummins.com</a>	<b>ISX 12</b> <b>425</b>	<b>425 hp (317 kW) @ 1800 rpm</b> <b>1450 lb-ft (1968 N-m) @ 1100 rpm</b>			Automotive Pg. No.
		Curve Number FR20604MC	CPL Code 44589	Date 9-Oct-2014	<b>2</b>

Compression Ratio:	<b>16.6:1</b>	Engine Configuration:	<b>D0K3003BX03</b>
Fuel System:	<b>XPI</b>	Emission Certification:	<b>CARB 2013, EPA 2013</b>
Cylinders:	<b>6</b>	Aspiration:	<b>Turbocharged and Charge Air Cooled</b>
Bore:	<b>5.11 in (130 mm)</b>	Displacement:	<b>729 in3 (11.9 L)</b>
Stroke:	<b>5.91 in (150 mm)</b>		

### General Performance Data

Maximum low idle speed	800 RPM	
Minimum low idle speed	600 RPM	
Nominal no load governed speed	2,300 RPM	
Maximum overspeed capability	2,625 RPM	
Torque available at clutch engagement	800 lb-ft	1,085 N-m

### Air Induction System

Maximum temperature rise between ambient air and engine air inlet	20 delta deg F	11.1 delta deg C
---	----------------	------------------

### Exhaust System

Maximum back pressure imposed by complete exhaust system	8.7 in-Hg	29 kPa
--	-----------	--------

### Cooling System

Maximum coolant temperature - engine out	225 deg F	107 deg C
Maximum charge air cooler outlet temperature (pumping mode)		
Maximum coolant temperature - engine out (pumping mode)		
Maximum coolant pressure (exclusive of pressure cap; closed thermostat at maximum no load speed)	54 psi	372 kPa
Minimum cooling capability @ nominal fuel rate [Level II] with 30 ram air speed and 50/50 E.G. coolant:		
Engine out coolant to ambient @ 1,700	119 delta deg F	66.1 delta deg C
Engine out coolant to ambient @ 1,200	128 delta deg F	71.1 delta deg C
Charge air cooler to ambient @ 1,700	43 delta deg F	23.9 delta deg C
Maximum allowable pressure drop across charge air cooler and OEM CAC piping (CACDP)	3 in-Hg	10.1 kPa
Maximum coolant temperature for engine protection controls	240 deg F	116 deg C

### Maximum Rating Performance Data

	Governed Speed		Maximum Power		Peak Torque	
	2,100 RPM		1,700 RPM		1,200 RPM	
Engine Speed	398 hp	297 kW	430 hp	321 kW	331 hp	247 kW
Output Power	995 lb-ft	1,349 N-m	1,328 lb-ft	1,801 N-m	1,450 lb-ft	1,966 N-m
Torque	741 ft3/min	350 L/s	647 ft3/min	305 L/s	467 ft3/min	220 L/s
Inlet Air Flow	53.3 lb/min	24.2 kg/min	47 lb/min	21 kg/min	34 lb/min	15 kg/min
Charge Air Flow	1,553 ft3/min	733 L/s	1,430 ft3/min	675 L/s	1,099 ft3/min	519 L/s
Exhaust Gas Flow	831 deg F	444 deg C	864 deg F	462 deg C	873 deg F	467 deg C
Exhaust Gas Temperature	12,050 BTU/min	212 kW	11,325 BTU/min	199 kW	8,100 BTU/min	142 kW
Heat Rejection to Coolant	141 gpm	8.9 L/s	113 gpm	7.1 L/s	80 gpm	5.0 L/s
Radiator Coolant Flow *	56 in-Hg	189 kPa	62 in-Hg	210 kPa	57 in-Hg	191 kPa
Turbo Comp. Outlet Pressure	337 deg F	169 deg C	356 deg F	180 deg C	351 deg F	177 deg C
Turbo Comp. Outlet Temperature	145.9 lb/hr	66.2 kg/hr	145.6 lb/hr	66.0 kg/hr	108.8 lb/hr	49.4 kg/hr
Fuel Consumption	207 psi	1,427 kPa	276 psi	1,903 kPa	301 psi	2,075 kPa
Brake Mean Effective Pressure						

\* - Radiator Coolant Flow is approximately 5% less with a continuously deaerating system.  
Coolant: 50/50 - Ethylene Glycol/Water by volume. Values are within +/- 5%.

### Change Log

Date	Author	Change Description
10/9/2014	A Keith McIntire	Created new FR 20604MC for 2015 ISX 12 End of Report



**AAA. PROPOSER SERVICE AND PARTS SUPPORT**

**1. Location of nearest Technical Service Representative to CTDOT**

Name George Brown

Address 14 Harmon Drive Blackwood NJ

Telephone 609-876-0205

Proposer to describe technical services readily available from said representative:

As described in our proposal

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**2. Location of nearest parts distribution center to CTDOT**

Name MCI Service Parts

Address 7001 Universal Drive

Telephone Louisville KY

Proposer to describe the extent of parts available at said center:

As described in our proposal.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**3. Policy for delivery of parts and components to be purchased for service and maintenance**

Regular method of Shipment Pre-Paid

Cost to CTDOT only overnight shipments are charged.

**EXHIBIT A.3**

FEDERAL TRANSIT ADMINISTRATION (FTA)  
FEDERALLY REQUIRED CLAUSES

**(CERTIFICATIONS ARE LOCATED AT THE END OF THIS SECTION)**

## Exhibit A.3

### FEDERAL TRANSIT ADMINISTRATION (FTA) Federally Required Contract Clauses

#### TABLE OF CONTENTS

1. Fly America Requirements
2. Buy America Requirements
3. [Reserved]
4. Cargo Preference Requirements
5. [Reserved]
6. Energy Conservation Requirements
7. Clean Water Requirements
8. Bus Testing
9. Pre-Award and Post Delivery Audit Requirements
10. Lobbying
11. Access to Records and Reports
12. Federal Changes
13. [Reserved]
14. Clean Air
15. Recycled Products
16. [Reserved]
17. [Reserved]
18. [Reserved]
19. No Government Obligation to Third Parties
20. Program Fraud and False or Fraudulent Statements and Related Acts
21. Termination
22. Government-wide Debarment and Suspension (Nonprocurement)
23. [Reserved]
24. Civil Rights Requirements
25. Breaches and Dispute Resolution
26. [Reserved]
27. [Reserved]
28. Disadvantaged Business Enterprises (DBE)
29. [Reserved]
30. Incorporation of Federal Transit Administration (FTA) Terms
31. [Reserved]

#### Additional Certifications:

- Certification To Federal Government Required Clauses (FTA)
- DBE Approval Certification
- Disadvantaged Business Enterprise & Equal Employment Opportunity Certifications
- Certification of Compliance with Federal Motor Vehicle Safety Standards (FMVSS)
- Compliance with the Americans with Disabilities Act



**1. FLY AMERICA REQUIREMENTS**  
**49 U.S.C. § 40118**  
**41 CFR Part 301-10**

The Contractor agrees to comply with 49 U.S.C. 40118 (the "Fly America" Act) in accordance with the General Services Administration's regulations at 41 CFR Part 301-10, which provide that recipients and subrecipients of Federal funds and their contractors are required to use U.S. Flag air carriers for U.S Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. The Contractor shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a U.S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements. The Contractor agrees to include the requirements of this section in all subcontracts that may involve international air transportation.

## **2. BUY AMERICA REQUIREMENTS**

**49 U.S.C. 5323(j)**

**49 C.F.R. Part 661**

*Buy America* - The contractor agrees to comply with 49 U.S.C. 5323(j) and 49 C.F.R. Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 C.F.R. 661.7, and include final assembly in the United States for fifteen (15) passenger vans and fifteen (15) passenger wagons produced by Chrysler Corporation, and microcomputer equipment and software. Separate requirements for rolling stock are set out at 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11. Rolling stock must be assembled in the United States and have a sixty percent (60%) domestic content.

A bidder or offeror must submit to the FTA recipient the appropriate Buy America certification (below) with all bids or offers on FTA-funded contracts, except those subject to a general waiver. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as nonresponsive. This requirement does not apply to lower tier subcontractors.

**Buy America Certification**

**Certification requirement for procurement of steel, iron, or manufactured products.**

*Certificate of Compliance with 49 U.S.C. 5323(j)(1)*

The bidder or offeror hereby certifies that it will meet the requirements of 49 U.S.C. 5323(j)(1) and the applicable regulations in 49 CFR Part 661.5.

Date \_\_\_\_\_

Signature \_\_\_\_\_

Company Name \_\_\_\_\_

Title \_\_\_\_\_

*Certificate of Non-Compliance with 49 U.S.C. 5323(j)(1)*

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(1) and 49 C.F.R. 661.5, 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.

Date \_\_\_\_\_

Signature \_\_\_\_\_

Company Name \_\_\_\_\_

Title \_\_\_\_\_

**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 or offeror hereby certifies that it will comply with the requirements of 49 U.S.C. 5323(j)(2)(C) and the regulations at 49 C.F.R. Part 661.11.

Date \_\_\_\_\_

Signature \_\_\_\_\_

Company Name \_\_\_\_\_

Title \_\_\_\_\_

*Certificate of Non-Compliance with 49 U.S.C. 5323(j)(2)(C)*

The bidder or offeror 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 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.

Date \_\_\_\_\_

Signature \_\_\_\_\_

Company Name \_\_\_\_\_

Title \_\_\_\_\_

3. [ RESERVED ]

#### **4. CARGO PREFERENCE REQUIREMENTS**

**46 U.S.C. 1241**

**46 CFR Part 381**

##### **Cargo Preference - Use of United States-Flag Vessels**

The Contractor agrees:

a. to use privately owned United States-Flag commercial vessels to ship at least fifty (50) percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to the underlying contract to the extent such vessels are available at fair and reasonable rates for United States-Flag commercial vessels;

b. to furnish within twenty (20) working days following the date of loading for shipments originating within the United States or within thirty (30) working days following the date of leading for shipments originating outside the United States, a legible copy of a rated, "on-board" commercial ocean bill-of-lading in English for each shipment of cargo described in the preceding paragraph to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590 and to the FTA recipient (through the contractor in the case of a subcontractor's bill-of-lading.)

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

5. [ RESERVED ]

**6. ENERGY CONSERVATION REQUIREMENTS**  
**42 U.S.C. 6321 et seq.**  
**49 CFR Part 18**

**Energy Conservation** - The Contractor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act.

**7. CLEAN WATER REQUIREMENTS**  
**33 U.S.C. 1251**

**Clean Water –**

(1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

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



**8. BUS TESTING**  
**49 U.S.C. 5318(e)**  
**49 CFR Part 665**

**Bus Testing** - The Contractor [Manufacturer] agrees to comply with 49 U.S.C. A 5318(e) and FTA's implementing regulation at 49 CFR Part 665 and shall perform the following:

- 1) A Manufacturer of a new bus model or a bus produced with a major change in components or configuration shall provide a copy of the final test report to the recipient at a point in the procurement process specified by the recipient which will be prior to the recipient's final acceptance of the first vehicle.
- 2) A Manufacturer who releases a report under Paragraph 1 above shall provide notice to the operator of the testing facility that the report is available to the public.
- 3) If the Manufacturer represents that the vehicle was previously tested, the vehicle being sold should have the identical configuration and major components as the vehicle in the test report, which must be provided to the recipient prior to recipient's final acceptance of the first vehicle. If the configuration or components are not identical, the Manufacturer shall provide a description of the change and the Manufacturer's basis for concluding that it is not a major change requiring additional testing.
- 4) If the Manufacturer represents that the vehicle is "grandfathered" (has been used in mass transit service in the United States before October 1, 1988, and is currently being produced without a major change in configuration or components), the Manufacturer shall provide the name and address of the recipient of such a vehicle and the details of that vehicle's configuration and major components.

**CERTIFICATION OF COMPLIANCE WITH FTA'S BUS TESTING REQUIREMENTS**

The undersigned [Contractor/Manufacturer] certifies that the vehicle offered in this procurement complies with 49 U.S.C. A 5318(e) and FTA's implementing regulation at 49 CFR Part 665.

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

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Company Name: \_\_\_\_\_

Title: \_\_\_\_\_



**9. PRE-AWARD AND POST DELIVERY AUDITS REQUIREMENTS**

**49 U.S.C. 5323**

**49 CFR Part 663**

**Buy America Requirements--Surface Transportation Assistance Act of 1982, as amended," 49 C.F.R. 661.12, but has been modified to include FTA's Buy America requirements codified at 49 U.S.C. A 5323(j).**

**Pre-Award and Post-Delivery Audit Requirements** - The Contractor agrees to comply with 49 U.S.C. § 5323(l) and FTA's implementing regulation at 49 C.F.R. Part 663 and to submit the following certifications:

(1) **Buy America Requirements:** The Contractor shall complete and submit a declaration certifying either compliance or noncompliance with Buy America. If the Proposer certifies compliance with Buy America, it shall submit documentation which lists 1) component and subcomponent parts of the rolling stock to be purchased identified by manufacturer of the parts, their country of origin and costs; and 2) the location of the final assembly point for the rolling stock, including a description of the activities that will take place at the final assembly point and the cost of final assembly.

(2) **Solicitation Specification Requirements:** The Contractor shall submit evidence that it will be capable of meeting the bid specifications.

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

**BUY AMERICA CERTIFICATE OF COMPLIANCE WITH FTA REQUIREMENTS FOR BUSES, OTHER ROLLING STOCK, OR ASSOCIATED EQUIPMENT**

**Certificate of Compliance**

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

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Company Name: \_\_\_\_\_

Title: \_\_\_\_\_

Submit documentation with your Proposal that lists 1) component and subcomponent parts of the rolling stock to be purchased identified by manufacturer of the parts, their country of origin and costs; and 2) the location of the final assembly point for the rolling stock, including a description of the activities that will take place at the final assembly point and the cost of final assembly (attach a separate sheet).

**Certificate of Non-Compliance**

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

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Company Name: \_\_\_\_\_

Title: \_\_\_\_\_

**10. LOBBYING**  
**31 U.S.C. 1352**  
**49 CFR Part 19**  
**49 CFR Part 20**

**Byrd Anti-Lobbying Amendment, 31 U.S.C. 1352, as amended by the Lobbying Disclosure Act of 1995, P.L. 104-65 [to be codified at 2 U.S.C. § 1601, et seq.]** - Contractors who apply or bid for an award of \$100,000 or more shall file the certification required by 49 CFR part 20, "New Restrictions on Lobbying." Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier shall also disclose the name of any registrant under the Lobbying Disclosure Act of 1995 who has made lobbying contacts on its behalf with non-Federal funds with respect to that Federal contract, grant or award covered by 31 U.S.C. 1352. Such disclosures are forwarded from tier to tier up to the recipient.

**APPENDIX A, 49 CFR PART 20--CERTIFICATION REGARDING LOBBYING**

Certification for Contracts, Grants, Loans, and Cooperative Agreements  
(To be submitted with each bid or offer exceeding \$100,000)

The undersigned [Contractor] certifies, to the best of his or her knowledge and belief, that:

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

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form--LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, *et seq.*)]

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients 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.

[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.]

The Contractor, \_\_\_\_\_, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. A 3801, *et seq.*, apply to this certification and disclosure, if any.

\_\_\_\_\_ Signature of Contractor's Authorized Official

\_\_\_\_\_ Name and Title of Contractor's Authorized Official

\_\_\_\_\_ Date

## 11. ACCESS TO RECORDS AND REPORTS

49 U.S.C. 5325

18 CFR 18.36 (i)

49 CFR 633.17

**Access to Records** - The following access to records requirements apply to this Contract:

1. Where the Purchaser is not a State but a local government and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 18.36(i), the Contractor agrees to provide the Purchaser, the FTA Administrator, the Comptroller General of the United States or any of their authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions. Contractor also agrees, pursuant to 49 C.F.R. 633.17 to provide the FTA Administrator or his authorized representatives including any PMO Contractor access to Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311.
2. Where the Purchaser is a State and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 633.17, Contractor agrees to provide the Purchaser, the FTA Administrator or his authorized representatives, including any PMO Contractor, access to the Contractor's records and construction sites pertaining to a major capital project, defined at 49 U.S.C. 5302(a)1, which is receiving federal financial assistance through the programs described at 49 U.S.C. 5307, 5309 or 5311. By definition, a major capital project excludes contracts of less than the simplified acquisition threshold currently set at \$100,000.
3. Where the Purchaser enters into a negotiated contract for other than a small purchase or under the simplified acquisition threshold and is an institution of higher education, a hospital or other non-profit organization and is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 C.F.R. 19.48, Contractor agrees to provide the Purchaser, FTA Administrator, the Comptroller General of the United States or any of their duly authorized representatives with access to any books, documents, papers and record of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions.
4. Where any Purchaser which is the FTA Recipient or a subgrantee of the FTA Recipient in accordance with 49 U.S.C. 5325(a) enters into a contract for a capital project or improvement (defined at 49 U.S.C. 5302(a)1) through other than competitive bidding, the Contractor shall make available records related to the contract to the Purchaser, the Secretary of Transportation and the Comptroller General or any authorized officer or employee of any of them for the purposes of conducting an audit and inspection.
5. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.
6. The Contractor agrees to maintain all books, records, accounts and reports required under this contract for a period of not less than three (3) years after the date of termination or expiration of this contract, except in the event of litigation or settlement of claims arising from the performance of this contract, in which case Contractor agrees to maintain same until the Purchaser, the FTA Administrator, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto. Reference 49 CFR 18.39(i)(11).
7. FTA does not require the inclusion of these requirements in subcontracts.



**Requirements for Access to Records and Reports by Types of Contract**

Contract Characteristics	Contract	Operational Service Contract	Turnkey	Construction	Architectural Engineering	Acquisition of Rolling Stock	Professional Services
I. State Grantees	a. Contracts below SAT (\$100,000)	None	Those imposed on state pass thru to Contractor	None	None	None	None
	b. Contracts above \$100,000/Capital Projects	None unless <sup>1</sup> non-competitive award	Those imposed on state pass thru to Contractor	Yes, if non-competitive award or if funded thru <sup>2</sup> 5307/5309/5311	None unless non-competitive award	None unless non-competitive award	None unless non-competitive award
II. Non State Grantees	a. Contracts below SAT (\$100,000)	Yes <sup>3</sup>	Those imposed on non-state Grantee pass thru to Contractor	Yes	Yes	Yes	Yes
	b. Contracts above \$100,000/Capital Projects	Yes <sup>3</sup>	Those imposed on non-state Grantee pass thru to Contractor	Yes	Yes	Yes	Yes

**Sources of Authority**

1. 49 USC 5325 (a)
2. 49 CFR 633.17
3. 18 CFR 18.36 (i)

**12. FEDERAL CHANGES**  
**49 CFR Part 18**

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

13. [ RESERVED ]

**14. CLEAN AIR**  
**42 U.S.C. 7401 et seq**  
**40 CFR 15.61**  
**49 CFR Part 18**

**Clean Air** - (1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. §§ 7401 et seq. The Contractor agrees to report each violation to the Purchaser and understands and agrees that the Purchaser will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

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

**15. RECYCLED PRODUCTS**

**42 U.S.C. 6962**

**40 CFR Part 247**

**Executive Order 12873**

Recovered Materials - The contractor 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.

16. [ RESERVED ]

17. [RESERVED]

18. [ RESERVED ]



## 19. NO GOVERNMENT OBLIGATION TO THIRD PARTIES

### **No Obligation by the Federal Government.**

(1) The Purchaser and Contractor acknowledge and agree that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of the underlying contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this contract and shall not be subject to any obligations or liabilities to the Purchaser, Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.

(2) The Contractor agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

**20. PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS  
AND RELATED ACTS**

**31 U.S.C. 3801 et seq.**

**49 CFR Part 31 18 U.S.C. 1001**

**49 U.S.C. 5307**

**Program Fraud and False or Fraudulent Statements or Related Acts.**

(1) The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § 3801 et seq. and U.S. DOT regulations, "Program Fraud Civil Remedies," 49 C.F.R. Part 31, apply to its actions pertaining to this Project. Upon execution of the underlying contract, the Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract or the FTA assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.

(2) The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance originally awarded by FTA under the authority of 49 U.S.C. § 5307, the Government reserves the right to impose the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1) on the Contractor, to the extent the Federal Government deems appropriate.

(3) The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance provided by FTA. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

**21. TERMINATION**  
**49 U.S.C. Part 18**  
**FTA Circular 4220.1E**

**SEE CONTRACT DOCUMENT (SP-50); SECTION 10. (TERMINATION)**

**22. GOVERNMENT-WIDE DEBARMENT AND SUSPENSION (NONPROCUREMENT)**  
**49 CFR Part 29**  
**Executive Order 12549**

**Suspension and Debarment**

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

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

By signing and submitting its Proposal, Proposer certifies as follows:

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

23. [ RESERVED ]

## 24. CIVIL RIGHTS REQUIREMENTS

29 U.S.C. § 623, 42 U.S.C. § 2000

42 U.S.C. § 6102, 42 U.S.C. § 12112

42 U.S.C. § 12132, 49 U.S.C. § 5332

29 CFR Part 1630, 41 CFR Parts 60 et seq.

**Civil Rights** - The following requirements apply to the underlying contract:

1. **Nondiscrimination** - In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, section 202 of the Americans with Disabilities Act of 1990, 42 U.S.C. § 12132, and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national origin, sex, age, or disability. In addition, the Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.
2. **Equal Employment Opportunity** - The following equal employment opportunity requirements apply to the underlying contract:
  - (a) **Race, Color, Creed, National Origin, Sex** - In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal transit laws at 49 U.S.C. § 5332, the Contractor agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Parts 60 et seq., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Project. The Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.
  - (b) **Age** - In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. §§ 623 and Federal transit law at 49 U.S.C. § 5332, the Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.
  - (c) **Disabilities** - In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, the Contractor agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, the Contractor agrees to comply with any implementing requirements FTA may issue.
3. The Contractor also agrees to include these requirements in each subcontract financed in whole or in part with Federal assistance provided by FTA, modified only if necessary to identify the affected parties.

**25. BREACHES AND DISPUTE RESOLUTION**  
**49 CFR Part 18**  
**FTA Circular 4220.1E**

**SEE CONTRACT DOCUMENT (SP-50); SECTION 12. (BREACH)**

**Disputes** - Disputes arising in the performance of this Contract which are not resolved by agreement of the parties shall be decided in writing by the authorized representative of CTDOT's Representative. This decision shall be final and conclusive unless within ten (10) days from the date of receipt of its copy, the Contractor mails or otherwise furnishes a written appeal to the Representative. In connection with any such appeal, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of its position. The decision of the Representative of CTDOT shall be binding upon the Contractor and the Contractor shall abide by the decision.

**Performance During Dispute** - Unless otherwise directed by CTDOT, Contractor shall continue performance under this Contract while matters in dispute are being resolved.

**Claims for Damages** - Should either party to the Contract suffer injury or damage to person or property because of any act or omission of the party or of any of his employees, agents or others for whose acts he is legally liable, a claim for damages therefor shall be made in writing to such other party within a reasonable time after the first observance of such injury or damage.

**Remedies** - Unless this contract provides otherwise, all claims, counterclaims, disputes and other matters in question between CTDOT and the Contractor arising out of or relating to this agreement or its breach will be decided by arbitration if the parties mutually agree, or in a court of competent jurisdiction within the State in which CTDOT is located.

**Rights and Remedies** - The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law. No action or failure to act by CTDOT or Contractor shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

26. [ RESERVED ]



27. [ RESERVED ]

**28. DISADVANTAGED BUSINESS ENTERPRISE (DBE)**  
**49 CFR Part 26**

**Disadvantaged Business Enterprises**

- a. This contract is subject to the requirements of Title 49, Code of Federal Regulations, Part 26, *Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs*. The national goal for participation of Disadvantaged Business Enterprises (DBE) is 10%. The agency's overall goal for DBE participation is 12.6 %. A separate contract goal has not been established for this procurement.
- b. The Contractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of this DOT-assisted contract. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as CTDOT deems appropriate. Each subcontract the Contractor signs with a subcontractor must include the assurance in this paragraph (see 49 CFR 26.13(b)).
- c. The successful Contractor will be required to report its DBE participation obtained through race-neutral means throughout the period of performance.
- d. The Contractor is required to pay its subcontractors performing work related to this contract for satisfactory performance of that work no later than thirty (30) days after the Contractor's receipt of payment for that work from CTDOT. In addition, the Contractor is required to return any retainage payments to those subcontractors within thirty (30) days after the subcontractor's work related to this contract is satisfactorily completed.
- e. The contractor must promptly notify CTDOT, whenever a DBE subcontractor performing work related to this contract is terminated or fails to complete its work, and must make good faith efforts to engage another DBE subcontractor to perform at least the same amount of work. The Contractor may not terminate any DBE subcontractor and perform that work through its own forces or those of an affiliate without prior written consent of CTDOT.

29. [ RESERVED ]

**30. INCORPORATION OF FEDERAL TRANSIT ADMINISTRATION (FTA) TERMS  
FTA Circular 4220.1E**

**Incorporation of Federal Transit Administration (FTA) Terms** - The preceding provisions include, in part, certain Standard Terms and Conditions required by DOT, whether or not expressly set forth in the preceding contract provisions. All contractual provisions required by DOT, as set forth in FTA Circular 4220.1E, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Agreement. The Contractor shall not perform any act, fail to perform any act, or refuse to comply with any CTDOT requests which would cause CTDOT to be in violation of the FTA terms and conditions.

31. [ RESERVED ]

**FTA CERTIFICATIONS**

**Buy America Certification**

**Certification requirement for procurement of steel, iron, or manufactured products.**

*Certificate of Compliance with 49 U.S.C. 5323(j)(1)*

The bidder or offeror hereby certifies that it will meet the requirements of 49 U.S.C. 5323(j)(1) and the applicable regulations in 49 CFR Part 661.5.

Date \_\_\_\_\_

Signature \_\_\_\_\_

Company Name \_\_\_\_\_

Title \_\_\_\_\_

*Certificate of Non-Compliance with 49 U.S.C. 5323(j)(1)*

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(1) and 49 C.F.R. 661.5, 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.

Date \_\_\_\_\_

Signature \_\_\_\_\_

Company Name \_\_\_\_\_

Title \_\_\_\_\_

**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 or offeror hereby certifies that it will comply with the requirements of 49 U.S.C. 5323(j)(2)(C) and the regulations at 49 C.F.R. Part 661.11.

Date October 11, 2016 \_\_\_\_\_

Signature  \_\_\_\_\_

Company Name Motor Coach Industries Inc. \_\_\_\_\_

Title Executive Vice-President, Sales & Marketing \_\_\_\_\_

*Certificate of Non-Compliance with 49 U.S.C. 5323(j)(2)(C)*

The bidder or offeror 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 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.

Date \_\_\_\_\_

Signature \_\_\_\_\_

Company Name \_\_\_\_\_

Title \_\_\_\_\_

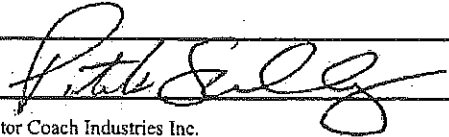
**CERTIFICATION OF COMPLIANCE WITH FTA'S BUS TESTING REQUIREMENTS**

The undersigned [Contractor/Manufacturer] certifies that the vehicle offered in this procurement complies with 49 U.S.C. A 5318(e) and FTA's implementing regulation at 49 CFR Part 665.

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

Date: October 11, 2016

Signature: \_\_\_\_\_



Company Name: \_\_\_\_\_

Motor Coach Industries Inc.

Title: \_\_\_\_\_

Executive Vice-President, Sales & Marketing

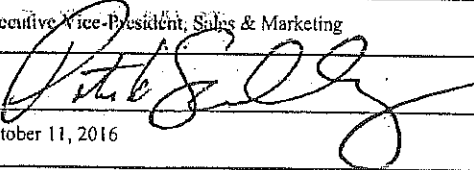


## FEDERAL BUS TESTING NARRATIVE

1. Will Federal Bus Testing be required for the model, type and power train configuration of the buses and other equipment described in these specifications?

No

2. If the answer to Question #1 is "yes", Please provide the following in narrative form below:
- The reasons why Federal Bus Testing will be required
  - The expected schedule for the beginning and completion of such test

Company Name:	Motor Coach Industries Inc.
Authorized Representative:	Patrick Scully
Title:	Executive Vice-President, Sales & Marketing
Signature	
Date:	October 11, 2016

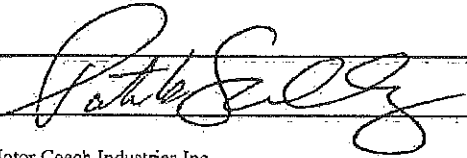
**BUY AMERICA CERTIFICATE OF COMPLIANCE WITH FTA REQUIREMENTS FOR BUSES, OTHER ROLLING STOCK, OR ASSOCIATED EQUIPMENT**

**Certificate of Compliance**

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

Date: October 11, 2016

Signature: \_\_\_\_\_



Company Name: Motor Coach Industries Inc.

Title: Executive Vice-President Inc.

Submit documentation with your Proposal that lists 1) component and subcomponent parts of the rolling stock to be purchased identified by manufacturer of the parts, their country of origin and costs; and 2) the location of the final assembly point for the rolling stock, including a description of the activities that will take place at the final assembly point and the cost of final assembly (attach a separate sheet).

**Certificate of Non-Compliance**

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

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Company Name: \_\_\_\_\_

Title: \_\_\_\_\_

APPENDIX A, 49 CFR PART 20--CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements  
(To be submitted with each bid or offer exceeding \$100,000)

The undersigned [Contractor] certifies, to the best of his or her knowledge and belief, that:

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

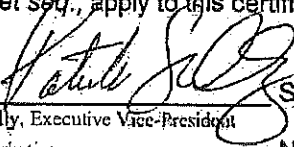
(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for making lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form--LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, *et seq.*)]

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients 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.

[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.]

The Contractor, Motor Coach Industries Inc., certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. A 3801, *et seq.*, apply to this certification and disclosure, if any.



Signature of Contractor's Authorized Official

Patrick Scully, Executive Vice-President  
Sales & Marketing

Name and Title of Contractor's Authorized Official

October 11, 2016

Date

**CERTIFICATION TO FEDERAL GOVERNMENT REQUIRED CLAUSES (FTA)**

**AFFIRMATION OF THE BIDDER'S AUTHORIZED REPRESENTATIVE**


Name of Proposer: Motse Coach Industries, Inc.

Name and Relationship of Authorized Representative: Patrick J Scully, Executive VP,  
Sales + Marketing


BY SIGNING BELOW, on behalf of the Proposer, I declare that the Proposer has duly authorized me to make this certification and bind the Proposer's compliance. Thus, the Proposer agrees to comply with all Federal statutes and regulations, and follow applicable Federal directives, and comply with the requirements of these clauses as indicated on the ensuing pages, Federal Government Required Clauses (FTA).

The Proposer affirms the truthfulness of this certification it has made, and acknowledges that the Program Fraud Civil Remedies Act of 1986, 31 U.S.C. 3801 *et seq.*, and implementing U.S. DOT regulations, "Program Fraud Civil Remedies," 49 CFR Part 31 apply to any certification, assurance or submission made to FTA. The criminal provisions of 18 U.S.C. 1001 apply to any certification, assurance, or submission made in connection with a Federal public transportation program authorized in 49 U.S.C. Chapter 53 or any other statute.

In signing this document, I declare that the foregoing certification and any other statements made by me on behalf of the Proposer are true and correct.

Signature:  Date: December 8, 2016


Name (print) Patrick J Scully  
Authorized Representative of Applicant

  
(Signature of Notary  
& SEAL)



**DBE APPROVAL CERTIFICATION**

I hereby certify that the Proposer has complied with the requirements of 49 CFR 26.49, Participation by Disadvantaged Business Enterprises in DOT Programs, and that our goals have not been disapproved by the Federal Transit Administration.



TJW  
WAGER

Signature of the Proposer's Authorized Official

Thomas Wager, Vice President, Public Sector Sales Name and Title of the Proposer's Authorized Official

November 8, 2016 Date

## DISADVANTAGED BUSINESS ENTERPRISE & EQUAL EMPLOYMENT OPPORTUNITY CERTIFICATIONS


### (1) Transit Vehicle Manufacturer (TVM) Disadvantaged Business Enterprise

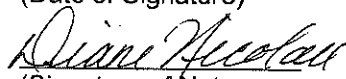
Pursuant to the provisions of Section 105(f) of the Surface Transportation Assistance Act of 1982, each Proposer for this contract must certify that it has complied with the requirements of 49 CFR Part 26.49, regarding the participation of disadvantaged business enterprises in FTA-assisted procurements of transit vehicles. Absent this certification, properly completed and signed, a Proposal shall be deemed non-responsive.

Certification: I hereby certify, for the Proposer named below, that it has complied with the provisions of 49 CFR Part 26.49 and that I am duly authorized by said Proposer to make this certification.

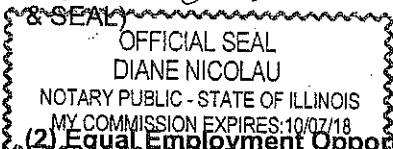
Motor Coach Industries, Inc.  
Name of Proposer/Company Name

11/8/16  
(Date of Signature)

  
(Signature of Representative)

  
(Signature of Notary)

THOMAS J. WAGNER Vice President,  
Public Sector  
(Type or Print Name & Title of that Representative)

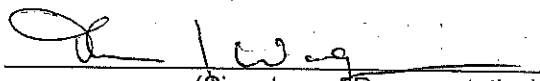


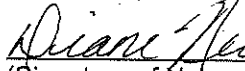
### (2) Equal Employment Opportunity

The Proposer, and any and all subcontractors of the Proposer, are required to comply with Executive Order 11246, entitled "Equal Employment Opportunity", as amended by Executive Order 11375, and supplemented in U.S. Department of Labor regulation (41 CFR Part 60).

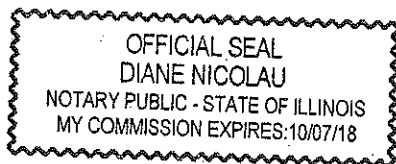
Certification: I hereby certify, for the Proposer named above, that it has complied with the provisions of Executive Order 11246, as amended by Executive Order 11375; and supplemented in U.S. Dept. of Labor Regulation (41 CFR Part 60) and that I am duly authorized by said Proposer to make this certification.

11/8/16  
(Date of Signature)

  
(Signature of Representative)

  
(Signature of Notary  
& SEAL)

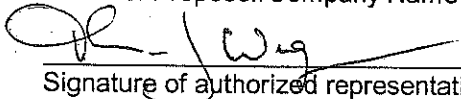
THOMAS J. WAGNER Vice President,  
Public Sector  
(Type or Print Name & Title of that Representative)



**CERTIFICATION OF COMPLIANCE WITH  
FEDERAL MOTOR VEHICLE SAFETY STANDARDS (FMVSS)**

The Proposer hereby certifies that vehicles to be provided under the resultant contract award comply with all stipulated and relevant Federal Motor Vehicle Safety Standards (FMVSS). In accordance with the Federal Government Required Clauses (FTA) of this contract, the Proposer shall ensure that all vehicles will be affixed with a bus "manufacturer's FMVSS self-certification sticker information that the vehicle complies with relevant FMVSS".

Motor Coach Industries Inc.  
Name of Proposer/Company Name

  
Signature of authorized representative

Thomas Wagner  
Type or print name

  
Signature of notary and

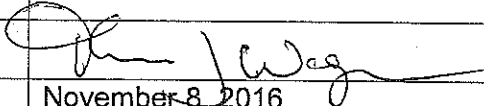


**REGULATIONS:**

The Proposer understands through this certification that all vehicles provided under this contract shall conform to Federal and State regulations in effect at time of vehicle delivery.

## COMPLIANCE WITH THE AMERICANS WITH DISABILITIES ACT

The undersigned, Motor Coach Industries certifies that all vehicles manufactured and delivered to the State of Connecticut, Department of Transportation are in full compliance with the Americans With Disabilities Act. 49 CFR 38

Company Name:	Motor Coach Industries Inc.
Authorized Representative:	Thomas Wagner
Title:	Vice President, Public Sector Sales
Signature	
Date:	November 8, 2016



**EXHIBIT B**

**PRICE SCHEDULE**

**STATE OF CONNECTICUT  
DEPARTMENT OF TRANSPORTATION  
PURCHASING & MATERIALS MANAGEMENT**

ConnDOT Purchasing Contact:  
Mary Matuszak  
Fiscal Admin. Supervisor

Telephone Number:  
(860) 594-2342  
e-mail: mary.matuszak@ct.gov

<b>EXHIBIT B</b> <b>PRICE SCHEDULE</b> For RFP No. 16DOT7002  <b><u>IMPORTANT!</u></b> <b><u>RETURN ORIGINAL AND THREE COPIES</u></b>	PROPOSER NAME:  Motor Coach Industries Inc.
	SSN OR FEIN #  45-0277789

Payment terms are net 45 days. Any deviation may result in RFP rejection.  
RFP prices shall include all transportation charges FOB state agency.

Page 1 OF 4

DESCRIPTION OF COMMODITY AND/OR SERVICES	UNIT OF MEASURE	UNIT PRICE
--	-----------------	------------

**MAKE AND MODEL**  
**45' Heavy Duty High Floor**  
**Suburban Commuter Diesel Buses**

**DATE OF DELIVERY**  
**After Receipt of Order (ARO)**

MCI D4500

180 days ARO

each

\$ 495,107

**EXPEDITED PAYMENT DISCOUNT:**  
DISCOUNT SHALL BE LISTED BELOW AND MUST BE A MINIMUM OF TEN (10) DAYS. IF NONE, SO STATE: \_\_\_\_\_

Discount Percentage: 0.35 %

Discount Maximum Time Period: 10 Days

STATE OF CONNECTICUT  
DEPARTMENT OF TRANSPORTATION  
PURCHASING & MATERIALS MANAGEMENT

ComDOT Purchasing Contact:  
Mary Matuszak  
Fiscal Admin. Supervisor

**EXHIBIT B**  
**PRICE SCHEDULE**  
For RFP No. 16DOT7002

Telephone Number:  
(860) 594-2342  
e-mail: mary.matuszak@ct.gov

**IMPORTANT!**  
**RETURN ORIGINAL AND THREE COPIES**

PROPOSER NAME:  
Motor Coach Industries Inc  
SSN OR FEIN #  
45-0277789

Payment terms are net 45 days. Any deviation may result in RFP rejection.  
RFP prices shall include all transportation charges FOB state agency.

OPTIONAL SPARE PARTS AND EXTENDED WARRANTY PRICING

Item #	Quantity	Description of Item	45 Bus Unit Price
1	(1 to 10)	Diesel Bus Engine with Filters, Turbo Charger, Air Compressor, ECM & Hose Lines	\$ 38,921
2	(1 to 10)	Diesel Bus Transmission	\$ 15,189
3	(1 to 5)	Rear Axle Assembly	\$ 9,079
4	(1 to 5)	Differential Assembly	\$ 847
5	(1 to 5)	Driver's Seat	\$ 1,813
6	(1 to 5)	Diesel Particulate Filter / SCR Assembly	\$ 15,865
7	(1 to 3)	Air Compressor	\$ 3,719
8	(1 to 3)	Alternator and Starter	\$ 2,013
9	(1 to 3)	Electronic Destination Sign	\$ 6,500
10	(1 to 3)	Multiplex System	\$ 2,016
11	(1 to 3)	Complete Video Recording System	\$ 3,687
12	(1 to 1)	Electric Cooling Fans	\$ 425
13	(1 to 10)	Electric Cooling Fan Assembly	\$ 4,672 (fans only)
14	(1 to 10)	Air Conditioner Compressor	\$ 3,36

STATE OF CONNECTICUT

DEPARTMENT OF TRANSPORTATION  
PURCHASING & MATERIALS MANAGEMENT

**EXHIBIT B**

**PRICE SCHEDULE**  
For RFP No. 16DOT7002

ConnDOT Purchasing Contact:  
Mary Matuszak  
Fiscal Admin. Supervisor

Telephone Number:  
(860) 594-2342  
e-mail: mary.matuszak@ct.gov

**IMPORTANT!**  
**RETURN ORIGINAL AND THREE COPIES**

PROPOSER NAME:

Motor Coach Industries Inc.

SSN OR FEIN #

45-0277789

Payment terms are net 45 days. Any deviation may result in RFP rejection.  
RFP prices shall include all transportation charges FOB state agency.

**OPTIONAL SPARE PARTS AND EXTENDED WARRANTY PRICING**

Item #	(Quantity) Description of Item	45 BUS Unit Price
15	(1 to 10) Air Conditioner Evaporator	\$ 2,220
16	(1 to 1) Air Conditioner Evaporator Fan Motor	\$ 1,574
17	(1 to 10) Air Conditioner Condenser	\$ 1,303
18	(1 to 1) Air Conditioner Condenser Fan Motor	\$ 925
19	(1 to 10) Ultra Cap	\$ 5,833
20	Extended Engine Warranty (to five years)	\$ 6,270
21	Extended Transmission Warranty (to five years)	\$ 2,008
22	(1 to 1) Spare Tire and Rim Assembly	\$ 818
23	(1 to 1) Spare Removable SEON Hard Disk/Bus	\$ 942
24	(1 to 5) SEON DVR	\$ 2,833
25	(1 to 1) Exterior SEON Camera	\$ 1,477
26	(1 to 5) TRAPEZE OMG Router	\$ 6,805
27	(1 to 5) TRAPEZE IMLU Computer	\$ 4,245
28	(1 to 5) Street and Curb Mirror Assemblies	\$ 1,366
29	(1 to 5) Street and Curb Passenger side Window Assemblies	\$ 1,215



### Optional Quotation Page Including 61 Passenger Seat Layout

MCI is pleased to provide the following optional prices as requested

Item	Price
MCI D4500 Hybrid Coach (As requested Exhibit A.1-2 General Requirements)	\$275,000.00 (Incremental per Coach Cost vs. Base Price)
Stainless Steel Lower Exterior Sidewall Panels (As requested Exhibit A.1-22 Underfloor Baggage Compartments)	No Additional Charge
61 Passenger Seat Layout (see attached drawing) (As requested Exhibit A.1-5 Capacity)	2,100.00/Coach (Incremental per Coach Cost vs. Base Price)
Cummins 5 year 500,000 mile Engine Warranty (As requested Page 46 of 54 Warranty Provisions)	\$ 6,270.00/Coach (Incremental per Coach Cost vs. Base Price)
Allison Transmission 5 year Unlimited Mile Warranty (As requested Page 46 of 54 Warranty Provisions)	\$ 2,008.00/Coach (Incremental per Coach Cost vs. Base Price)
Credit for Deletion of Factory Supplied Tires (As requested Exhibit A.1-71 Tires)	(\$4,400.00)/Coach
Kiel Avance Passenger Seats (As requested Exhibit A.1-38)	No Additional Charge
Trapeze AVM System (As requested Exhibit A.1-102 Automatic Vehicle Monitoring)	Not Yet Available From Trapeze
Smart Tire Pressure Monitoring System (As requested A.1-71 Wheels)	904.00/Coach Note: Independent from the Intelligent Vehicle Net Work)
Back up Camera with view thru I/O screen (As requested addendum # 2)	\$550.00/Coach

**EXHIBIT C**

SEEC FORM 11



## Notice to Executive Branch State Contractors and Prospective State Contractors of Campaign Contribution and Solicitation Limitations

This notice is provided under the authority of Connecticut General Statutes §9-612(G)(2), as amended by P.A. 10-1, and is for the purpose of informing state contractors and prospective state contractors of the following law (*italicized words are defined on the reverse side of this page.*

### CAMPAIGN CONTRIBUTION AND SOLICITATION LIMITATIONS

No *state contractor, prospective state contractor, principal of a state contractor or principal of a prospective state contractor*, with regard to a *state contract or state contract solicitation* with or from a state agency in the executive branch or a quasi-public agency or a holder, or principal of a holder of a valid prequalification certificate, shall make a contribution to (i) an exploratory committee or candidate committee established by a candidate for nomination or election to the office of Governor, Lieutenant Governor, Attorney General, State Comptroller, Secretary of the State or State Treasurer, (ii) a political committee authorized to make contributions or expenditures to or for the benefit of such candidates, or (iii) a party committee (which includes town committees).

In addition, no holder or principal of a holder of a valid prequalification certificate, shall make a contribution to (i) an exploratory committee or candidate committee established by a candidate for nomination or election to the office of State senator or State representative, (ii) a political committee authorized to make contributions or expenditures to or for the benefit of such candidates, or (iii) a party committee.

On and after January 1, 2011, no state contractor, prospective state contractor, principal of a state contractor or principal of a prospective state contractor, with regard to a state contract or state contract solicitation with or from a state agency in the executive branch or a quasi-public agency or a holder, or principal of a holder of a valid prequalification certificate, shall **knowingly solicit** contributions from the state contractor's or prospective state contractor's employees or from a *subcontractor or principals of the subcontractor* on behalf of (i) an exploratory committee or candidate committee established by a candidate for nomination or election to the office of Governor, Lieutenant Governor, Attorney General, State Comptroller, Secretary of the State or State Treasurer, (ii) a political committee authorized to make contributions or expenditures to or for the benefit of such candidates, or (iii) a party committee.

### DUTY TO INFORM

State contractors and prospective state contractors are required to inform their principals of the above prohibitions, as applicable, and the possible penalties and other consequences of any violation thereof.

### PENALTIES FOR VIOLATIONS

Contributions or solicitations of contributions made in violation of the above prohibitions may result in the following civil and criminal penalties:

**Civil Penalties** – Up to \$2,000 or twice the amount of the prohibited contribution, whichever is greater, against a principal or a contractor. Any state contractor or prospective state contractor which fails to make reasonable efforts to comply with the provisions requiring notice to its principals of these prohibitions and possible consequences of their violations may also be subject to civil penalties of up to \$2,000 or twice the amount of the prohibited contributions made by their principals.

**Criminal penalties** – Any knowing and willful violation of the prohibition is a Class D felony, which may subject the violator to imprisonment of not more than 5 years, or not more than \$5,000 in fines, or both.

### CONTRACT CONSEQUENCES

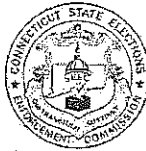
In the case of a state contractor, contributions made or solicited in violation of the above prohibitions may result in the contract being voided.

In the case of a prospective state contractor, contributions made or solicited in violation of the above prohibitions shall result in the contract described in the state contract solicitation not being awarded to the prospective state contractor, unless the State Elections Enforcement Commission determines that mitigating circumstances exist concerning such violation.

The State shall not award any other state contract to anyone found in violation of the above prohibitions for a period of one year after the election for which such contribution is made or solicited, unless the State Elections Enforcement Commission determines that mitigating circumstances exist concerning such violation.

Additional information may be found on the website of the State Elections Enforcement Commission, [www.ct.gov/seec](http://www.ct.gov/seec). Click on the link to "Lobbyist/Contractor Limitations."





## DEFINITIONS

"State contractor" means a person, business entity or nonprofit organization that enters into a state contract. Such person, business entity or nonprofit organization shall be deemed to be a state contractor until December thirty-first of the year in which such contract terminates. "State contractor" does not include a municipality or any other political subdivision of the state, including any entities or associations duly created by the municipality or political subdivision exclusively amongst themselves to further any purpose authorized by statute or charter, or an employee in the executive or legislative branch of state government or a quasi-public agency, whether in the classified or unclassified service and full or part-time, and only in such person's capacity as a state or quasi-public agency employee.

"Prospective state contractor" means a person, business entity or nonprofit organization that (i) submits a response to a state contract solicitation by the state, a state agency or a quasi-public agency, or a proposal in response to a request for proposals by the state, a state agency or a quasi-public agency, until the contract has been entered into, or (ii) holds a valid prequalification certificate issued by the Commissioner of Administrative Services under section 4a-100. "Prospective state contractor" does not include a municipality or any other political subdivision of the state, including any entities or associations duly created by the municipality or political subdivision exclusively amongst themselves to further any purpose authorized by statute or charter, or an employee in the executive or legislative branch of state government or a quasi-public agency, whether in the classified or unclassified service and full or part-time, and only in such person's capacity as a state or quasi-public agency employee.

"Principal of a state contractor or prospective state contractor" means (i) any individual who is a member of the board of directors of, or has an ownership interest of five per cent or more in, a state contractor or prospective state contractor, which is a business entity, except for an individual who is a member of the board of directors of a nonprofit organization, (ii) an individual who is employed by a state contractor or prospective state contractor, which is a business entity, as president, treasurer or executive vice president, (iii) an individual who is the chief executive officer of a state contractor or prospective state contractor, which is not a business entity, or if a state contractor or prospective state contractor has no such officer, then the officer who duly possesses comparable powers and duties, (iv) an officer or an employee of any state contractor or prospective state contractor who has *managerial or discretionary responsibilities with respect to a state contract*, (v) the spouse or a *dependent child* who is eighteen years of age or older of an individual described in this subparagraph, or (vi) a political committee established or controlled by an individual described in this subparagraph or the business entity or nonprofit organization that is the state contractor or prospective state contractor.

"State contract" means an agreement or contract with the state or any state agency or any quasi-public agency, let through a procurement process or otherwise, having a value of fifty thousand dollars or more, or a combination or series of such agreements or contracts having a value of one hundred thousand dollars or more in a calendar year, for (i) the rendition of services, (ii) the furnishing of any goods, material, supplies, equipment or any items of any kind, (iii) the construction, alteration or repair of any public building or public work, (iv) the acquisition, sale or lease of any land or building, (v) a licensing arrangement, or (vi) a grant, loan or loan guarantee. "State contract" does not include any agreement or contract with the state, any state agency or any quasi-public agency that is exclusively federally funded, an education loan, a loan to an individual for other than commercial purposes or any agreement or contract between the state or any state agency and the United States Department of the Navy or the United States Department of Defense.

"State contract solicitation" means a request by a state agency or quasi-public agency, in whatever form issued, including, but not limited to, an invitation to bid, request for proposals, request for information or request for quotes, inviting bids, quotes or other types of submittals, through a competitive procurement process or another process authorized by law waiving competitive procurement.

"Managerial or discretionary responsibilities with respect to a state contract" means having direct, extensive and substantive responsibilities with respect to the negotiation of the state contract and not peripheral, clerical or ministerial responsibilities.

"Dependent child" means a child residing in an individual's household who may legally be claimed as a dependent on the federal income tax of such individual.

"Solicit" means (A) requesting that a contribution be made, (B) participating in any fund-raising activities for a candidate committee, exploratory committee, political committee or party committee, including, but not limited to, forwarding tickets to potential contributors, receiving contributions for transmission to any such committee or bundling contributions, (C) serving as chairperson, treasurer or deputy treasurer of any such committee, or (D) establishing a political committee for the sole purpose of soliciting or receiving contributions for any committee. Solicit does not include: (i) making a contribution that is otherwise permitted by Chapter 155 of the Connecticut General Statutes; (ii) informing any person of a position taken by a candidate for public office or a public official, (iii) notifying the person of any activities of, or contact information for, any candidate for public office; or (iv) serving as a member in any party committee or as an officer of such committee that is not otherwise prohibited in this section.

"Subcontractor" means any person, business entity or nonprofit organization that contracts to perform part or all of the obligations of a state contractor's state contract. Such person, business entity or nonprofit organization shall be deemed to be a subcontractor until December thirty first of the year in which the subcontract terminates. "Subcontractor" does not include (i) a municipality or any other political subdivision of the state, including any entities or associations duly created by the municipality or political subdivision exclusively amongst themselves to further any purpose authorized by statute or charter, or (ii) an employee in the executive or legislative branch of state government or a quasi-public agency, whether in the classified or unclassified service and full or part-time, and only in such person's capacity as a state or quasi-public agency employee.

"Principal of a subcontractor" means (i) any individual who is a member of the board of directors of, or has an ownership interest of five per cent or more in, a subcontractor, which is a business entity, except for an individual who is a member of the board of directors of a nonprofit organization, (ii) an individual who is employed by a subcontractor, which is a business entity, as president, treasurer or executive vice president, (iii) an individual who is the chief executive officer of a subcontractor, which is not a business entity, or if a subcontractor has no such officer, then the officer who duly possesses comparable powers and duties, (iv) an officer or an employee of any subcontractor who has managerial or discretionary responsibilities with respect to a subcontract with a state contractor, (v) the spouse or a dependent child who is eighteen years of age or older of an individual described in this subparagraph, or (vi) a political committee established or controlled by an individual described in this subparagraph or the business entity or nonprofit organization that is the subcontractor.