
Request for Proposals

EXHIBIT A

State of Connecticut, Department of Transportation

Division of Purchasing & Materials Management

ConnDOT Contact: Mary Matuszak, Fiscal Administrative Supervisor

Date Issued: March 26, 2009

RFP Due Date: May 28, 2009

State of Connecticut, Department of Transportation (ConnDOT)
Announcement of Request for Proposals (RFP) for
PURCHASE OF LOW FLOOR HEAVY DUTY TRANSIT BUSES AND HIGH
FLOOR HEAVY DUTY SUBURBAN BUSES

Date: March 26, 2009

RFP No. 09DOT7004

Pursuant to the provisions of Section 13b-34 of the General Statutes of Connecticut as amended, sealed proposals will be received by ConnDOT at the address provided in this RFP for furnishing the commodities and/or services listed herein.

ConnDOT welcomes the opportunity to work with our customers and suppliers to provide 30', 35', 40', 45' & 60' Clean Diesel and Hybrid Buses as outlined throughout this RFP document.

We invite you to be part of this effort.

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ABBREVIATIONS AND COMMONLY USED TERMS

ABS: Anti-Lock Braking System

AC: Alternating Current

ADA: Americans with Disabilities Act

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.

ANSI: American National Standards Institute

APTA: American Public Transportation Association

ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

ASTM: American Society for Testing and Materials

ATC: Automatic Traction Control

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).

CCTV: Closed Circuit Television

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

CF: Compact Flash

CFR: Code of Federal Regulations

ConnDOT: State of Connecticut, Department of Transportation

Code: A legal requirement.

CTDMV: State of Connecticut, Department of Motor Vehicles

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.

DAT: Digital Audio Tape

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

DBE: Disadvantaged Business Enterprise

DC: Direct Current

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.

DOE: U.S. Department of Energy

DOT: U.S. Department of Transportation

DR: Diagnostic Reader

DRL: Daytime Running Lights

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.

ECM: Engine Control Module

ECS: Emission Control System

EMI: Electromagnetic Interference

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.

EPA: U.S. Environmental Protection Agency

FCC: Federal Communications Commission

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.

FMCSA: Federal Motor Carrier Safety Administration

FMCSR: Federal Motor Carrier Safety Regulations (US)

FMEA: Failure Modes and Effects Analysis

FMVSS: Federal Motor Vehicle Safety Standards (US)

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.

FTA: U.S. Federal Transit Administration

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

GAAP: Generally Accepted Accounting Principles

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.

GPS: Global Positioning System

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.

HHDD: Heavy, Heavy-Duty Diesel

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.

t₁ and t₂ = any two points in time during the impact.

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

HMI: 67 Human Machine Interface

Hoses: Flexible lines.

HVAC: Heating, Ventilation and Air Conditioning

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.

IAS: International Approval Services

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

I/O: Input/Output

ISO: International Organization for Standardization

JIC: Joint Industrial Council

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.

LED: Light Emitting Diode

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.

Low Voltage (LV): 50 volts or less (AC and DC).

MDBF: Mean Distance Between Failure

MDBSF: Mean Distance Between Service Failure

MDT: Mobile Data Terminal

MDVR: Mobile Digital Video Recording

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.

MTBF: Mean Time Before Failure

NATEF/ASE: The National Automotive Technicians Education Foundation/Automotive Service Excellence

NFPA: National Fire Protection Association

NHTSA: National Highway Traffic Safety Administration

NIC: Network Interface Card

OCU: Operator Control Unit

OEM: Original Equipment Manufacturer (Bus Manufacturer)

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

OSHA: Occupational Safety and Health Administration

OSI: Open Systems Interconnect

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.

PMAD: Personnel Mobility Aid Devices

Power: Work or energy divided by time.

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

PPI: Producer Price Index

PRD: Pressure Relief Device

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.

PWM: Pulse Width Modulation

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.

RFI: Radio Frequency Interference

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

SAE: Society Automotive Engineers

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

SLW (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.

SLW: Seated Load Weight

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.

SPI: Society of the Plastics Industry

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.

TCRB: Transportation Cooperative Research Board

TRB: Transportation Research Board

TRiM: Ticket Reader/Issue Machine

TVM: Transit Vehicle Manufacturer

UL: Underwriters Laboratories

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.

Request for Proposals

PURCHASE OF LOW FLOOR HEAVY DUTY TRANSIT BUSES AND HIGH FLOOR HEAVY DUTY SUBURBAN BUSES

Overview

The State of Connecticut, Department of Transportation (ConnDOT) owns and contracts for the management of the CTTransit system and also is the primary funder of twelve (12) transit districts in the State of Connecticut. The purpose of this procurement is to purchase up to 625 buses for Connecticut's transit system for both replacement and option buses.

ConnDOT is interested in deploying a mix of traditional clean fuel diesel buses as well as hybrid technology where applicable. This procurement is for 30', 35', 40' and 60' low floor heavy duty transit buses. ConnDOT desires to receive proposals for both clean fuel diesel and hybrid electric drive design versions of each of these different size buses. ConnDOT is also requesting proposals for 45' heavy duty high floor clean fuel diesel suburban commuter buses. All are required to have a minimum expected life of twelve (12) 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.

It is expected that other transit agencies will piggyback on this procurement. The equipment needs of the Greater Bridgeport Transit Authority, the Housatonic Area Regional Transit District, the Norwalk Transit District, and the Middletown Area Transit District have been included in this procurement. It is possible that various minor modifications may be needed to accommodate the needs of transit districts that may participate in this process.

ConnDOT shall have the right to sell, assign or transfer the contract and 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 ConnDOT may have under the contract.

The term of this contract will be for five (5) years from the date of award so that buses may be replaced as they reach the end of their lifespan. The Contractor(s) shall comply with all applicable Federal, State and local regulations. The buses shall meet all applicable FMVSS and shall accommodate all applicable FMCSR regulations in effect at the date of manufacture.

Separate awards for different types of vehicles are possible under this RFP.

ConnDOT has not fully identified and programmed all of the funding required for this procurement. As ConnDOT desires to receive proposals for both diesel and hybrid electric drive design versions of these different size buses, the amount of funding that is needed may vary. ConnDOT expects to purchase all of the replacement equipment identified in this proposal. However, Proposers should be aware that all funding has not yet been identified and put in place.

The contract will be awarded subject to conditions of a financial assistance contract between the FTA and ConnDOT and all contract parties must comply with all applicable FTA requirements.

All contract parties must comply with all applicable American Recovery and Reinvestment Act of 2009 requirements for purchases using these funds.

Expected Five Year Equipment Need

The tables below show ConnDOT's and transit district's planned purchases over the next five (5) years.

Vehicle Type			Base Year
	Like Replacements	Unlike Replacements	Option Buses
30 Foot Buses Conventional or Hybrid	0	0	5
35 Foot Buses Conventional or Hybrid	54	0	10
40 Foot Buses Conventional or Hybrid	14	0	19
45 Foot Commuter Buses	30	3	17
60 Foot Articulated Buses Conventional or Hybrid	0	35	5
Totals	98	38	56
Replacement Buses		136	
Total Buses		192	

Vehicle Type			Option Year One
	Like Replacements	Unlike Replacements	Option Buses
30 Foot Buses Conventional or Hybrid	0	0	10
35 Foot Buses Conventional or Hybrid	0	0	5
40 Foot Buses Conventional or Hybrid	14	0	18
45 Foot Commuter Buses	0	0	15
60 Foot Articulated Buses Conventional or Hybrid	0	0	15
Totals	14	0	63
Replacement Buses		14	
Total Buses		77	

Vehicle Type			Option Year Two
	Like Replacements	Unlike Replacements	Option Buses
30 Foot Buses Conventional or Hybrid	6	0	5
35 Foot Buses Conventional or Hybrid	0	0	5
40 Foot Buses Conventional or Hybrid	1	8	19
45 Foot Commuter Buses	0	0	3
60 Foot Articulated Buses Conventional or Hybrid	0	0	5
Totals	7	8	37
Replacement Buses		15	
Total Buses		52	

Expected 5 Year Bus Procurement Equipment
Need (Continued)

Vehicle Type	Like Replacements	Unlike Replacements	Option Year Three
			Option Buses
30 Foot Buses Conventional or Hybrid	0	0	5
35 Foot Buses Conventional or Hybrid	10	0	5
40 Foot Buses Conventional or Hybrid	36	0	0
45 Foot Commuter Buses	0	0	10
60 Foot Articulated Buses Conventional or Hybrid	0	0	5
Totals	46	0	25

Replacement Buses 46
Total Buses 71

Vehicle Type	Like Replacements	Unlike Replacements	Option Year Four
			Option Buses
30 Foot Buses Conventional or Hybrid	18	2	9
35 Foot Buses Conventional or Hybrid	0	3	55
40 Foot Buses Conventional or Hybrid	40		91
45 Foot Commuter Buses	0		10
60 Foot Articulated Buses Conventional or Hybrid	0		5
Totals	58	5	170

Replacement Buses 63
Total Buses 233

Total Replacement Like Kind 223
Total Replacement Unlike Kind 51
Total Option Buses 351
Maximum Bus Purchase 625

Scope of Services

- Purchase of up to 625 buses for Connecticut's transit system for replacement and system expansion.
- Manufacture 30', 35', 40' and 60' low floor heavy duty transit buses, both clean fuel diesel and hybrid electric drive design versions
- Manufacture 45' heavy duty high floor clean fuel diesel suburban commuter buses.

Instructions to Proposers

1. Proposal Schedule

Release of RFP:	Date: <u>March 26, 2009</u>
Receipt of Questions:	Date: <u>April 17, 2009</u> , by 2:00 pm Eastern Time
Answers to Questions posted as Addendum:	Date: <u>May 1, 2009</u>
Proposal Due Date:	Date: <u>May 28, 2009</u> , by 2:00 pm Eastern Time

During the period from your organization's receipt of this Request for Proposals, and until a contract is awarded, your organization shall not contact any employee of the State of Connecticut for additional information, except in writing, directed to the State of Connecticut, Department of Transportation, Attn.: Mary Matuszak, Division of Purchasing & Materials Management, 2800 Berlin Turnpike, Newington, CT 06131-7546.

2. Questions

Questions for the purpose of clarifying the RFP must be submitted in writing and must be received in ConnDOT's Division of Purchasing & Materials Management no later than 2:00 pm Eastern Time on April 17, 2009.

Questions must be delivered to:

State of Connecticut, Department of Transportation
Attn.: Mary Matuszak
(RFP #09DOT7004)
2800 Berlin Turnpike
Newington, CT 06131-7546

or emailed to email address: mary.matuszak@ct.gov

3. Sealed Proposals (ONE ORIGINAL AND SIX (6) COPIES)

Proposals must be submitted in a SEALED envelope or carton, clearly marked with RFP No. 09DOT7004, the date, and the name and address of the Proposer. Any material that is not so received may be opened as general mail, and result in invalidating the Proposer's submission. Facsimile or unsealed proposals will not be accepted under any circumstances.

Proposal Requirements

1. Contract Period

The State intends that this contract shall be in effect for a period of 5 years, beginning from date of award.

The State reserves the sole right to extend this contract for a period up to the full original contract term or parts thereof.

2. Motor Carrier Safety Review

If the performance of the Contract requires the use and operation of any commercial motor vehicle, as defined in section 14-1 of the Connecticut General Statutes, or other motor vehicle with a GVWR of 18,000 pounds or more, each Proposer will be the subject of an evaluation, conducted by the CTDMV of its motor carrier safety fitness. The primary factor in the evaluation is the current SAFESTAT score, calculated by the FMCSA in accordance with the provisions of Title 49, Section 385.1, et seq., of the Code of Federal Regulations.

To be deemed qualified, the Proposer must have an overall SAFESTAT category rating of "D" or better, on the date of evaluation. In addition, the Proposer's driver and vehicle out-of-service rates will be consulted. The rates are determined by the number of out-of-service violations cited to the motor carrier in the course of all official, reported vehicle and/or driver inspections conducted during the preceding thirty (30) months. To be deemed qualified, the Proposer must not have either a vehicle or driver out-of-service rate, by percentage of out-of-service violations per the total number of inspections reported, that is more than twice the national average. In addition, the Proposer must have a current federal safety management practices rating of "Satisfactory," as defined in 49 CFR Section 385.3, as amended.

Further information concerning the motor carrier safety evaluation, to which a Proposer is subject, may be obtained from CTDMV, at <http://www.ct.gov/dmv/cwp/view.asp?a=798&q=413206&dmvPNavCtr=#49068>. All official inspection and rating data that is used in the performance of each evaluation is available to any motor carrier through the federal SAFESTAT website, at <http://www.ai.volpe.dot.gov/>.

3. Pre-Meeting Requirements

No pre-proposal meeting will apply. Rather, questions may be addressed in writing as identified in Section "Instructions to Proposers", page 15 of this RFP Document.

4. Quantities and/or Usages

These are estimated quantities and/or usages only and in no way represent a commitment and/or intent to purchase. Actual quantities may vary and will be identified on individual purchase orders issued by ConnDOT.

5. Brand Name Specifications and/or References

Brand names or Catalogs referenced or implied in the specifications of this request for proposal are for the purpose of describing and establishing general performance and quality levels. Such references are not intended to be restrictive. Proposals are invited on these and comparable brands or products provided the quality of the proposed products meet or exceed the quality of the specifications listed for each item. Proposers must submit complete documentation on the specifications and quality levels of the proposed products. Proposals submitted that do not contain this documentation are subject to rejection.

6. Contract Award

The State reserves the right to award this Contract in a manner deemed to be in the best interest of the State and may include, but not be limited to:

- A. By item, group of items, or in its entirety
- B. Geographic location to adequately service the entire State of Connecticut in the best possible manner
- C. Multiple Vendor Award

7. Bonds

A Performance Bond and a Payment Bond will be required per Purchase Order, as follows: 10% of the total amount of the bus portion of the purchase order. Such bonds must be received within twenty (20) days of request. Failure to submit Bonds on the forms required by the State shall result in the State either re-awarding the contract to the next lowest Proposer or re-bidding the contract. Other offers of surety will be reviewed on a case by case basis. It is the responsibility of the Contractor to ensure that its bonds are updated as required.

Such bonds shall be:

1. **Corporation:** The Bonds must be signed by an official of the Corporation above his official title and the corporate seal must be affixed over his signature.
2. **Firm or Partnership:** The Bonds must be signed by all the partners and indicate they are "Doing Business As (name of firm)".
3. **Individual:** The Bonds must be signed by the individual owning the business and indicated "Owner".
4. The Surety Company executing the Bonds must be licensed to do business in the State of Connecticut, or Bonds must be countersigned by a company so licensed.
5. The Bonds must be signed by an official of the Surety Company and the corporate seal must be affixed over his signature.
6. Signature of two witnesses for both principal and the Surety must appear on the Bonds.
7. A Power of Attorney for the official signing the Bonds for the Surety Company must be submitted with the Bonds.

8. Stability of Proposed Prices

Any price offerings from Proposers must be valid for a period of 180 days from the due date of the proposals.

9. Amendment or Cancellation of the RFP

ConnDOT reserves the right to cancel, amend, modify or otherwise change this RFP at any time if it deems it to be in the best interest of the State to do so.

10. Proposal Modifications

No additions or changes to any proposal will be allowed after the proposal due date, unless such modification is specifically requested by ConnDOT. ConnDOT, at its option, may seek Proposer retraction and/or clarification of any discrepancy or contradiction found during its review of proposals.

11. Proposer Presentation of Supporting Evidence

Proposers must be prepared to provide any evidence of experience, performance, ability, and/or financial surety that ConnDOT deems to be necessary or appropriate to fully establish the performance capabilities represented in their proposals.

12. Proposer Demonstration of Proposed Services and or Products

At the discretion of ConnDOT, Proposers must be able to confirm their ability to provide all proposed services. Any required confirmation must be provided at a site approved by ConnDOT.

13. Erroneous Awards

ConnDOT reserves the right to correct inaccurate awards. This may include, in extreme circumstances, revoking the awarding of a contract already made to a Proposer and subsequently awarding the contract to another Proposer.

Such action on the part of ConnDOT shall not constitute a breach of contract on the part of ConnDOT since the contract with the initial Proposer is deemed to be void and of no effect as if no contract ever existed between ConnDOT and such Proposer.

14. Proposal Expenses

Proposers are responsible for all costs and expenses incurred in the preparation of proposals and for any subsequent work on the proposal that is required by ConnDOT.

- 15. Ownership of Proposals**
All proposals shall become the sole property of the State and will not be returned.
- 16. Ownership of Subsequent Products**
Any product, whether acceptable or unacceptable, developed under a contract awarded as a result of this RFP shall be the sole property of the State unless otherwise stated in the contract.
- 17. Oral Agreement or Arrangements**
Any alleged oral agreements or arrangements made by Proposers with any State agency or employee will be disregarded in any State proposal evaluation or associated award.
- 18. Subcontractors**
ConnDOT must approve any and all subcontractors utilized by the successful Proposer prior to any such subcontractor commencing any work. Proposers acknowledge by the act of submitting a proposal that any work provided under the contract is work conducted on behalf of the State and that the Commissioner of ConnDOT or his designee may communicate directly with any subcontractor as the State deems to be necessary or appropriate. It is also understood that the successful Proposer 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 successful Proposer to ConnDOT upon request. The successful Proposer must provide the majority of services described in the specifications.
- 19. Confidentiality and Care of Data**
The successful proposer agrees to protect the confidentiality of any files, data or other material pertaining to this contract and to restrict their use solely for the purpose of performing this contract. The successful proposer shall take all steps necessary to safeguard data, files, reports or other information from loss, destruction or erasure. Any costs or expenses of replacing or damages resulting from the loss of such data shall be borne by the Contractor when such loss or damage occurred through its negligence.
- 20. RFP Contract (See attachment)**
The Contract Document is a template that will be signed by the Awarded Contractor and ConnDOT.

SPECIAL PROVISIONS

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 but 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.

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.

COMPLIANCE WITH CT. 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. You may also review information on the Secretary of State's Office website at <http://www.sots.ct.gov>.

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.

PURCHASE ORDERS:

Purchase Orders will be issued by ConnDOT'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 ConnDOT's Division of Purchasing & Materials Management; Mr. Martin Manganello at telephone number (860) 594-2070.

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

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.

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.

ConnDOT 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 ConnDOT 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, ConnDOT 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 ConnDOT. These acceptance tests shall include pre-delivery inspections and testing by the Contractor and inspections and testing by ConnDOT 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 ConnDOT. 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 ConnDOT.

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. ConnDOT 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.

ConnDOT 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 ConnDOT. 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. ConnDOT 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, ConnDOT may elect to perform chassis dynamometer tests. Operational deficiencies of each bus shall be identified and recorded.

TRAINING, MANUALS and PARTS AVAILABILITY

The Contractor shall deliver the following training videos to ConnDOT on CD or DVD 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

The Contractor shall also provide eighty (80) hours of maintenance training to ConnDOT within 180 calendar days of delivery of the first bus at a time and location specified by ConnDOT. 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

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
7. Hybrid drive propulsion system

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.

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.

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 ConnDOT 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 ConnDOT 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 ConnDOT'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
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.

- 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 ConnDOT).
- 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.

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. ConnDOT 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 supersessions 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 ConnDOT. 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.

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.

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 ConnDOT's designated agent at the point of delivery and may be preceded by a cursory inspection of the bus.

CERTIFICATE OF ORIGIN:

The awarded vendor must furnish a certificate of origin to the State of Connecticut. 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

ACCEPTANCE OF BUS

Within fifteen (15) calendar days after arrival at the designated point of delivery, the bus will undergo ConnDOT tests as specified. If the bus passes these tests or if ConnDOT does not notify Contractor of non-acceptance within fifteen (15) calendar days after delivery, acceptance of the bus by ConnDOT occurs on the fifteenth day after delivery. Acceptance may occur earlier if ConnDOT 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.

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 ConnDOT's personnel with reimbursement by the Contractor.

REPAIRS BY CONTRACTOR

After non-acceptance of the bus, the Contractor must begin work within five (5) working days after receiving notification from ConnDOT of failure of acceptance tests. ConnDOT 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 ConnDOT's option, the Contractor may be required to remove the bus from ConnDOT's property while repairs are being affected. If the bus is removed from ConnDOT'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.

REPAIRS BY ConnDOT

1. **Parts Used.** If ConnDOT 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 ConnDOT 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 ConnDOT after non-acceptance of the bus, these parts will be shipped prepaid to ConnDOT 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.** ConnDOT 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 ConnDOT's service garage at the time the defect correction is made.
5. **Reimbursement for Parts.** ConnDOT 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.

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, ConnDOT 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 ConnDOT shall be fixed at **\$150.00 per calendar day** per bus not delivered in substantially as good condition as inspected by ConnDOT 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 ConnDOT and further authorizes ConnDOT 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 ConnDOT 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 ConnDOT arising at any time from the failure of the Contractor to fulfill the obligations referenced in this clause in a timely manner.

ConnDOT specifically reserves the right, without limitation of any other rights, to terminate the Contract in accordance with "Termination of Contract".

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 ConnDOT 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 ConnDOT, within eight (8) hours of ConnDOT'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 ConnDOT.

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

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: Attn: Wallace P. Lugli
Chief Financial Management and Support
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.

WARRANTY PROVISIONS

The complete bus, propulsion system, components, major subsystems and body and chassis structure are to be warranted free from defects and related defects for one (1) year or 50,000 miles, whichever comes first, beginning on the date of revenue service but not longer than fifteen (15) days after acceptance. The warranty is based on regular operation of the bus under the operating conditions prevailing in ConnDOT'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 or drive motors, and generators (for hybrid technology) 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.

Contractor warrants the ECS for five (5) years or 100,000 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 systems
- Cooling systems
 - Radiator
 - Transmission cooler
- Passenger seating (excluding fabric)
- Fuel 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 ConnDOT 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. ConnDOT 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 ConnDOT.

The Contractor shall pass on to ConnDOT any warranty, offered by a component supplier, that is superior to that required herein. The Contractor shall provide a list to ConnDOT 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 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, ConnDOT 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 ConnDOT-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.

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

If ConnDOT 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 ConnDOT. ConnDOT 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 ConnDOT, the Contractor may be required to remove the bus from the property of ConnDOT while repairs are being affected. If the bus is removed from ConnDOT's property, repair procedures must be diligently pursued by the Contractor's representative.

If ConnDOT 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, ConnDOT may use Contractor-specified parts available from its own stock if deemed in its best interests.

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

ConnDOT shall be reimbursed by the Contractor for labor. The amount shall be determined by ConnDOT for a technician at a straight time wage rate plus fringe benefits and overhead adjusted for ConnDOT'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 ConnDOT's service garage at the time the defect correction is made.

ConnDOT 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 ConnDOT.

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 ConnDOT 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 ConnDOT 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 ConnDOT.

The following list represents requirements by ConnDOT 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

ConnDOT'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 ConnDOT.

ConnDOT 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.

PRICE ESCALATION/ECONOMIC PRICE ADJUSTMENT:

ConnDOT 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 ConnDOT within a period of 365 days of contract award. The price(s) of any buses/equipment ordered by ConnDOT 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 WPS141106 "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 5 percent 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 significant modifications are made to the technical specifications, the parties will enter into negotiations to determine the final unit price for subsequent orders.

ASSIGNMENT OF CONTRACT BY STATE

At any time during the continuance of the contract, ConnDOT 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 ConnDOT may have under the contract.

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.)

PROHIBITED INTEREST

No member officer or employee of ConnDOT 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.

BUSINESS OPERATIONAL CHANGES

In the event that the awarded Contractor moves or updates telephone numbers, it is the responsibility of the Contractor to advise ConnDOT'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

TECHNICAL SPECIFICATIONS

GENERAL REQUIREMENTS

This procurement is for 30', 35', 40' and 60' low floor heavy duty transit buses and 45' heavy duty high floor suburban commuter buses. They all are required to have a minimum expected life of twelve (12) years or 500,000 miles which ever 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, with the exception of the 45' heavy duty high floor suburban commuter buses.

These buses shall be designed to operate the "Transit Bus Duty Cycle" as described in the APTA "Standard Bus Procurement Guidelines". All definitions and abbreviations listed in the APTA "Standard Bus Procurement Guidelines" shall also apply to this procurement. The "Standard Bus Procurement Guidelines" are available for reference on the APTA website as follows: www.apta.com/ebiz/procurement/index.cfm

The Contractor shall comply with all applicable Federal, State and Local regulations. The bus shall meet all applicable FMVSS and shall accommodate all applicable FMCSR regulations in effect at the date of manufacture.

The Contractor 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.

ConnDOT shall receive one (1) severe duty notebook computer for each of the applications listed below, preloaded with software:

- Engine programming and diagnostics
- Transmission programming and diagnostics
- Multiplex system programming and diagnostics
- HVAC system programming and diagnostics
- Electronic Destination Sign programming and diagnostics
- Video Security System programming and diagnostics

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 system 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
Jacking Adapters	1	2	3
Wheel Alignment Tools	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 be 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 and 100 percent, and at altitudes up to 3,000 feet above sea level. Degradation of performance due to atmospheric conditions shall be minimized at temperatures below 10° F, above 115° F, or at altitudes above 3,000 feet.

All the Connecticut bus transit systems in this procurement operate in a high corrosion environment due to the winter sand, salt and calcium chloride, 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 ConnDOT 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 shall use, whenever possible and allowed by the specifications, recycled materials in the manufacture of the bus.

The Contractor shall comply with all applicable Federal requirements defined in the Americans with Disabilities Act, 49 CFR Part 38, and all State and Local regulations regarding mobility-impaired persons.

BASIC BODY

The bus shall have a clean, smooth, modern design. The exterior and body features, including grilles and louvers, shall be shaped to facilitate cleaning by automatic bus washers without snagging washer brushes. Water and dirt shall not be retained in or on any body feature to freeze or bleed out onto the bus after leaving the washer. The body and windows shall be sealed to prevent leaking of air, dust, or water under normal operating conditions and during cleaning in automatic bus washers for the service life of the bus. Exterior panels shall be sufficiently stiff to minimize vibration, drumming or flexing while the bus is in service. When panels are lapped, the upper and forward panels shall act as a watershed. However if entry of moisture into interior of vehicle is prevented by other means, then rear cap panels may be lapped otherwise. The windows, hatches, and doors shall be able to be sealed. Accumulation on any window of the bus of spray and splash generated by the bus' wheels on a wet road shall be minimized.

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

The bus shall withstand a 25 mph impact by a 4,000 pound automobile at any point, excluding doorways, along either side of the bus with no more than 3 inches of permanent structural deformation at seated passenger hip height. This impact shall not result in sharp edges or protrusions in the bus interior.

Exterior panels below 35 inches from ground level shall withstand a static load of 2,000 pounds applied perpendicular to the bus by a pad no larger than 5 inches square. This load shall not result in deformation that prevents installation of new exterior panels to restore the original appearance of the bus.

Body materials shall be selected and the body fabricated to reduce maintenance, extend durability, and provide consistency of appearance throughout the service life of the bus. Detailing shall be kept simple; add-on devices and trim, where necessary, shall be minimized and integrated into the basic design. The body material surfaces shall be protected against graffiti and vandalism.

The bus flooring, sides, roof, understructure, axle suspension components shall resist corrosion or deterioration from atmospheric conditions and road salts for a period of twelve (12) years or 500,000 miles which ever comes first. It shall maintain structural integrity and nearly maintain original appearance throughout its service life, provided that it is maintained by ConnDOT in accordance with the procedures specified in the Contractor's service manual. With the exception of periodically inspecting the visible coatings applied to prevent corrosion and reapplying these coatings in limited spots, the Contractor shall not require the complete reapplication of corrosion compounds over the life of the bus.

The vehicle shall be constructed using only inherently corrosion-resistant materials and fasteners to minimize deterioration. The structure shall not require corrosion-preventive coatings or after-treatments 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 1 percent.

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.

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

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

Prior to acceptance of first bus, the structure of the bus shall have undergone appropriate structural testing and/or analysis, including FTA required Altoona testing, to ensure adequacy of design for the urban transit service. Any items that required repeated repairs or replacement must undergo the corrective action with supporting test and analysis. A report clearly describing and explaining the failures and corrective actions taken to ensure any and all such failures will not occur shall be submitted to ConnDOT.

Towing devices shall be provided on each end of the bus. Towing devices should accommodate flat-bedding or flat-towing. Each towing device shall withstand, without permanent deformation, tension loads up to 1.2 times the curb weight of the bus within 20 degrees of the longitudinal axis of the bus. The rear towing device(s) shall not provide a toehold for unauthorized riders. 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 lifting and towing of the bus for a short distance, such as in cases of an emergency, to allow access to provisions for front towing of bus. The method of attaching the tow bar or adapter shall require the specific approval of ConnDOT. Each towing device shall accommodate a crane hook with a 1 inch throat.

It shall be possible to safely jack up the bus, at curb weight, with a common 10 ton floor jack with or without special adapter, when a tire or dual set is completely flat and the bus is on a level, hard surface, without crawling under any portion of the bus. Jacking from a single point shall permit raising the bus sufficiently high to remove and reinstall a wheel and tire assembly. Jacking pads located on the axle or suspension near the wheels shall permit easy and safe jacking with the flat tire or dual set on a 6 inch high run-up block not wider than a single tire. Jacking and changing any one tire shall be completed by a mechanic in less than 30 minutes from the time the bus is approached. The bus shall withstand such jacking at any one or any combination of wheel locations without permanent deformation or damage. Jacking pads shall be painted safety yellow or orange for ease of identification.

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

Where the floor meets the walls of the bus, as well as other vertical surfaces, such as, platform risers, the surface edges shall be blended with a circular section of radius not less than 1 inch. Similarly, a molding or cove shall prevent debris accumulation between the floor and wheel housings. The vehicle floor in the area of the entrance and exit doors shall have a lateral slope not exceeding 2 degrees to allow for drainage.

The floor deck may be integral with the basic structure or mounted on the structure securely to prevent chafing or horizontal movement and designed to last the life of the bus. Sheet metal screws shall not be used to retain the floor and all floor fasteners shall be serviceable from one (1) side only. The use of adhesives to secure the floor to the structure shall be allowed only in combination with the use of bolt or screw fasteners and its effectiveness shall last throughout life of the coach. Tapping plates, if used for the floor fasteners, shall be no less than the same thickness as a standard nut and all floor fasteners shall be secured and protected from corrosion for the service life of the bus. The floor deck shall be reinforced as needed to support passenger loads. At GVWR, the floor shall have an elastic deflection of no more than 0.60 inches from the normal plane. The floor shall withstand the application of 2.5 times gross load weight without permanent detrimental deformation. Floor, with coverings applied, shall withstand a static load of at least 150 pounds applied through the flat end of a ½ inch-diameter rod, with 1/32 inch radius, without permanent visible deformation.

The floor shall consist of the subfloor and the floor covering. The floor, as assembled, including the sealer, attachments and covering shall be waterproof, non-hygroscopic, and impervious to mold growth.

The subfloor shall be SpaceAge Synthetics Thermo-Lite or equal composite flooring material that will provide a minimum 150 pound weight savings per bus to the standard ¾ inch marine plywood subfloor product. The composite material shall be waterproof and will not rot, warp, mildew, allow mold growth, split, soften, delaminate, will accept standard tooling and hardware, cannot be damaged by insects and should last the life of a twelve (12) year bus.

Platform height shall not exceed 12 inches. Trim shall be provided along top edges of platforms unless integral nosing is provided. Except where otherwise indicated, covering of platform surfaces and risers shall be same material as specified for floor covering. Trim installed along edges of platforms shall be constructed of stainless steel.

The operator's platform shall be of a height that, in a seated position, the operator can see an object located at an elevation of 42 inches above the road surface, 24 inches from the leading edge of the bumper. Notwithstanding this requirement, the platform height shall not position the operator such that the operator's vertical upward view is less than 15 degrees.

If the driver's platform is higher than 12 inches, then the farebox is to be mounted on platform of suitable height to provide accessibility for operator without compromising passenger's access.

If the vehicle is of a bi-level floor design, an intermediate platform shall be provided along the center aisle of the bus to facilitate passenger traffic between the upper and lower floor levels. This intermediate platform shall be cut into the rear platform and shall be approximately the aisle width, 18 inches deep and approximately ½ the height of the upper level relative to the lower level. The horizontal surface of this platform shall be covered with yellow Hypalon or equal ribbed rubber or skid-resistant material and shall be sloped slightly for drainage. A warning decal or sign shall be provided at the immediate platform area to alert passengers to the change in floor level.

Sufficient clearance and air circulation shall be provided around the tires, wheels, and brakes to preclude overheating when the bus is operating on the design operating profile. The Waterbury buses shall be designed and constructed to allow the use of full-tire snow chains. Tire chain clearance shall be provided in accordance with SAE J683.

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

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

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

Wheel housings shall be constructed of corrosion-resistant, fire-resistant material. Wheel housings, as installed and trimmed, shall withstand impacts of a 2 inch steel ball with at least 200 foot-pounds of energy without penetration.

Exterior protrusions, greater than ½ inch and within 80 inches of the ground, shall have a radius no less than the amount of the protrusion. The exterior rearview mirrors and required lights and reflectors are exempt from the protrusion requirement. Grilles, doors, bumpers and other features on the sides and rear of the bus shall be designed to minimize the ability of unauthorized riders to secure toeholds or handholds.

Exterior panels below the lower daylight opening and within 35 inches above ground level shall be divided into sections that are repairable or replaceable by a mechanic in less than thirty (30) minutes for a section up to 5 feet long (excludes painting).

Lower exterior panels within 28 inches above ground level shall be equipped with removable resilient, impact resistant panels for protection against minor impacts and scratches. The panels shall withstand impacts of 200 foot-pounds of energy from a steel-faced spherical missile no less than 9 inches in diameter without any visible damage to it or underlying panel and structure. The panels shall be no greater than 8 feet in length and shall be easily replaced by a mechanic in less than ten (10) minutes. The panels shall be color impregnated to complement color and paint scheme.

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

Provisions shall be made to recess mount standard size U.S. license plates per SAE J686 on the front and rear of the bus. These provisions shall recess the license plates so that they can be cleaned by automatic bus washing equipment without being caught by the brushes. License plates shall be mounted at the lower center or lower street side of the bus and shall not allow a toehold or handhold for unauthorized riders.

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

Splash aprons, composed of ¼ inch-minimum composition or rubberized fabric, shall be installed behind and/or in front of wheels as needed to reduce road splash and protect underfloor components. The splash aprons shall extend downward to within 4 inches of the road surface at static conditions. Apron widths shall be no less than tire widths, except for the front apron that shall extend across the width of the bus. Splash aprons shall be bolted to the bus understructure. Splash aprons and their attachments shall be inherently weaker than the structure to which they are attached. The flexible portions of the splash aprons shall not be included in the road clearance measurements. Other splash aprons shall be installed where necessary to protect bus equipment.

Conventional or pantograph hinged doors shall be used for the engine compartment and for all auxiliary equipment compartments. Access openings shall be sized for easy performance of tasks within the compartment including tool operating space. Access doors shall be of rugged construction and shall maintain mechanical integrity and function under normal operations throughout the service life of the bus. They shall close flush with the body surface. All doors shall be hinged at the top or on the forward edge and shall be prevented from coming loose or opening during transit service or in bus washing operations. Doors with top hinges shall have safety props stored behind the door or on the doorframe. All access doors shall be retained in the open position by props or counterbalancing with over-center or gas-filled springs and shall be easily operable by one person. Springs and hinges shall be corrosion resistant. Latch handles shall be flush with, or recessed behind, the body contour and shall be sized to provide an adequate grip for opening. Access doors, when opened, shall not restrict access for servicing other components or systems. Access doors larger in area than 100 square inches shall be equipped with latches. The latches shall be standardized and shall be openable without the use of a key or tool.

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

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

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

All exterior lights shall be designed to prevent entry and accumulation of moisture or dust, and each lamp shall be replaceable in less than five (5) minutes by a mechanic. Commercially available LED type lamps shall be used wherever possible. Lights 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. Two (2) hazard lamps at the rear of the bus shall be visible from behind when the engine service doors are opened. Light lenses shall be designed and located to prevent damage when running the vehicle through an automatic bus washer. Lights located on the roof and sides (directionals) of the bus shall have protective shields or be of the flush mount type to protect the lens against minor impacts.

Lamps at the front and rear passenger doorways shall comply with ADA requirements and shall activate only when the doors open. These lamps shall illuminate the street surface to a level of no less than 1 foot-candle for a distance of 3 feet outward from the outboard edge of the door threshold. The lights may be positioned above or below the lower daylight opening of the windows and shall be shielded to protect passengers' eyes from glare. Turn-signal lights shall be provided on both sides of the bus.

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

Bumpers shall provide impact protection for the front and rear of the bus with the top of the bumper being 28½ inches above the ground. Bumper height shall be such that when one bus is parked behind another, a portion of the bumper faces will contact each other.

No part of the bus, including the bumper, shall be damaged as a result of a 5 mph impact of the bus at curb weight with a fixed, flat barrier perpendicular to the bus' longitudinal centerline. The bumper shall return to its pre-impact shape within ten (10) minutes of the impact. The bumper shall protect the bus from damage as a result of 6.5 mph impacts at any point by the Common Carriage with Contoured Impact Surface defined in Figure 2 of FMVSS 301 loaded to 4,000 pounds parallel to the longitudinal centerline of the bus and 5.5 mph impacts into the corners at a 30 degree angle to the longitudinal centerline of the bus. The energy absorption system of the bumper shall be independent of every power system of the bus and shall not require service or maintenance in normal operation during the service life of the bus.

No part of the bus, including the bumper, shall be damaged as a result of a 2 mph impact with a fixed, flat barrier perpendicular to the longitudinal centerline of the bus. The bumper shall return to its pre-impact shape within ten (10) minutes of the impact. When using a yard tug with a smooth, flat plate bumper 2 feet wide contacting the horizontal centerline of the rear bumper, the bumper shall provide protection at speeds up to 5 mph, over pavement discontinuities up to 1 inch high, and at accelerations up to 2 mph/sec. The rear bumper shall protect the bus, when impacted anywhere along its width by the Common Carriage with Contoured Impact Surface defined in Figure 2 of FMVSS 301 loaded to 4,000 pounds, at 4 mph parallel to, or up to a 30 degree angle to, the longitudinal centerline of the bus. The

rear bumper shall be shaped to preclude unauthorized riders standing on the bumper. The bumper shall be independent of all power systems of the bus and shall not require service or maintenance in normal operation during the service life of the bus.

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

All 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. All materials shall be strong enough to resist everyday abuse and vandalism; they shall be resistant to scratches and markings. Interior trim shall be secured to avoid resonant vibrations under normal operational conditions.

Interior surfaces more than 10 inches below the lower edge of the side windows or windshield shall be shaped so that objects placed on them fall to the floor when the coach is parked on a level surface. The entire interior shall be cleanable with a hose, using a liquid soap attachment. Water and soap should not normally be sprayed directly on the instrument and switch panels. An anti-graffiti/vandalism surface treatment for interior surfaces shall be provided.

The entire front end of the bus shall be sealed to prevent debris accumulation behind the dash and to prevent the operator's feet from kicking or fouling wiring and other equipment. The front end shall be free of protrusions that are hazardous to passengers standing or walking in the front of the bus during rapid decelerations. Paneling across the front of the bus and any trim around the operator's compartment shall be formed metal or plastic material. Plastic dash panels shall be reinforced, as necessary, vandal-resistant, and replaceable. All colored, painted, and plated parts forward of the operator's barrier shall be finished with a dull matte surface to reduce glare.

The rear bulkhead and rear interior surfaces shall be material suitable for exterior skin, painted and finished to exterior quality, or paneled with melamine-type material, and trimmed with stainless steel, aluminum, or plastic.

Interior side trim panels shall be Arborite Vogue P-925-S or equal material. The operator's barrier shall be smoke color acrylic type material. Panels shall be easily replaceable and tamper-resistant. They shall be reinforced, as necessary, to resist vandalism and other rigors of transit bus service. Individual trim panels and parts shall be interchangeable to the extent practicable. Untrimmed areas shall be painted and finished to the quality described in Section 5.4.3.10. All materials shall comply with the Recommended Fire Safety Practices defined in FTA Docket 90, dated October 20, 1993.

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

An Operator's Barrier shall extend continually from floor to ceiling and from the bus wall to first stanchion immediately behind the Operator to provide security to the Operator and limit passenger conversation. Location and shape must permit full seat travel possibilities and accommodate the shoulders of a 95th percentile male. The partition shall have a side return and stanchion to prevent passengers from standing behind the Operator's seat; lower area between seat and panel must be accessible to the Operator. The partition must be strong enough in conjunction with entire partition assembly for mounting of such equipment as flare kits, fire extinguishers (1.2kg), microcomputer, public address amplifier, etc. The partition shall start 1 inch above floor and dark or black panels are preferred. The panel should be attached with rubber grommets.

An enclosed Operator storage area shall be provided with a positive latching door and lock; minimum approximate size: 14 in. x 14 in. x 14 in.

Sturdy divider panels constructed of durable, unpainted, corrosion-resistant material complementing the interior trim shall be provided to act as both a physical and visual barrier for seated passengers. Modesty panels shall be located at doorways to protect passengers on adjacent seats, and along front edge of rear upper level. Design and installation of modesty panels located in front of forward facing seats shall include a handhold/grabhandle along its top edge. These dividers shall be mounted on the sidewall and shall project toward the aisle no farther than passenger knee projection in longitudinal seats or the aisle side of the transverse seats. Modesty panels shall extend no higher than the lower daylight opening of the side windows and those forward of transverse seats shall extend downward to a level between 1½ and 1 inches above the floor. Panels forward of longitudinal seats shall extend to below the level of the seat cushion. Dividers positioned at the doorways shall provide no less than a 2½ inch clearance between the modesty panel and the opened door to protect passengers from being pinched. Modesty panels installed at doorways shall be equipped with grab rails. The modesty panel and its mounting shall withstand a static force of 250 pounds applied to a 4 inch by 4 inch area in the center of the panel without permanent visible deformation. A clear Plexiglas wind screen shall be provided on the modesty panel located in front of the curb side seats directly behind the rear door.

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 bus is on a level surface. Any air vents in this area shall be louvered to reduce airflow noise and to reduce the probability of trash or litter being thrown or drawn through the grille. If it is necessary to remove the panel to service components located on the rear bulkhead, the panel shall be hinged or shall be able to be removed and replaced by a mechanic in five (5) minutes. Grilles where access to or adjustment of equipment is required shall be heavy duty and designed to minimize damage.

ENGINE

The propulsion system and drive train shall provide power to enable the bus to meet the defined acceleration, top speed, and gradability requirements, and operate all propulsion-driven accessories. Power requirements are based on HHDD engines certified for use in all fifty states using actual road test results or computerized vehicle performance data. The buses shall be capable of achieving a top speed of 68 mph on a straight, level road at GVWR with all accessories operating.

Gradability requirements shall be met on grades with a dry commercial asphalt or concrete pavement at GVWR with all accessories operating. The propulsion system and drive train shall enable the bus to achieve and maintain a speed of 40 mph on a 2½ percent ascending grade and 7 mph on a 16 percent ascending grade.

The bus acceleration shall meet the requirements as listed in the APTA "Standard Bus Procurement Guidelines." The operating range of each bus when run on the transit coach duty cycle shall be at least 350 miles.

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

The HHDD engine shall be designed to operate for not less than 300,000 miles without major failure or significant deterioration. Components of the fuel injector and/or control system shall be designed to operate for not less than 150,000 miles without replacement or major service.

The engine shall be designed to operate on Nos. 1 or 2 ultra low sulfur diesel fuel and up to 20 percent Biodiesel. The engine shall be equipped with an electronically controlled management system.

The engine control system shall have onboard diagnostic capabilities able to monitor vital engine functions, store and time stamp out of parameter conditions in memory, and communicate faults and vital conditions to service personnel. Diagnostic reader device connector ports, suitably protected against dirt and moisture, shall be provided in operator's area and near or inside engine compartment.

The engine starter shall be protected by an interlock that prevents its engagement when the engine is running. The engine shall be equipped with an operator-controlled fast idle device. The fast idle control shall be a two-way toggle mounted on the dash or side console and shall activate only with the transmission in neutral and the parking brake applied.

The engine control system shall protect the engine against progressive damage. The system shall monitor conditions critical for safe operation and automatically derate power and/or speed and initiate engine shutdown as needed. The on-board diagnostic system shall trigger a visual and audible alarm to the operator when the engine control unit detects a malfunction and the engine protection system is activated.

Automatic shutdown shall only occur when the following parameters established for the functions below are exceeded: Coolant Level, Coolant Temperature, Oil Pressure and Oil Temperature.

The optional hybrid drive propulsion system shall be provided for each bus size. The hybrid propulsion system shall be an Allison E40, BAE HybriDrive, ISE Thudervolt/Siemans or equal design. It must have been installed and operating on a minimum 100 transit buses for a minimum of one (1) year at the time of proposal submission. The traction electrical storage shall be nickel metal hydride or Lithium Ion batteries or Ultracapacitors. Lead acid batteries for traction storage will not be accepted.

The cooling systems shall be of sufficient size to maintain all engine and transmission fluids and engine intake air at safe, continuous operating temperatures during the most severe operations possible and in accordance with engine and transmission manufacturers' cooling system requirements. The cooling system fan/fans control should sense the temperatures of the operating fluids and the intake air and if either is above safe operating conditions the cooling fan should be engaged. The fan control system shall be designed with a fail-safe mode of "fan on". The cooling system in new condition shall have an ambient capacity of at least 110° F with water as coolant and sea level operation.

The engine shall be cooled by a water-based, pressure type, cooling system that does not permit boiling or coolant loss during the operations described above. Engine thermostats shall be easily accessible for replacement. Shutoff valves shall allow filter replacement without coolant loss. Valves shall permit complete shutoff of lines for the heating and defroster units, and water booster pumps. The water boost pump shall be a magnetically coupled, brushless and seal less design. 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.

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

The engine shall meet all applicable emission standards. Exhaust gases and waste heat shall be discharged from the roadside rear corner of the roof. The exhaust pipe shall be of sufficient height to prevent exhaust gases and waste heat from discoloring or causing heat deformation to the bus roof. The entire exhaust system shall be adequately shielded to prevent heat damage to any bus component. The exhaust outlet shall be designed to minimize rain, snow or water generated from high-pressure washing systems from entering into the exhaust pipe and causing damage to the catalyst.

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

The power plant shall be arranged so that accessibility for all routine maintenance is assured. No special tools, other than dollies and hoists, shall be required to remove the power plant. Two (2) mechanics shall be able to remove and replace the engine and transmission assembly in less than twelve (12) total combined man-hours. The muffler, exhaust system, air cleaner, air compressor, starter, alternator, radiator, all accessories, and any other component requiring service or replacement shall be easily removable and independent of the engine and transmission removal. An engine oil pressure gauge and coolant temperature gauge shall be provided in the engine compartment. These gauges shall be easily read during service and mounted in an area where they shall not be damaged during minor or major repairs.

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

The engine and transmission shall be equipped with sufficient heavy-duty fuel and oil filters for efficient operation and to protect the engine and transmission between scheduled filter changes. To the extent practicable, the filters shall be of the spin-on, disposable type or integral with the engine and transmission. All filters shall be easily accessible and the filter bases shall be plumbed to assure correct reinstallation. The engine shall be equipped with a fuel-priming pump or a check valve fitted in the fuel suction line to aid restarting after fuel filter changes.

A Spinner II Model 976 or equal centrifugal, non-disposable bypass engine oil filter shall be provided.

An air cleaner with a dry filter element and a graduated air filter restriction indicator shall be provided. The filter shall be removable by a mechanic in ten (10) minutes or less. The location of the air intake system shall be designed to minimize the entry of dust and debris and maximize the life of the air filter. The engine air duct shall be designed to minimize the entry of water into the air intake system. Drainage provisions shall be included to allow any water/moisture to drain prior to entry into air filter.

Engine-driven accessories shall be mounted for quick removal and repair. Accessory drive systems shall operate without unscheduled adjustment for not less than 50,000 miles on the design operating profile. These accessories shall be driven at speeds sufficient to assure adequate system performance during extended periods of idle operation and low route speed portion of the design operating profile. Belt guards shall be provided as required for safety and shall be sturdy in design and installation and readily removable.

Any accessory may be driven hydraulically or electrically. The hydraulic system shall demonstrate a mean time between repairs in excess of 50,000 miles. Hydraulic system service tasks shall be minimized and scheduled no more frequently than those of other major coach systems. All elements of the hydraulic system shall be easily accessible for service or unit replacement. Critical points in the hydraulic system shall be fitted with service ports so that portable diagnostic equipment may be connected or sensors for an off-board diagnostic system permanently attached to monitor system operation. A tamper-proof priority system shall prevent the loss of power steering during operation of the bus if other devices are also powered by the hydraulic system. Sensors in the hydraulic system, excluding those in the power steering system, shall indicate on the operator's on-board diagnostic panel conditions of low hydraulic fluid level.

All fluid lines and air piping shall be rigidly supported to prevent chafing damage, 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 inch 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.

Lines shall have a maximum length of 6 feet unless demonstrated inappropriate for a given application. Hoses/lines shall be secured with heavy-duty stainless steel, 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.

The vehicle engine compartment shall be equipped with an AMEREX ABC dry chemical pre-engineered fire suppression system model V25 or equal. The system shall be approved and listed for use at -65° F to 150° F by Factory Mutual Research Corporation. The automatic actuation system shall provide twenty-four (24) hour fire detection. The system shall also be activated manually by depressing an electric switch (button with pull pin, labeled 'fire') mounted in the driver's dash area. An inspection door will be provided by the OEM on the bus body allowing for visual site inspection of the agent cylinder gauge.

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

The fuel tank(s) shall be equipped with an external, hex head, brass drain plug. It shall be at least a 3/8 inch size and shall be located at the lowest point of the tank(s). The fuel tank(s) shall have an inspection plate or easily removable filler neck to permit cleaning and inspection of the tank(s) without removal from the bus. The tank(s) shall be baffled internally to prevent fuel-sloshing noise regardless of fill level. The baffles or fuel pickup location shall assure continuous full power operation on a 6 percent upgrade for fifteen (15) minutes starting with no more than 25 gallons of fuel over the unusable amount in the tank(s). The bus shall operate at idle on a 6 percent downgrade for thirty (30) minutes starting with no more than 10 gallons of fuel over the unusable amount in the tank(s).

The fuel tank(s) shall be made of corrosion resistant stainless steel and shall be securely mounted to the bus to prevent movement during bus maneuvers, but shall be capable of being removed and reinstalled by a mechanic for cleaning or replacement in ninety (90) minutes or less.

The capacity, date of manufacture, manufacturer name, location of manufacture, and certification of compliance to FMCSR shall be permanently marked on the fuel tank(s). The markings shall be readily visible and shall not be covered with an undercoating material.

The fuel filler shall be an Emco Wheaton or equal system and accommodate a nozzle that forms a locked and sealed connection during the refueling process to eliminate spills. Fuel shall not be allowed to flow into the tank unless the nozzle has been properly coupled, locked and sealed to the filler. With the nozzle open, fuel shall enter the tank at a fill rate of not less than 40 gallons per minute of foam-

free fuel without causing the nozzle to shut off before the tank is full. The nozzle shall automatically shut off when the tank is essentially full. Once disconnected, fuel shall not be allowed to flow through the nozzle at any time. Any pressure over 3 psi shall be relieved from the fuel tank automatically. An audible signal shall indicate when the tank is essentially full. The fuel filler shall be located 7 to 25 feet behind the centerline of the front door on the curbside of the bus. The filler cap shall be retained to prevent loss and shall be recessed into the body so that spilled fuel will not run onto the outside surface of the bus.

Oil and hydraulic lines shall be compatible with the fluid they carry. The lines shall be designed and intended for use in the environment which they are installed, i.e., high temperatures in engine compartment, road salts, oils, etc. Lines shall be capable of withstanding maximum system pressures. Lines within the engine compartment shall be composed of steel tubing where practicable except in locations where flexible lines are specifically required. Hydraulic lines of the same size and with the same fittings as those on other piping systems of the bus, but not interchangeable, shall be tagged or marked for use on the hydraulic system only.

TRANSMISSION

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

The transmission shall be an Allison B330R or B400R or B500R or equal sized appropriately for the buses in this procurement. All transmissions shall be factory filled with Castro Transynd synthetic transmission fluid or equal fluid. The transmission shall be multiple speed, automatic shift with torque converter, retarder and electronic controls. Gross input power, gross input torque and rated input speed shall be compatible with the engine. A mechanic, with optional assistance, shall be able to remove and replace the transmission assembly for service in less than sixteen (16) total combined man-hours. The transmission shall be designed to operate for not less than 300,000 miles on the design operating profile without replacement or major service.

The electronic controls shall be capable of transmitting and receiving electronic inputs and data from other Drivetrain components and broadcasting that data to other vehicle systems. Electronic controls shall be compatible with either 12 or 24 volt power distribution, provide consistent shift quality, and compensate for changing conditions such as variations in vehicle weight and engine power. A brake pedal application of 15 to 20 psi shall be required by the operator to engage forward or reverse range from the neutral position to prevent sudden acceleration of the bus from a parked position.

The electronically controlled transmission shall have on-board diagnostic capabilities, be able to monitor functions, store and time stamp out-of-parameter conditions in memory, and communicate faults and vital conditions to service personnel. The transmission shall contain built-in protection software to guard against severe damage. A diagnostic reader device connector port, suitably protected against dirt and moisture, shall be provided in the operator's area. The on-board diagnostic system shall trigger a visual alarm to the operator when the electronic control unit detects a malfunction.

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

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 the parking brake is applied. 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 shall become partially engaged (approximately 1/4 to 1/3 of its total application, with a resulting deceleration of no greater than 0.03g) 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 0.3g/sec. for duration of a quarter-second or more.

AXLES

The front axle shall be a MAN or equal solid beam, non-driving with a load rating sufficient for the bus loaded to GVWR and shall be equipped with oil lubricated front wheel bearings and seals. All friction points on the front axle shall be equipped with replaceable bushings or inserts and lubrication fittings easily accessible from a pit or hoist.

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

The bus shall be driven by a single heavy-duty MAN or equal axle at the rear with a load rating sufficient for the bus loaded to GVWR. Transfer of gear noise to the bus interior shall be minimized. The drive axle shall be designed to operate for not less than 300,000 miles on the design operating profile without replacement or major repairs. The lubricant drain plug shall be magnetic type, external hex head. If a planetary gear design is employed, the oil level in the planetary gears shall be easily checked through the plug or sight gauge. The drive shaft shall be guarded to prevent it striking the floor of the coach or the ground in the event of a tube or universal joint failure.

SUSPENSION SYSTEM

Both the front and rear suspensions shall be pneumatic type. The basic suspension system shall last the service life of the bus without major overhaul or replacement. Normal replacement items, such as one (1) suspension bushing, shock absorbers, or air spring shall be replaceable by a mechanic in thirty (30) minutes or less. 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.

The suspension system shall permit a minimum wheel travel of 3 inches jounce-upward travel of a wheel when the bus hits a bump (higher than street surface), and 3 inches rebound-downward travel when the bus comes off a bump and the wheels fall relative to the body. Elastomeric bumpers shall be provided at the limit of jounce travel. Rebound travel may be limited by elastomeric bumpers or hydraulically within the shock absorbers. Suspensions shall incorporate appropriate devices for automatic height control so that regardless of load the bus height relative to the centerline of the wheels does not change more than $\pm \frac{1}{2}$ inch at any point.

Vertical damping of the suspension system shall be accomplished by hydraulic shock absorbers mounted to the suspension arms or axles and attached to an appropriate location on the chassis. Damping shall be sufficient to control coach motion to three (3) cycles or less after hitting road perturbations. Shock absorbers shall maintain their effectiveness for at least 50,000 miles of the service life of the bus. Each unit shall be replaceable by a mechanic in less than fifteen (15) minutes.

The shock absorber bushing shall be made of elastomeric material that will last the life of the shock absorber.

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

A kneeling system shall lower the entrance(s) of the bus a minimum of 2½ inches during loading or unloading operations regardless of load up to GVWR, measured at the longitudinal centerline of the entrance door(s), by the driver using a three position, spring loaded to center switch. Downward direction will lower the bus. Release of switch at anytime will completely stop lowering motion and hold height of the bus at that position. Upward direction of the switch will allow the system to go to floor height without the driver having to hold the switch up.

Brake and Throttle interlock shall prevent movement when the bus is kneeled. The kneeling control shall be disabled when the bus is in motion. The bus shall kneel at a maximum rate of 1¼ inches per second at essentially a constant rate. After kneeling, the bus shall rise within 2 seconds to a height permitting the bus to resume service and shall rise to the correct operating height within 7 seconds regardless of load up to GVWR. During the lowering and raising operation, the maximum acceleration shall not exceed 0.2g and the jerk shall not exceed 0.3g/sec.

An indicator visible to the driver shall be illuminated until the bus is raised to a height adequate for safe street travel. An audible warning alarm will sound simultaneously with the operation of the kneeler to alert passengers and bystanders. A warning light mounted near the curbside of the front door, minimum 3 inches diameter, amber lens shall be provided that will blink when the kneel feature is activated. Kneeling shall not be operational while the wheelchair ramp or lift is deployed or in operation.

WHEELS AND TIRES

Wheels and rims shall be hub-piloted powder coated painted steel and shall resist rim flange wear. All wheels shall be interchangeable and shall be removable without a puller. Wheels shall be compatible with tires in size and load-carrying capacity. Front wheels and tires shall be balanced as an assembly per SAE J1986.

Tires shall be provided by the Contractor installed on each bus suitable for the conditions of transit service and sustained operation at the maximum speed capability of the bus. Load on any tire at GVWR shall not exceed the tire supplier's rating. A spare tire on a rim shall be provided with every bus.

The buses in this procurement shall be equipped with a standard hub odometer mounted at the curbside of the rear axle. The hub odometer shall have a capacity reading no less than 999,999 miles in full mile increments (no tenths of a mile).

STEERING

The steering wheel shall be removable with a standard or universal puller. The steering column shall have full tilt and telescoping capability allowing the operator to easily adjust the location of the steering wheel.

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. With the bus on dry, level, commercial asphalt pavement, and tires inflated to recommended pressure and the front wheels positioned straight ahead, the torque required to turn the steering wheel 10 degrees shall be no less than 5 foot pounds and no more than 10 foot pounds. Steering torque may increase to 70 foot pounds when the wheels are approaching the steering stops, as the relief valve activates. Steering effort shall be measured with the bus at GVWR, stopped with the brakes released and the engine at normal idling speed on clean, dry, level, commercial asphalt pavement and the tires inflated to recommended pressure. Power steering failure shall not result in loss of steering control. With the bus in operation the steering effort shall not exceed 55 pounds at the steering wheel rim and perceived free play in the steering system shall not materially increase as a result of power assist failure. Gearing shall require no more than seven (7) turns of the steering wheel lock-to-lock.

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

The steering wheel diameter shall be no less than 18 inches and no more than 20 inches; the rim diameter shall be 7/8 inches to 1¼ inches and shaped for firm grip with comfort for long periods of time. The steering wheel shall be black in color and a rounded three spoke design.

Steering wheel spokes and wheel thickness should be such as to insure that visibility is within the range of a 95th percentile range as described in SAE 1050a, section 4.2.2 and 4.2.3. Placement of steering column must be as far forward as possible, but either in-line or behind the instrument cluster.

The steering wheel shall have a rearward tilt adjustment range of no less than 40 degrees as measured from the horizontal and upright position.

BRAKES

Service brakes shall be controlled and actuated by a compressed air system. Force to activate the brake pedal control shall be an essentially linear function of the bus deceleration rate and shall not exceed 50 pounds at a point 7 inches above the heel point of the pedal to achieve maximum braking. The heel point is the location of the driver's heel when foot is rested flat on the pedal and the heel is touching the floor or heel pad of the pedal. A microprocessor controlled ABS shall be provided. The microprocessor for the ABS system shall be protected yet in an accessible location to allow for ease of service. The total braking effort shall be distributed between all wheels in such a ratio as to ensure equal friction material wear rate at all wheel locations.

Microprocessor controlled ATC shall be provided. Actuation of ABS and/or ATC shall override the operation of the brake retarder.

The entire service brake system, including friction material, shall have a minimum overhaul or replacement life of 30,000 miles with a brake retarder on the design operating profile. Brakes shall be self-adjusting throughout this period. Visible stroke indicators shall be provided to allow service personnel to easily identify when the brakes are not in correct adjustment. The brake linings shall be made of non-asbestos material. In order to aid maintenance personnel in determining extent of wear, a provision such as a scribe line or chamfer indicating the thickness at which replacement becomes necessary, shall be provided on each brake lining.

Replaceable wheel bearing seals shall run on replaceable wear surfaces or be of an integral wear surface sealed design. Oil lubricated wheel bearings and hub seals shall not leak or weep lubricant for 100,000 miles when running on the design operating profile.

The bus shall be equipped with brake drums or disk brakes. Brake drums shall allow machining to ¼ inch oversize.

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

The parking brake shall be a spring-operated system, actuated by a valve that exhausts compressed air to apply the brakes. The parking brake may be manually enabled when the air pressure is at the operating level per FMVSS 121. An emergency brake release shall be provided to release the brakes in the event of automatic emergency brake application. The parking brake valve button will pop out when air pressure drops below requirements of FMVSS 121. The driver shall be able to manually depress and hold down the emergency brake release valve to release the brakes and maneuver the bus to safety. Once the operator releases the emergency brake release valve, the brakes shall engage to hold the bus in place.

A chock block retainer shall be provided so that it neatly and conveniently stores the standard CTRANSIT chock block on the front of the curb side front wheel well.

COOLING

The radiator, and charge air cooler if integrated, shall be of durable corrosion-resistant construction with bolted-on removable tanks. The radiator shall be designed so a mechanic can gain access to a substantial portion of the side facing the engine for the purpose of cleaning the radiator in five (5) minutes or less.

Radiators with a fin density greater than 12 fins per inch, and louvered/slit designs, are more susceptible to clogging and deteriorating cooling performance over time and shall not be used.

No heat producing components or climate control system components shall be mounted between the engine cooling air intake aperture and the radiator. The radiator and charge air cooler shall be designed to withstand thermal fatigue and vibration associated with the installed configuration.

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

The cooling fan shall be temperature controlled, allowing the engine to reach operating temperature quickly. The temperature-controlled fan shall not be driven when the coolant temperature falls below the minimum level recommended by the engine manufacturer.

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

Radiator piping shall be stainless steel or brass tubing and, if practicable, hoses shall be eliminated. Necessary hoses shall be premium, silicone rubber type that is impervious to all bus fluids. All hoses shall be as short as practicable. All hoses shall be secured with premium, stainless steel clamps that

provide a complete 360 degree seal. The clamps shall maintain a constant tension at all times, expanding and contracting with the hose in response to temperature changes and aging of the hose material.

PNEUMATIC SYSTEMS

The bus air system shall operate the air-powered accessories and the braking system with reserve capacity. New buses shall not leak down more than 5 psi as indicated on the instrument panel mounted air gauges, within fifteen (15) minutes from the point of governor cut-off.

Provision shall be made to apply shop air to the bus air systems using a standard tire inflation type valve. Lincoln Air Quick Disconnect #11659 or equal quick disconnect fittings shall be easily accessible and located in the engine compartment and near the front bumper area for towing. Retained caps shall be installed to protect fitting against dirt and moisture when not in use. Air for the compressor shall be filtered through the main engine air cleaner system. The air system shall be protected by a pressure relief valve set at 150 psi and shall be equipped with check valve and pressure protection valves to assure partial operation in case of line failures.

The engine-driven air compressor shall be sized to charge the air system from 40 psi to the governor cutoff pressure in less than three (3) minutes while not exceeding the fast idle speed setting of the engine.

Air lines, except necessary flexible lines, shall conform to the installation and material requirements of SAE Standard J1149 for copper tubing with standard, brass, flared or ball sleeve fittings, or SAE Standard J844 for nylon tubing if not subject to temperatures over 200° F. Nylon tubing shall be installed in accordance with the following color-coding standards:

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

Line supports shall prevent movement, flexing, tension strain, and vibration. Copper lines shall be supported to prevent the lines from touching one another or any component of the bus. To the extent practicable and before installation, the lines shall be pre-bent on a fixture that prevents tube flattening or excessive local strain. Copper lines shall be bent only once at any point, including pre-bending and installation. Rigid lines shall be supported at no more than 5 foot intervals. Nylon lines may be grouped and shall be supported at 2 foot intervals or less.

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

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

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

shall be sloped toward the drain valve. All air reservoirs shall have brass drain valves which discharge below floor level with lines routed to eliminate the possibility of water traps and/or freezing in the drain line.

An air dryer shall prevent accumulation of moisture and oil in the air system. The air dryer system shall include a replaceable desiccant bed, electrically heated drain, and activation device. A mechanic shall be able to replace the desiccant in less than fifteen (15) minutes. An oil separator shall be provided between the compressor and dryer.

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

Charge air piping shall be constructed of stainless steel, aluminized steel or anodized aluminum, except between the air filter and turbocharger inlet where piping may be constructed of fiberglass. Connections between all charge air piping sections shall be sealed with a short section of reinforced hose and secured with stainless steel, constant tension clamps that provide a complete 360 degree seal.

HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

The HVAC unit shall be a Thermo King T-Series or equal incorporating a bus rear-mount with a screw type compressor design.

With the bus running at the design operating profile with corresponding door opening cycle, and carrying a number of passengers equal to 150 percent of the seated load, the HVAC system shall maintain an average passenger compartment temperature within a range between 65°F and 80°F, while controlling the relative humidity to a value of 50 percent or less. The system shall maintain these conditions while subjected to any outside ambient temperatures within a range of 10°F to 95°F and at any ambient relative humidity levels between 5 and 50 percent.

When the bus is operated in outside ambient temperatures of 95°F to 115°F, the interior temperature of the bus shall be permitted to rise one degree for each degree of exterior temperature in excess of 95°F. When bus is operated in outside ambient temperatures in the range of -10°F to +10°F, the interior temperature of the bus shall not fall below 55°F while bus is running on the Design Operating Profile.

The air conditioning portion of the HVAC system shall be capable of reducing the passenger compartment temperature from 110°F to 90°F in less than twenty (20) minutes after engine start-up. Engine temperature shall be within the normal operating range at the time of start-up of the cool-down test and the engine speed shall be limited to fast idle that may be activated by an operator-controlled device. During the cool-down period the refrigerant pressure shall not exceed safe high-side pressures and the condenser discharge air temperature, measured 6 inches from the surface of the coil, shall be less than 45°F above the condenser inlet air temperature. The appropriate solar load as recommended in the APTA "Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System," representing 4 P.M. on August 21, shall be used. There shall be no passengers on board, and the doors and windows shall be closed.

The air conditioning system shall meet performance requirements using: HFC R134a. The climate control blower motors and fan shall be designed such that their operation complies with the interior noise level requirements as specified.

The HVAC system excluding the operator's heater/defroster shall be centrally controlled with an advanced electronic/diagnostic control system with provisions for extracting/reading data.

After manual selection and/or activation of climate control system operation mode, all interior climate control system requirements for the selected mode shall be attained automatically to within $\pm 2^\circ$ F of specified temperature control set-point.

The climate control system shall have the provision to allow operator to adjust the temperature control set-point at a minimum of between 68°F and 72°F . From then on, all interior climate control system requirements shall be attained automatically, unless re-adjusted by operator.

The operator shall have full control over the defroster and operator's heater. The operator shall be able to adjust the temperature in the operator's area through air distribution and fans. The interior climate control system shall switch automatically to the ventilating mode if the refrigerant compressor or condenser fan fails.

Interior temperature distribution shall be uniform to the extent practicable to prevent hot and/or cold spots. After stabilization with doors closed, the temperatures between any two points in the passenger compartment in the same vertical plane, and 6 inches to 72 inches above the floor, shall not vary by more than 5°F with doors closed. The interior temperatures, measured at the same height above the floor, shall not vary more than $\pm 5^\circ\text{F}$, from the front to the rear, from the average temperature determined in accordance to APTA Recommended Instrumentation and Performance Testing for Transit Bus Air Conditioning System. Variations of greater than $\pm 5^\circ\text{F}$ will be allowed for limited, localized areas provided the majority of the measured temperatures fall within the specified requirement.

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

Airflow may be reduced to 15 cfm per passenger (150 percent of seated load) when operating in the heating mode. The fans shall not activate until the heating element has warmed sufficiently to assure at least 70°F air outlet temperature. The heating air outlet temperature shall not exceed 120°F under any normal operating conditions.

The bus interior climate control system shall deliver at least 100 cfm of air to the operator's area when operating in the ventilating and cooling modes. Adjustable nozzles shall permit variable distribution or shutdown of the airflow. Airflow in the heating mode shall be reduced proportionally to the reduction of airflow into the passenger area. The windshield defroster unit shall meet the requirements of SAE Recommended Practice J382, Windshield Defrosting Systems Performance Requirements, and shall have the capability of diverting heated air to the operator's feet and legs. The defroster or interior climate control system shall maintain visibility through the operator's side window.

The controls for the operator's compartment for heating, ventilation, and cooling systems shall be integrated and shall meet the following requirements. The heat/defrost system fan shall be controlled by a separate switch that has an "Off" position and at least two positions for speed control. All switches and controls shall preclude the possibility of clothing becoming entangled.

A manually operated control valve shall control the coolant flow through the heater core. If a cable operated manual control valve is used, the cable length shall be kept to a minimum to reduce cable seizing. Heater water control valves shall be "positive" type, closed or open.

A separate heating, ventilation, and defroster system for the operator's area shall be provided and shall be controlled by the operator. The system shall meet the following requirements:

The heater and defroster system shall provide heating for the operator and heated air to completely defrost and defog the windshield, operator's side window, and the front door glasses in all operating conditions. Fan(s) shall be able to draw air from the bus body interior and/or the exterior through a control device and pass it through the heater core to the defroster system and over the operator's feet. A minimum capacity of 100 cfm shall be provided. The operator shall have complete control of the heat and fresh airflow for their area.

The defroster supply outlets shall be located at the lower edge of the windshield. These outlets shall be unbreakable and shall be free of sharp edges that can catch clothes during normal daily cleaning.

The system shall be such that foreign objects such as coins or tickets cannot fall into the defroster air outlets. Adjustable ball vents shall be provided at the left of the operator's position to allow direction of air onto the side windows. Two (2) additional ball vents shall be located on the vertical front dash panel adjacent to the front door to allow direction of air onto the door windows and/or entrance area

A ventilation system shall be provided to ensure operator comfort and shall be capable of providing fresh air in both the foot and head areas. Vents shall be controllable by the operator from the normal driving position. Decals shall be provided indicating "operating instructions" and "open" and "closed" positions as well. When closed, vents shall be sealed to prevent the migration of water or air into the bus.

Air shall be filtered before discharge into the passenger compartment. The filter shall meet the ANSI/ASHRAE 52.1 requirement for 5 percent or better atmospheric dust spot efficiency, 50 percent weight arrestance, and a minimum dust holding capacity of 120 gram per 1,000 cfm cell. More efficient air filtration may be provided to maintain efficient heater and/or evaporator operation. Air filters shall be easily removable for service. Air filters shall be of the disposable type.

Two roof ventilators shall be provided in the roof of the bus, one approximately over or just forward of the front axle and the other, approximately over the rear axle. A third roof ventilator is required for the 60' articulated bus. A single roof ventilator is required for the 30' bus.

Each ventilator shall be motorized to open and close remotely via a push-button driver control switch. Each ventilator shall operate independently of the other. Selecting the "open" switch fully opens the ventilator to provide maximum airflow to the bus interior. Selecting the "close" switch position fully closes and automatically locks the ventilator hatch. The ventilators shall meet FMVSS217 requirements for non-school bus applications. When open with the bus in motion, the ventilators shall provide fresh air inside the bus. Each ventilator shall cover an opening area no less than 425 square inches and shall be capable of being positioned as a scoop with either the leading or trailing edge open no less than 4 inches, or with all four (4) edges raised simultaneously to a height of no less than 3½ inches. An escape hatch shall be incorporated into the roof ventilator. Roof ventilator(s) shall be sealed to prevent entry of water when closed.

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

Heat shall be supplied to the entrance and exit areas to prevent accumulation of snow, ice, or slush with bus operating under design operating profile and corresponding door opening cycle.

Sufficient floor level heaters shall be provided that evenly supply heated forced air through floor ducts across the length of bus. Floor ducts may be discontinued at the upper level but additional provisions to prevent cold floor and ensure temperature uniformity shall be included. Control of the floor level heating shall be through the main heating system electronic control.

INTERIOR LIGHTING

The passenger interior lighting system shall be DINEX LED lighting system or equal. The interior lighting system shall provide a minimum 15 foot-candle illumination on a 1 square foot plane at an angle of 45 degree from horizontal, center 33 inches above the floor and 24 inches in front of the seat back at each seat position. Allowable average light level for the rear bench seats shall be 7 foot-candles. Floor surface in the aisles shall be a minimum of 10 foot-candles, vestibule area a minimum of 4 foot-candles with the front doors open and minimum of 2 foot-candles with the front doors closed. The front entrance area and curb lights shall illuminate when the front door is open and master run switch is in the "Lights" positions. Rear exit area and curb lights shall illuminate when rear door is unlocked.

If applicable to the bus design, step lighting for the intermediate platform between lower and upper floor levels shall be provided and shall illuminate in all engine run positions. The step lighting shall be low-profile to minimize tripping and snagging hazard for passengers and shall be shielded as necessary to protect passengers' eyes from glare.

The light source shall be located to minimize windshield glare with distribution of the light focused primarily on the passengers' reading plane while casting sufficient light onto the advertising display. High power solid state LED strip shall be in 1 foot section increment with high power LED manufactured by either Nichia or Philips or equal with expectation to maintain on average 60-70 percent of original brightness after 60,000 hours of operation. The brightness of each individual light fixture shall be software programmable to minimize glare. Photo sensor detects and adjusts light level automatically relative to ambient light for passenger comfort.

Lens material shall be clear polycarbonate. Lens shall be designed to effectively "mask" all individual LED's to make them invisible and there shall be no "hot spot" or "dark spot". Lens shall be sealed to inhibit incursion of dust and insects yet are easily removable for service. If threaded fasteners are used they must be held captive in the lens. Access panels shall be provided to allow servicing of components located behind light panels.

Individual driver module shall be provided for each light fixture. Driver module shall have built-in self protection of thermal shut-down and restart, PWM output to regulate light level, reverse polarity protect and rebuildable.

When the master switch is in the RUN or NITE/RUN mode, the first light module on each side of the coach shall slowly fade to darkness when the front door is in the closed position and light output shall gradually illuminate to reach maximum light level when the door is opened. Solid state LED lighting shall have unlimited on-off cycles.

Failure of any light fixture or driver module shall be broadcasted via telltale light panel or dashboard display. The system will look for supply current and lighting fixture temperature to be approximately the same for all of the driver modules, and will show which module(s) seem to have a problem.

The light system may be designed to form part of the entire air distribution duct.

Emergency backup system shall keep the light fixtures over the front and rear doors illuminated at minimum light output under a separated battery power for ten (10) to fifteen (15) minutes allowing passengers visibility and timely evacuation from the vehicle during emergency conditions.

A light fixture shall be mounted in the ceiling above the farebox location. The fixture shall be capable of projecting a concentrated beam of light on the farebox. This light will automatically come on whenever the front doors are opened and the run switch is in the "night run" or "night park" position.

DOORS

A single front doorway shall be provided for the 45' bus. Three (3) doorways shall be provided for the 60' articulated bus. Two (2) doorways shall be provided for the other low floor buses in the curbside of the bus for passenger ingress and egress. The front doorway shall be forward of the front wheels and located so that the operator will be able to collect or monitor the collection of fares. Passenger doors and doorways shall comply with ADA requirements.

The rear doorway centerline shall be rearward of the point midway between the front door centerline and the rearmost seat back.

The door style for the low floor buses shall be slide glide. The door for the 45' commuter bus shall be a plug style.

Structure of the doors, their attachments, inside and outside trim panels, and any mechanism exposed to the elements shall be corrosion-resistant. Door panel construction shall be of corrosion-resistant metal or reinforced non-metallic composite materials. The doors, when fully opened, shall provide a firm support and shall not be damaged if used as an assist by passengers during ingress or egress. The front leaves of the passenger doors shall overlap the rear leaves.

The front door clear width shall be no less than 31.75 inches with the doors fully opened. The rear door clear width shall be no less than 24 inches with the doors fully opened. When open, the doors shall leave an opening no less than 76 inches in height.

Both front and rear low floor bus doors shall be a "Full Glass" glazing design to provide passengers and vehicle operators an unobstructed view. The doors shall be Vapor Bus International Ameriview or equal. The doors shall be tamper resistant but parts shall be designed for quick and easy replacement by a trained mechanic.

The front door panel glazing material shall have a nominal ¼ inch thick laminated safety glass conforming with the requirements of ANSI Z26.1 Test Grouping 2 and the Recommended Practices defined in SAE J673. Glazing material in the rear doorway door panels shall be the same material, thickness and color as the side windows.

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

Closing door edge speed shall not exceed 19 inches per second. Power close rear doors shall be equipped with a sensitive edge or other obstruction sensing system such that if an obstruction is struck by a closing door edge, the doors will stop and/or reverse direction prior to imparting a 10 pound force on 1 square inch of that obstruction. Doors closed by return spring or counterweight-type device need not be equipped with an obstruction sensing device but shall be capable of being pushed to the point where the door starts to open with a force not to exceed 20 pounds applied to the center edge of the forward door panel. Whether or not the obstruction sensing system is present or functional it shall be possible to withdraw a 1½ inch diameter cylinder from between the center edges of a closed and locked door with an outward force not greater than 35 pounds.

Door actuators shall be adjustable so that the door opening and closing speeds can be independently adjustable. Actuators and the complex door mechanism shall be concealed from passengers but shall be easily accessible for servicing. The door actuators shall be rebuildable. If powered by compressed air, exhaust from the door system shall be routed below the floor of the bus to prevent accumulation of any oil that may be present in air system and to muffle sound.

In the event of an emergency, it shall be possible to open the doors manually from inside the bus using a force of no more than 25 pounds after actuating an unlocking device at each door. The unlocking devices shall be clearly marked as an emergency-only device and shall require two (2) distinct actions to actuate. The respective door emergency unlocking device shall be accessible from the entrance and exit areas. When the rear door emergency device is actuated, the door interlock throttle system shall return the engine to idle and the door interlock brake system shall apply to stop the bus. When the front door emergency device is actuated, only the door interlock throttle system shall be actuated. Locked doors shall require a force of more than 100 pounds to open manually. When the locked doors are manually forced to open, damage shall be limited to the bending of minor door linkage with no resulting damage to the doors, engines, and complex mechanism.

Access doors for the door actuator compartments shall be secured with hand screws or latches, and shall prevent entry of mechanism lubricant into the bus interior. All fasteners that retain access panels shall be captive in the cover.

FARE COLLECTION

Space, as far forward as practicable and structural provisions, shall be made for installation of a GFI Genfare farebox & TRiM unit. Location of the fare collection device shall not restrict traffic in the vestibule, including wheelchairs if a front door loading device is used, and shall allow the operator to easily reach the farebox controls and to view the fare register. The fare box shall not restrict access to the operator area, shall not restrict operation of operator controls and shall not, either by itself or in combination with stanchions, transfer mounting, cutting, and punching equipment and route destination signs, restrict operator's field of view per SAE Recommended Practice J1050. Location and mounting of the fare collection device shall allow use, without restriction, by passengers. Fare box location shall permit accessibility to the vault for easy manual removal or attachment of suction devices. Meters and counters on the fare box shall be readable on a daily basis. The floor under the fare box shall be reinforced, as necessary, to provide a sturdy mounting platform and to prevent shaking of the fare box.

Each transit system in this procurement will supply and install their own fare box and transfer/ticket issuing equipment when the bus is delivered in Connecticut. All the transit systems in this procurement utilize GFI Genfare electronic fareboxes equipped with TRiM units. The bus manufacturer is required to provide enough space for this equipment installation and meet all ADA requirements and Driver access to the Bus Operator Work Station. A stanchion around the farebox/TRiM equipment is not required.

A 15 amp minimum protected circuit shall be available to power the fare box. This power service shall include a grounded lead with both wires enclosed in a flexible conduit. The farebox and transfer issuing equipment will be provided and installed by each transit system after the bus is delivered to Connecticut.

WINDOWS

The windshield shall permit an operator's field of view as referenced in SAE Recommended Practice J1050. The vertically upward view shall be a minimum of 15 degrees, measured above the horizontal and excluding any shaded band. The vertically downward view shall permit detection of an object 3½ feet high no more than 2 feet in front of the bus. The horizontal view shall be a minimum of 90 degrees above the line of sight. Any binocular obscuration due to a center divider may be ignored when determining the 90 degree requirement, provided that the divider does not exceed a 3 degree angle in the operator's field of view. Windshield pillars shall not exceed 10 degrees of binocular obscuration. The windshield shall be designed and installed to minimize external glare as well as reflections from inside the bus.

The windshield shall be easily replaceable by removing zip-locks from the windshield retaining moldings. Bonded-in-place windshield shall not be used. The windshield glazing material shall have a ¼ inch nominal thickness laminated safety glass conforming to the requirements of ANSI Z26.1 Test Grouping 1A and the Recommended Practices defined in SAE J673. The glazing material shall have

single density tint. The upper portion of the windshield above the operator's field of view shall have a dark, shaded band with a minimum luminous transmittance of 6 percent when tested in accordance to ASTM D-1003.

The operator's side window shall be the sliding type, requiring only the rear half of sash to latch upon closing and shall open sufficiently to permit the seated operator to easily adjust the street side outside rearview mirror. When in an open position, the window shall not rattle or close during braking. The entire assembly shall be hinged and have a single release for emergency egress. This window section shall slide in tracks or channels designed to last the service life of the bus. The operator's side window shall not be bonded in place and shall be easily replaceable. The glazing material shall have a single density tint.

Design must prevent sections from freezing closed in the winter. Light transmittance shall be 75 percent on the glass area below 53 inches from the operator platform floor.

The operator's view, perpendicular through operator's side window glazing, should extend a minimum of 33 inches to the rear of the Heel Point on the accelerator, and in any case must accommodate a 95th percentile male operator. The view through the glazing at the front of the assembly should begin not more than 26 inches above the operator's floor to ensure visibility of an under-mounted convex mirror. Operator's window construction shall maximize ability for full opening of the window.

The operator's side window glazing material shall have a ¼ inch nominal thickness laminated safety glass conforming with the requirements of ANSI Z26.1 Test Grouping 2 and the Recommended Practices defined in SAE J673.

All side windows, except windows in passenger doors and those smaller than 500 square inches, shall have window panels that are openable by passengers. Openable window panels shall be equipped with latches that secure the window in the fully open and fully closed positions.

Each openable side window shall incorporate an upper transom portion. The transom shall be between 25 and 35 percent of the total window area. The lower portion of the window shall be fixed. The transom portion shall be hinged along the lower edge and open inward.

All side windows shall be easily replaceable without disturbing adjacent windows and shall be mounted so that flexing or vibration from engine operation or normal road excitation is not apparent.

The windows shall be designed and constructed to enable a mechanic to remove and replace two (2) windows in less than ten (10) minutes.

Emergency exit and window operation instructions must be a metal plate and a fixed to the bus sidewall. The instruction must be in both English and Spanish and be mounted within 6 inches of the emergency handle.

Side windows glazing material shall have ¼ inch nominal thickness laminated safety glass. The material shall conform to applicable requirements of ANSI Z26.1 and the Recommended Practices defined in SAE J673.

Windows on the bus sides and in the rear door shall be tinted gray in color, complementary to the bus exterior with a 76 percent light transmission. Windows over the destination signs shall not be tinted. The side window sash frames including the Driver's window frame will be made of black anodized aluminum.

MIRRORS

The bus shall be equipped with 8" x 15" 2/1 split view or equal corrosion-resistant, outside rearview mirror on each side of the bus. The upper part of the mirror is flat and the lower portion is convex. Mirrors shall permit the operator to view the roadway along both sides of the bus, including the rear

wheels. The curbside rearview mirror shall be mounted so that its lower edge is no less than 80 inches above the street surface.

The bus shall be equipped with two (2) outside mirrors of unit magnification (flat), each with not less than 50 square inches of reflective surface. The mirrors shall be corrosion-resistant and be installed with stable supports on each side of the bus. The mirrors shall be located so as to provide the operator a view to the rear along both sides of the bus and shall be adjustable both in the horizontal and vertical directions to view the rearward scene. The curbside rearview mirror shall be mounted so that its lower edge is no less than 80 inches above the street surface and equipped with a permanent high quality weather resistant orange reflective decal. The roadside rearview mirror shall be mounted lower on the bus body so that the operator's line of sight is not obstructed.

The operator shall be able to adjust the curbside mirror remotely while seated in the driving position. The control for remote positioning of the mirror shall be a single switch or device.

All exterior mirrors shall be electrically heated. The heaters shall be energized whenever the operator's heater and/or defroster is activated.

Mirrors shall be firmly attached to the bus to minimize vibration and prevent loss of adjustment, but not so firmly attached that the bus or its structure is damaged when the mirror is struck in an accident. Mirrors shall retract or fold sufficiently to allow bus washing operations.

Interior mirrors shall be provided for the operator to observe passengers throughout the bus without leaving his/her seat and without shoulder movement. The operator shall be able to observe passengers in the front/entrance and rear/exit areas, anywhere in the aisle, and in the rear seats.

SEATS

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

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

The passenger seating arrangement in the bus shall be such that seating capacity is maximized and in compliance to the following requirements. ConnDOT recognizes that ramp or lift location, foot room, hip-to-knee room, doorway type and width, seat construction, floor level type, seat spacing requirements, etc. ultimately affect seating capacity and layout.

Passenger seats shall be arranged in a transverse, forward facing configuration, except at the wheel housings where aisle-facing seats may be arranged as appropriate with due regard for passenger access and comfort. Other areas where aisle-facing seats may be provided are at wheelchair securement areas and platforms (such as for fuel tank storage space).

Passenger seating capacity with this arrangement shall be no less than fifty-seven (57) for a 60' or 45' bus, thirty-eight (38) for a 40' bus, thirty (30) for a 35' bus and twenty-five (25) in a 30' bus, not including the operator with an emphasis on flexibility in design to maximize seating capacity, with the specified seating arrangement. Rearward facing seats are discouraged.

The passenger seats in the 45' bus shall be the high back fully cushioned American Seating model 2095 or equal. The seats in the front of the low floor buses shall be American Seating model 6466 or equal and those in the rear (aft of the rear/exit door) shall be American Seating model 6468 or equal. Seat mounted grab rails shall be black thermoplastic.

The 6466 model passenger seats shall be fully cushioned 2 inch thick and the 6468 model seats shall be equipped with vandal-resistant ¾ inch extra padded inserts. Note that all applicable seat dimensions specified below shall be measured with pad fully depressed. The padded seat inserts shall be affixed to the seat body with industrial heavy duty Velcro. A provision, such as a small grommited hole, to allow drainage, shall be incorporated into seat insert.

Hip-to-knee room measured from the front of one seat back horizontally across the highest part of the seat to the seat or panel immediately in front, shall be no less than 28 inches. At all seating positions in paired transverse seats immediately behind other seating positions hip-to-knee room shall be no less than 28 inches.

In order to maximize seating capacity without unduly affecting passenger comfort, minor variations in the required hip-to-knee room will be allowed in limited areas. All such areas shall be identified to ConnDOT prior to bid for approval.

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

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

The aisle between the seats shall be no less than 20 inches wide at seated passenger hip height. Seat backs shall be shaped to increase this dimension to no less than 24 inches at standing passenger hip height.

All proposers shall submit a copy of their proposed seat layout consistent with these specifications showing hip-to-knee and foot room dimensions, stanchion layout and wheelchair maneuverability layout with your proposal.

Armrests shall be padded with material that is the same as, or similar to, the seat back padding and handhold. Seats, back cushions and other pads shall be securely attached and shall be detachable by means of a simple release mechanism employing a special tool so that they are easily removable by maintenance personnel but not by passengers. To the extent practicable, seat cushions and pads shall be interchangeable throughout the bus. Materials shall have high resistance to tearing, flexing, and wetting. The seat fabric shall be Holdsworth 5621/6094/3267 or equal.

PASSENGER ASSISTS

Passenger assists in the form of full grip, vertical stanchions or handholds shall be provided for the safety of standees and for ingress/egress. Passenger assists shall be convenient in location, shape, and size for both the 95th percentile male and the 5th percentile female standee. Starting from the entrance door and moving anywhere in the bus and out the exit door, a vertical assist shall be provided either as the vertical portion of seat back assist and as a separate item so that a 5th percentile female passenger may easily move from one assist to another using one hand and the other without losing support. All handholds and stanchions at front doorway, around farebox, and at interior steps for bi-level designs shall be powder-coated in high contrast yellow color. The forward-most vertical stanchions on either side of the aisle immediately behind the operator's area shall be powder-coated yellow.

Excluding those mounted on the seats and doors, the assists shall have a cross-sectional diameter between 1¼ and 1½ inches or shall provide an equivalent gripping surface with no corner radii less than ¼ inch. All passenger assists shall permit a full hand grip with no less than 1½ inches of knuckle